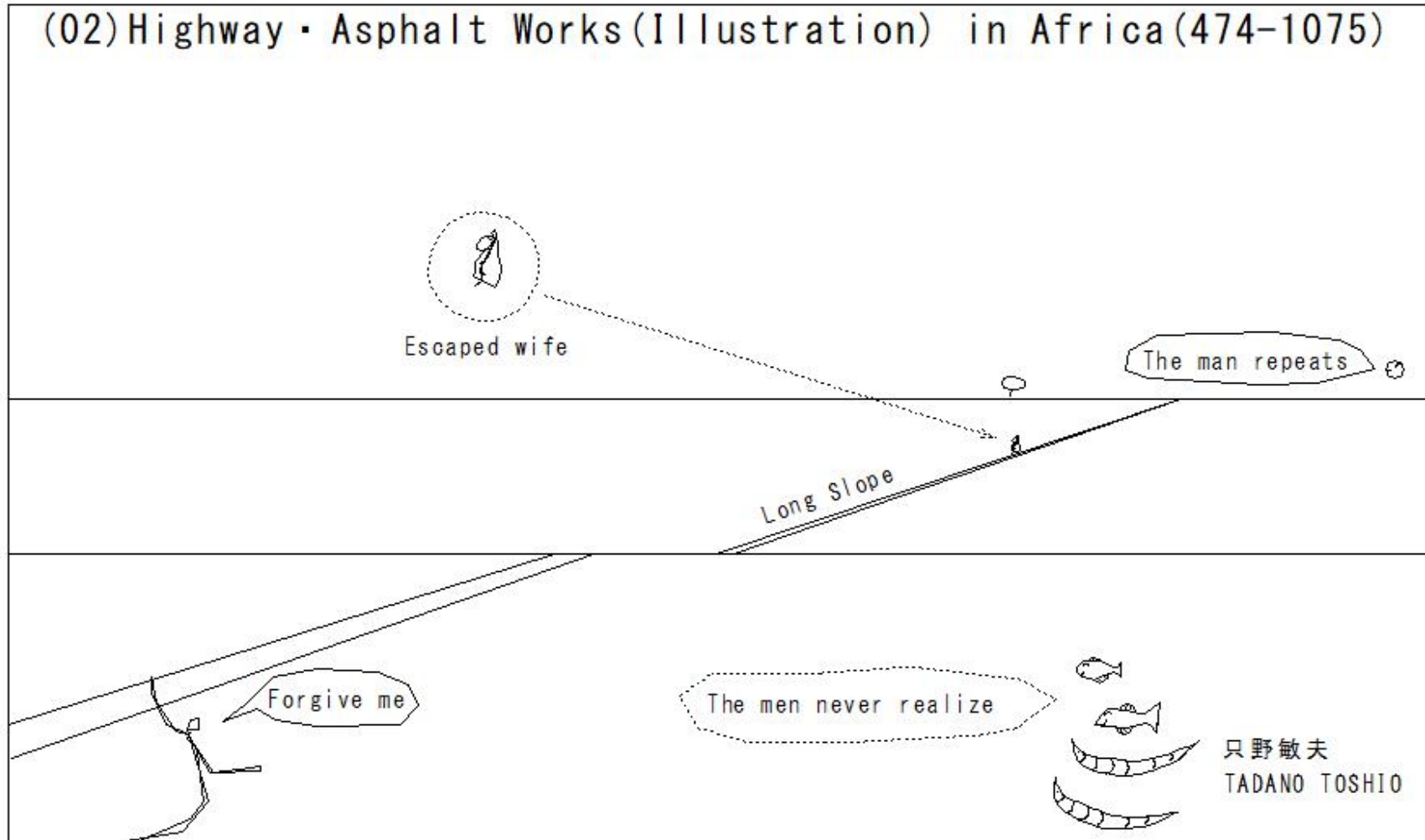


(02)Highway · Asphalt Works(Illustration) in Africa(474-1075)



Reference

- | | | |
|---|--|--|
| 1 土木工学ハンドブック
Civil Engineering Handbook | 土木学会編
Edited by Japan Society of Civil Engineers | 技報堂
GIHODO SHUPPAN Co., Ltd. |
| 2 農業土木ハンドブック
Agricultural civil engineering handbook | 農業土木学会編
Japan Society of Agricultural Civil Engineers | 丸善株式会社
Maruzen Co., Ltd. |
| 3 林業土木ハンドブック
Forestry Civil Engineering Handbook | | 千代田出版
Chiyoda Publishing Co., Ltd. |
| 4 道路構造冷の解説と運用
Explanation and operation of road structure | (2003) | 社団法人 日本道路協会
Japan Road Association |
| 5 応用地質用語集
Glossary of applied geological terms | | 東洋書店
Toyo Shoten Co., Ltd. |
| 6 実用英和対訳 土木用語辞典
Practical English-Japanese translation Dictionary of civil engineering terms | | 工学出版株式会社
Engineering Publishing Co., Ltd. |
| 7 農業土木用語集
Glossary of agricultural civil engineering terms | | 東洋書店
Toyo Shoten Co., Ltd. |
| 8 土木施工用語集
Glossary of civil engineering construction terms | | 東洋書店
Toyo Shoten Co., Ltd. |
| 9 土木コンクリート用語集
Glossary of civil engineering and concrete terms | | 東洋書店
Toyo Book Book Store |
| 10 土木用語辞典
Dictionary of civil engineering terms | 東京工学会編
Edited by Tokyo Engineering Study Group | 工学出版株式会社
Engineering Publishing Co., Ltd. |
| 11 アスファルト混合物の知識 (図解土木講座)
Knowledge of asphalt mixture (illustrated civil engineering course) | | 技報堂
GIHODO SHUPPAN Co., Ltd. |
| 12 日本道路協会: アスファルト舗装要綱
Japan Road Association: Asphalt pavement guidelines | | 社団法人 日本道路協会
Japan Road Association |
| 13 図解 土質・基礎用語集
Illustrated Glossary of Soil Characteristics and Basic Terms | | 東洋書店
Toyo Shoten Co., Ltd. |
| 14 図解テキスト 土木一般 (1-5)
Illustrated Text General civil engineering(1-5) | | 市ヶ谷出版社
ICHIGAYA Publishing Co., Ltd |

只野敏夫
Tadano Toshio

(H474)Road Structure Act	Road Structure Act
(H475)Road Structure Act(Road classification)	(Road classification)
(H476)Road Structure Act(Road classification)	(Road classification)
(H477)Road Structure Act(Road classification)	(Road classification)
(H478)Road Structure Act(Road classification)	(Road classification)
(H479)Road Structure Act(Design vehicle)	(Design vehicle)
(H480)Road Structure Act(Design vehicle)	(Design vehicle)
(H481)Road Structure Act(Design vehicle)	(Design vehicle)
(H482)Road Structure Act(Road Classification)	(Road Classification)
(H483)Road Structure Act(Road Classification)	(Road Classification)
(H484)Road Structure Act(Road Classification)	(Road Classification)
(H485)Road Structure Act(Lane width)	(Lane width)
(H486)Road Structure Act(Lane separation)	(Lane separation)
(H487)Road Structure Act(Width of side strip in center strip)	(Width of side strip)
(H488)Road Structure Act(Width of shoulder on the left side of the road)	(Width of side strip)
(H489)Road Structure Act(Width of shoulder on the right side of the road)	(Width of side strip)
(H490)Road Structure Act(Width of the side strip on the road shoulder)	(Width of side strip)
(H491)Road Structure Act(Width of bicycle and pedestrian path)	(Width of bicycle)
(H492)Road Structure Act(Sidewalk width)	(Sidewalk width)
(H493)Road Structure Act(Construction Limit:Construction Gauge)	(Construction Gauge)
(H494)Road Structure Act(Construction Limit:Construction Gauge)	(Construction Gauge)
(H495)Road Structure Act(Construction Limit:Construction Gauge)	(Construction Gauge)
(H496)Road Structure Act(Construction Limit:Construction Gauge)	(Construction Gauge)
(H497)Road Structure Act(Construction Limit:Construction Gauge)	(Construction Gauge)
(H498)Road Structure Act(Construction Limit:Construction Gauge)	(Construction Gauge)
(H499)Road Structure Act(Construction Limit:Construction Gauge)	(Construction Gauge)
(H500)Road Structure Act(Design speed (unit: kilometers per hour))	(Design speed)
(H501)Road Structure Act(Curve radius)	(Curve radius)
(H502)Road Structure Act(Side slope of curved sections)	(Side slope of curved sections)
(H503)Road Structure Act(transition section)	(transition section)
(H504)Road Structure Act(Sight distance)	(Sight distance)
(H505)Road Structure Act(Longitudinal gradient)	(Longitudinal gradient)
(H506)Road Structure Act(Vertical curve radius)	(Vertical curve radius)
(H507)Road Structure Act(Length of vertical curve)	(Length of vertical curve)
(H508)Road Structure Act(Cross slope)	(Cross slope)

(H509)Road Structure Act(Composite gradient)	(Composite gradient)
(H510)Road Structure Act(Level crossing with railways, etc)	(Level crossing with railways)
(H511)Road Structure Act(Bicycle-only road or bicycle-pedestrian-only road)	(Bicycle-only road)
(H512)Road Structure Act(Pedestrian-only road)	(Pedestrian-only road)
(H513)Road Structure Act(Central strip)	(Central strip)
(H514)Road Structure Act(Sight distance)	(Sight distance)
(H515)Road Structure Act(Additional lanes)	(Additional lanes)
(H516)Road Structure Act(Setback: Nose offset)	(Setback: Nose offset)
(H517)Road Structure Act(Design vehicle)	(Design vehicle)
(H518)Road Structure Act(Design vehicle)	(Design vehicle)
(H519)Road Structure Act(Design vehicle)	(Design vehicle)
(H520)Road Structure Act(Design vehicle)	(Design vehicle)
(H521)Road Structure Act(Design vehicle)	(Design vehicle)
(H522)Road Structure Act(Design vehicle)	(Design vehicle)
(H523)Road Structure Act(Vehicle limits in other countries)	(Vehicle limits)
(H524)Road Structure Act(Shape of container)	(Shape of container)
(H525)Road Structure Act(Bicycles and pedestrians)	(Bicycles and pedestrians)
(H526)Road Structure Act(Bicycles and pedestrians)	(Bicycles and pedestrians)
(H527)Road Structure Act(Bicycles and pedestrians)	(Bicycles and pedestrians)
(H528)Road Structure Act(Bicycles and pedestrians)	(Bicycles and pedestrians)
(H529)Road Structure Act(Basic concepts of road planning)	(Basic concepts of road planning)
(H530)Road Structure Act(Procedure for estimating planned traffic volume)	(Procedure for estimating planned traffic volume)
(H531)Road Structure Act(Procedure for estimating planned traffic volume)	(Procedure for estimating planned traffic volume)
(H532)Road Structure Act(Procedure for estimating planned traffic volume)	(Procedure for estimating planned traffic volume)
(H533)Road Structure Act(Procedure for estimating planned traffic volume)	(Procedure for estimating planned traffic volume)
(H534)Road Structure Act(Procedure for estimating planned traffic volume)	(Procedure for estimating planned traffic volume)
(H535)Road Structure Act(Zone level and target road network)	(Zone level and target road network)
(H536)Road Structure Act(Large vehicle traffic volume)	(Large vehicle traffic volume)
(H537)Road Structure Act(Large vehicle traffic volume)	(Large vehicle traffic volume)
(H538)Road Structure Act(Road classification)	(Road classification)
(H539)Road Structure Act(Road classification-Type 1 road)	(Road classification-Type 1 road)
(H540)Road Structure Act(Road classification-Type 2 road)	(Road classification-Type 2 road)
(H541)Road Structure Act(Road classification-Type 3 road)	(Road classification-Type 3 road)
(H542)Road Structure Act(Road classification-Type 4 road)	(Road classification-Type 4 road)

(H543)Road Structure Act(Road classification-Road classification system)	(Road classification-Road classification system)
(H544)Road Structure Act(Road classification-Road classification system)	(Road classification-Road classification system)
(H545)Road Structure Act(Design speed)	(Design speed)
(H546)Road Structure Act(Length of design section)	(Length of design section)
(H547)Road Structure Act(Connection of different design sections)	(Connection of different design sections)
(H548)Road Structure Act(Connecting different design sections by class)	(Connecting different design sections by class)
(H549)Road Structure Act(Types of access restrictions)	(Types of access restrictions)
(H550)Road Structure Act(Types of access restrictions)	(Types of access restrictions)
(H551)Road Structure Act(Types of access restrictions)	(Types of access restrictions)
(H552)Road Structure Act(Types of access restrictions)	(Types of access restrictions)
(H553)Road Structure Act(Types of access restrictions)	(Types of access restrictions)
(H554)Road Structure Act(Components of cross section and combinations)	(Components of cross section and combinations)
(H555)Road Structure Act(Components of cross section and combinations)	(Components of cross section and combinations)
(H556)Road Structure Act(Roads and lanes)	(Roads and lanes)
(H557)Road Structure Act(Roadways and lanes)	(Roadways and lanes)
(H558)Road Structure Act(Roadways and lanes)	(Roadways and lanes)
(H559)Road Structure Act(Varies depending on each section)	(Varies depending on each section)
(H560)Road Structure Act(2-lane road width determined)	(2-lane road width determined)
(H561)Road Structure Act(Standard lane width)	(Standard lane width)
(H562)Road Structure Act(Width of central strip)	(Width of central strip)
(H563)Road Structure Act(Width of side strip in center strip)	(Width of side strip in center strip)
(H564)Road Structure Act(Central strip width)	(Central strip width)
(H565)Road Structure Act(Central strip width)	(Central strip width)
(H566)Road Structure Act(Type and structure of center strip)	(Type and structure of center strip)
(H567)Road Structure Act(Type and structure of center strip)	(Type and structure of center strip)
(H568)Road Structure Act(Type and structure of center strip)	(Type and structure of center strip)
(H569)Road Structure Act(Type and structure of center strip)	(Type and structure of center strip)
(H570)Road Structure Act(Type and structure of center strip)	(Type and structure of center strip)
(H571)Road Structure Act(Type and structure of center strip)	(Type and structure of center strip)
(H572)Road Structure Act(Shoulder)	(Shoulder)
(H573)Road Structure Act(Shoulder-Width of shoulder on the left side of the lane)	(Shoulder)
(H574)Road Structure Act(Shoulder-Width of side strip on shoulder)	(Shoulder)
(H575)Road Structure Act(Shoulder-Functional classification of shoulders)	(Shoulder)
(H576)Road Structure Act(Shoulder-Functional classification of shoulders)	(Shoulder)

(H577)Road Structure Act(Shoulder- Structure of shoulders)	(Shoulder)
(H578)Road Structure Act(Shoulder- Structure of shoulders)	(Shoulder)
(H579)Road Structure Act(Shoulder- Side strip on the shoulder of the road)	(Shoulder)
(H580)Road Structure Act(Shoulder- Side strip on the shoulder of the road)	(Shoulder)
(H581)Road Structure Act(Shoulder- Protective shoulder)	(Shoulder)
(H582)Road Structure Act(Shoulder- Protective shoulder)	(Shoulder)
(H583)Road Structure Act(Stop zone)	(Shoulder)
(H584)Road Structure Act(Width of bicycle and pedestrian paths)	(Width of bicycle)
(H585)Road Structure Act(Sidewalk width)	(Sidewalk width)
(H586)Road Structure Act(Width of bicycle lane)	(Width of bicycle lane)
(H587)Road Structure Act(Width of pedestrian lane)	(Width of pedestrian lane)
(H588)Road Structure Act(Sidewalk structure)	(Sidewalk structure)
(H589)Road Structure Act(Sidewalk structure)	(Sidewalk structure)
(H590)Road Structure Act(Sidewalk structure)	(Sidewalk structure)
(H591)Road Structure Act(Width of central strip of roads in snowy regions)	(Width of central strip of roads in snowy regions)
(H592)Road Structure Act(Width of central strip of roads in snowy regions)	(Width of central strip of roads in snowy regions)
(H593)Road Structure Act(Width of central strip of roads in snowy regions)	(Width of central strip of roads in snowy regions)
(H594)Road Structure Act(Width composition in snowy areas)	(Width composition in snowy areas)
(H595)Road Structure Act(Width composition in snowy areas)	(Width composition in snowy areas)
(H596)Road Structure Act(Width composition in snowy areas)	(Width composition in snowy areas)
(H597)Road Structure Act(Width composition in snowy areas)	(Width composition in snowy areas)
(H598)Road Structure Act(Width composition in snowy areas)	(Width composition in snowy areas)
(H599)Road Structure Act(Example of road width configuration for bridges and elevated roads)	(Example of road width configuration for bridges)
(H600)Road Structure Act(Planting belt)	(Planting belt)
(H601)Road Structure Act(Planting belt)	(Planting belt)
(H602)Road Structure Act(Planting belt)	(Planting belt)
(H603)Road Structure Act(Planting belt)	(Planting belt)
(H604)Road Structure Act(Side road(Byway))	(Side road(Byway))
(H605)Road Structure Act(Side road(Byway))	(Side road(Byway))
(H606)Road Structure Act(Environmental facilities zone)	(Environmental facilities zone)
(H607)Road Structure Act(Environmental facilities zone)	(Environmental facilities zone)
(H608)Road Structure Act(Standard width)	(Standard width)
(H609)Road Structure Act(Road width)	(Road width)
(H610)Road Structure Act(Standard Cross-sectional Diagram)	(Standard Cross-sectional Diagram)

(H715)Road Structure Act(Vehicle's transition driving path)	(Vehicle's transition driving path)
(H716)Road Structure Act(Vehicle's transition driving path)	(Vehicle's transition driving path)
(H717)Road Structure Act(Vehicle's transition driving path)	(Vehicle's transition driving path)
(H718)Road Structure Act(Vehicle's transition driving path)	(Vehicle's transition driving path)
(H719)Road Structure Act(Vehicle's transition driving path)	(Vehicle's transition driving path)
(H720)Road Structure Act(Vehicle's transition driving path)	(Vehicle's transition driving path)
(H721)Road Structure Act(Vehicle's transition driving path)	(Vehicle's transition driving path)
(H722)Road Structure Act(Vehicle's transition driving path)	(Vehicle's transition driving path)
(H723)Road Structure Act(Transition curves)	(Transition curves)
(H724)Road Structure Act(Transition curves)	(Transition curves)
(H725)Road Structure Act(Transition curves)	(Transition curves)
(H726)Road Structure Act(Transition curves)	(Transition curves)
(H727)Road Structure Act(Transition curves)	(Transition curves)
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(H729)Road Structure Act(Transition curves)	(Transition curves)
(H730)Road Structure Act(Transition curves)	(Transition curves)
(H731)Road Structure Act(One-way grade(superelevation), widening)	(One-way grade(superelevation), widening)
(H732)Road Structure Act(One-way grade(superelevation), widening)	(One-way grade(superelevation), widening)
(H733)Road Structure Act(One-way grade(superelevation), widening)	(One-way grade(superelevation), widening)
(H734)Road Structure Act(One-way grade(superelevation), widening)	(One-way grade(superelevation), widening)
(H735)Road Structure Act(One-way grade(superelevation), widening)	(One-way grade(superelevation), widening)
(H736)Road Structure Act(One-way grade(superelevation), widening)	(One-way grade(superelevation), widening)
(H737)Road Structure Act(One-way grade(superelevation), widening)	(One-way grade(superelevation), widening)
(H738)Road Structure Act(One-way grade(superelevation), widening)	(One-way grade(superelevation), widening)
(H739)Road Structure Act(One-way grade(superelevation), widening)	(One-way grade(superelevation), widening)
(H740)Road Structure Act(One-way grade(superelevation), widening)	(One-way grade(superelevation), widening)
(H741)Road Structure Act(One-way grade(superelevation), widening)	(One-way grade(superelevation), widening)
(H742)Road Structure Act(One-way grade(superelevation), widening)	(One-way grade(superelevation), widening)
(H743)Road Structure Act(One-way grade(superelevation), widening)	(One-way grade(superelevation), widening)
(H744)Road Structure Act(Size of buffer vertical curve)	(Size of buffer vertical curve)
(H745)Road Structure Act(Buffer vertical curve)	(Buffer vertical curve)
(H746)Road Structure Act(Buffer vertical curve)	(Buffer vertical curve)
(H747)Road Structure Act(Widening adjustment)	(Widening adjustment)
(H748)Road Structure Act(Adjustment by transition tangent)	(Adjustment by transition tangent)
(H749)Road Structure Act(Stretching in case of the number of lanes increases or decreases)	(Stretching in case of the number of lanes increases or decreases)

(H750)Road Structure Act(Stretching in case of the number of lanes increases or decreases)

(H751)Road Structure Act(Braking and stopping distance and overtaking sight distance)

(H752)Road Structure Act(Braking and stopping distance and overtaking sight distance)

(H753)Road Structure Act(Sight distance)

(H754)Road Structure Act(Braking stopping distance on wet road surface)

(H755)Road Structure Act(Effect of gradient on braking distance)

(H756)Road Structure Act(Braking stopping distance in case of the road surface is frozen in cold regions ($f = 0.15$))

(H757)Road Structure Act(Braking distance in case of traveling at or above the design speed)

(H758)Road Structure Act(Overtaking sight distance)

(H759)Road Structure Act(Overtaking sight distance)

(H760)Road Structure Act(Percentage of overtaking visibility sections to total sections)

(H761)Road Structure Act(Overtaking sight distance (RAL))

(H762)Road Structure Act(Passenger car equivalent daily traffic volume in the first year of sharing)

(H763)Road Structure Act(Ensuring sight distance)

(H764)Road Structure Act(Ensuring sight distance)

(H765)Road Structure Act(Ensuring sight distance)

(H766)Road Structure Act(Horsepower per unit weight of automobiles)

(H767)Road Structure Act(Forces acting on a car)

(H768)Road Structure Act(Horsepower per unit weight of automobiles)

(H769)Road Structure Act(Horsepower per unit weight of automobiles)

(H770)Road Structure Act(Special values for longitudinal gradient)

(H771)Road Structure Act(Gradient value and limit length)

(H772)Road Structure Act(Climbing performance curve)

(H773)Road Structure Act(Longitudinal gradient and limit length)

(H774)Road Structure Act(Characteristic values of longitudinal gradient in snowy and cold regions)

(H775)Road Structure Act(Longitudinal gradient)

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(H777)Road Structure Act(Cross-sectional configuration of climbing lanes)

(H778)Road Structure Act(Cross-sectional configuration of climbing lanes)

(H779)Road Structure Act(Single slope of main line)

(H780)Road Structure Act(Speed gradient diagram)

(H781)Road Structure Act(Climbing performance curve)

(H782)Road Structure Act(Climbing performance curve)

(H783)Road Structure Act(Vertical curves)

(H784)Road Structure Act(Vertical curves)

(Stretching in case of the number of lanes increases or decreases)

(Braking and stopping distance and overtaking sight distance)

(Braking and stopping distance and overtaking sight distance)

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(Braking stopping distance on wet road surface)

(Effect of gradient on braking distance)

(Braking stopping distance in case of the road surface is frozen in cold regions ($f = 0.15$))

(Braking distance in case of traveling at or above the design speed)

(Overtaking sight distance)

(Overtaking sight distance)

(Percentage of overtaking visibility sections to total sections)

(Overtaking sight distance (RAL))

(Passenger car equivalent daily traffic volume in the first year of sharing)

(Ensuring sight distance)

(Ensuring sight distance)

(Ensuring sight distance)

(Horsepower per unit weight of automobiles)

(Forces acting on a car)

(Horsepower per unit weight of automobiles)

(Horsepower per unit weight of automobiles)

(Special values for longitudinal gradient)

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(Characteristic values of longitudinal gradient in snowy)

(Longitudinal gradient)

(Longitudinal gradient)

(Cross-sectional configuration of climbing lanes)

(Cross-sectional configuration of climbing lanes)

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(Speed gradient diagram)

(Climbing performance curve)

(Climbing performance curve)

(Vertical curves)

(Vertical curves)

(H785)Road Structure Act(Vertical curves)	(Vertical curves)
(H786)Road Structure Act(Vertical curves)	(Vertical curves)
(H787)Road Structure Act(Vertical curves)	(Vertical curves)
(H788)Road Structure Act(Vertical curves)	(Vertical curves)
(H789)Road Structure Act(Vertical curves)	(Vertical curves)
(H790)Road Structure Act(Vertical curves)	(Vertical curves)
(H791)Road Structure Act(Vertical curves)	(Vertical curves)
(H792)Road Structure Act(Vertical curves)	(Vertical curves)
(H793)Road Structure Act(Vertical curves)	(Vertical curves)
(H794)Road Structure Act(Vertical curves)	(Vertical curves)
(H795)Road Structure Act(Vertical curves)	(Vertical curves)
(H796)Road Structure Act(Cross Slope)	(Cross Slope)
(H797)Road Structure Act(Cross Slope)	(Cross Slope)
(H798)Road Structure Act(Cross Slope)	(Cross Slope)
(H799)Road Structure Act(Cross Slope)	(Cross Slope)
(H800)Road Structure Act(Cross Slope)	(Cross Slope)
(H801)Road Structure Act(Composite gradient)	(Composite gradient)
(H802)Road Structure Act(Composite gradient)	(Composite gradient)
(H803)Road Structure Act(Composite gradient)	(Composite gradient)
(H804)Road Structure Act(Composite gradient)	(Composite gradient)
(H805)Road Structure Act(Intersection angle)	(Intersection angle)
(H806)Road Structure Act(Intersection angle)	(Intersection angle)
(H807)Road Structure Act(Intersection angle)	(Intersection angle)
(H808)Road Structure Act(Intersection shapes)	(Intersection angle)
(H809)Road Structure Act(Intersection shapes)	(Intersection angle)
(H810)Road Structure Act(Intersection shapes)	(Intersection angle)
(H811)Road Structure Act(Intersection shapes)	(Intersection shapes)
(H812)Road Structure Act(Intersection shapes)	(Intersection shapes)
(H813)Road Structure Act(Intersection spacing)	(Intersection spacing)
(H814)Road Structure Act(Intersection spacing)	(Intersection spacing)
(H815)Road Structure Act(Intersection spacing)	(Intersection spacing)
(H816)Road Structure Act(Intersection spacing)	(Intersection spacing)
(H817)Road Structure Act(Intersection spacing)	(Intersection spacing)
(H818)Road Structure Act(Intersection spacing)	(Intersection spacing)

(H819)Road Structure Act(Intersection spacing)	(Intersection spacing)
(H820)Road Structure Act(Alignment near intersections)	(Alignment near intersections)
(H821)Road Structure Act(Alignment near intersections)	(Alignment near intersections)
(H822)Road Structure Act(Longitudinal Alignment)	(Longitudinal Alignment)
(H823)Road Structure Act(Lane width and lane width)	(Lane width and lane width)
(H824)Road Structure Act(Lane width and number of lanes)	(Lane width and number of lanes)
(H825)Road Structure Act(Lane width and number of lanes)	(Lane width and number of lanes)
(H826)Road Structure Act(Main line shift)	(Main line shift)
(H827)Road Structure Act(Right turn lane)	(Right turn lane)
(H828)Road Structure Act(Left turn lane)	(Left turn lane)
(H829)Road Structure Act(Left turn lane)	(Left turn lane)
(H830)Road Structure Act(Shift lanes)	(Shift lanes)
(H831)Road Structure Act(Shift lanes)	(Shift lanes)
(H832)Road Structure Act(Shift lanes)	(Shift lanes)
(H833)Road Structure Act(Guideway -Traffic island-Corner cut)	(Guideway -Traffic island-Corner cut)
(H834)Road Structure Act(Guideway Design Method)	(Guideway Design Method)
(H835)Road Structure Act(Guideway Design Method)	(Guideway Design Method)
(H836)Road Structure Act(Guideway Design Method)	(Guideway Design Method)
(H837)Road Structure Act(Traffic islands and medians)	(Traffic islands and medians)
(H838)Road Structure Act(Traffic islands and medians)	(Traffic islands and medians)
(H839)Road Structure Act(Traffic islands and medians)	(Traffic islands and medians)
(H840)Road Structure Act(Traffic islands and medians)	(Traffic islands and medians)
(H841)Road Structure Act(Traffic islands and medians)	(Traffic islands and medians)
(H842)Road Structure Act(Traffic islands and medians)	(Traffic islands and medians)
(H843)Road Structure Act(Traffic islands and medians)	(Traffic islands and medians)
(H844)Road Structure Act(Traffic islands and medians)	(Traffic islands and medians)
(H845)Road Structure Act(How to pass through intersections and corner cutting)	Intersections and corner cutting)
(H846)Road Structure Act(How to pass through intersections and corner cutting)	Intersections and corner cutting)
(H847)Road Structure Act(How to pass through intersections and corner cutting)	Intersections and corner cutting)
(H848)Road Structure Act(How to pass through intersections and corner cutting)	Intersections and corner cutting)
(H849)Road Structure Act(How to pass through intersections and corner cutting)	Intersections and corner cutting)
(H850)Road Structure Act(How to pass through intersections and corner cutting)	Intersections and corner cutting)
(H851)Road Structure Act(Crosswalks and stop lines)	(Crosswalks and stop lines)
(H852)Road Structure Act(Crosswalks and stop lines)	(Crosswalks and stop lines)

(H655)Road Structure Act(Alignment design of urban roads)	(Alignment design of urban roads)
(H656)Road Structure Act(Alignment design of urban road)	(Alignment design of urban roads)
(H657)Road Structure Act(Alignment design of urban road)	(Alignment design of urban roads)
(H606)Road Structure Act(Environmental facilities zone)	(Environmental facilities zone)
(H607)Road Structure Act(Environmental facilities zone)	(Environmental facilities zone)
(H706)Road Structure Act(f value in case of exceeding design speed)	(f value in case of exceeding design speed)
(H834)Road Structure Act(Guideway Design Method)	(Guideway Design Method)
(H835)Road Structure Act(Guideway Design Method)	(Guideway Design Method)
(H836)Road Structure Act(Guideway Design Method)	(Guideway Design Method)
(H683)Road Structure Act(Lateral slip friction coefficient used in design)	(Lateral slip friction coefficient used in design)
(H560)Road Structure Act(2-lane road width determined)	(2-lane road width determined)
(H515)Road Structure Act(Additional lanes)	(Additional lanes)
(H748)Road Structure Act(Adjustment by transition tangent)	(Adjustment by transition tangent)
(H648)Road Structure Act(Alignment design)	(Alignment design)
(H820)Road Structure Act(Alignment near intersections)	(Alignment near intersections)
(H821)Road Structure Act(Alignment near intersections)	(Alignment near intersections)
(H529)Road Structure Act(Basic concepts of road planning)	(Basic concepts of road planning)
(H511)Road Structure Act(Bicycle-only road or bicycle-pedestrian-only road)	(Bicycle-only road)
(H1073)Road Structure Act(Bicycle-only roads, etc.)	(Bicycle-only roads, etc.)
(H1074)Road Structure Act(Bicycle-only roads, etc.)	(Bicycle-only roads, etc.)
(H1075)Road Structure Act(Bicycle-only roads, etc.)	(Bicycle-only roads, etc.)
(H525)Road Structure Act(Bicycles and pedestrians)	(Bicycles and pedestrians)
(H526)Road Structure Act(Bicycles and pedestrians)	(Bicycles and pedestrians)
(H527)Road Structure Act(Bicycles and pedestrians)	(Bicycles and pedestrians)
(H528)Road Structure Act(Bicycles and pedestrians)	(Bicycles and pedestrians)
(H751)Road Structure Act(Braking and stopping distance and overtaking sight distance)	(Braking and stopping distance and overtaking sight distance)
(H752)Road Structure Act(Braking and stopping distance and overtaking sight distance)	(Braking and stopping distance and overtaking sight distance)
(H757)Road Structure Act(Braking distance in case of traveling at or above the design speed)	(Braking distance in case of traveling at or above the design speed)
(H756)Road Structure Act(Braking stopping distance in case of the road surface is frozen in cold regions (f = 0.15))	(Braking stopping distance in case of the road surface is frozen in cold regions (f = 0.15))
(H754)Road Structure Act(Braking stopping distance on wet road surface)	(Braking stopping distance on wet road surface)
(H745)Road Structure Act(Buffer vertical curve)	(Buffer vertical curve)
(H746)Road Structure Act(Buffer vertical curve)	(Buffer vertical curve)
(H564)Road Structure Act(Central strip width)	(Central strip width)
(H565)Road Structure Act(Central strip width)	(Central strip width)
(H513)Road Structure Act(Central strip)	(Central strip)

(H653)Road Structure Act(Combinations of vertical curves)	(Combinations of horizontal alignments)
(H554)Road Structure Act(Components of cross section and combinations)	(Components of cross section and combinations)
(H555)Road Structure Act(Components of cross section and combinations)	(Components of cross section and combinations)
(H509)Road Structure Act(Composite gradient)	(Composite gradient)
(H801)Road Structure Act(Composite gradient)	(Composite gradient)
(H802)Road Structure Act(Composite gradient)	(Composite gradient)
(H803)Road Structure Act(Composite gradient)	(Composite gradient)
(H804)Road Structure Act(Composite gradient)	(Composite gradient)
(H548)Road Structure Act(Connecting different design sections by class)	(Connecting different design sections by class)
(H547)Road Structure Act(Connection of different design sections)	(Connection of different design sections)
(H493)Road Structure Act(Construction Limit:Construction Gauge)	(Construction Gauge)
(H494)Road Structure Act(Construction Limit:Construction Gauge)	(Construction Gauge)
(H495)Road Structure Act(Construction Limit:Construction Gauge)	(Construction Gauge)
(H496)Road Structure Act(Construction Limit:Construction Gauge)	(Construction Gauge)
(H497)Road Structure Act(Construction Limit:Construction Gauge)	(Construction Gauge)
(H498)Road Structure Act(Construction Limit:Construction Gauge)	(Construction Gauge)
(H499)Road Structure Act(Construction Limit:Construction Gauge)	(Construction Gauge)
(H629)Road Structure Act(Construction Limit:Construction Gauge)	(Construction Limit:Construction Gauge)
(H630)Road Structure Act(Construction Limit:Construction Gauge)	(Construction Limit:Construction Gauge)
(H631)Road Structure Act(Construction Limit:Construction Gauge)	(Construction Limit:Construction Gauge)
(H632)Road Structure Act(Construction Limit:Construction Gauge)	(Construction Limit:Construction Gauge)
(H633)Road Structure Act(Construction Limit:Construction Gauge)	(Construction Limit:Construction Gauge)
(H634)Road Structure Act(Construction Limit:Construction Gauge)	(Construction Limit:Construction Gauge)
(H635)Road Structure Act(Construction Limit:Construction Gauge)	(Construction Limit:Construction Gauge)
(H636)Road Structure Act(Construction Limit:Construction Gauge)	(Construction Limit:Construction Gauge)
(H637)Road Structure Act(Construction Limit:Construction Gauge)	(Construction Limit:Construction Gauge)
(H638)Road Structure Act(Construction Limit:Construction Gauge)	(Construction Limit:Construction Gauge)
(H650)Road Structure Act(Continuity of alignment)	(Continuity of alignment)
(H508)Road Structure Act(Cross slope)	(Cross slope)
(H796)Road Structure Act(Cross Slope)	(Cross Slope)
(H797)Road Structure Act(Cross Slope)	(Cross Slope)
(H798)Road Structure Act(Cross Slope)	(Cross Slope)
(H799)Road Structure Act(Cross Slope)	(Cross Slope)
(H800)Road Structure Act(Cross Slope)	(Cross Slope)

(H777)Road Structure Act(Cross-sectional configuration of climbing lanes)	(Cross-sectional configuration of climbing lanes)
(H778)Road Structure Act(Cross-sectional configuration of climbing lanes)	(Cross-sectional configuration of climbing lanes)
(H851)Road Structure Act(Crosswalks and stop lines)	(Crosswalks and stop lines)
(H852)Road Structure Act(Crosswalks and stop lines)	(Crosswalks and stop lines)
(H691)Road Structure Act(Curve length)	(Curve length)
(H692)Road Structure Act(Curve length)	(Curve length)
(H693)Road Structure Act(Curve length)	(Curve length)
(H694)Road Structure Act(Curve length)	(Curve length)
(H695)Road Structure Act(Curve length)	(Curve length)
(H696)Road Structure Act(Curve length)	(Curve length)
(H501)Road Structure Act(Curve radius)	(Curve radius)
(H685)Road Structure Act(Curve radius)	(Curve radius)
(H686)Road Structure Act(Curve radius)	(Curve radius)
(H500)Road Structure Act(Design speed (unit: kilometers per hour))	(Design speed)
(H545)Road Structure Act(Design speed)	(Design speed)
(H479)Road Structure Act(Design vehicle)	(Design vehicle)
(H480)Road Structure Act(Design vehicle)	(Design vehicle)
(H481)Road Structure Act(Design vehicle)	(Design vehicle)
(H517)Road Structure Act(Design vehicle)	(Design vehicle)
(H518)Road Structure Act(Design vehicle)	(Design vehicle)
(H519)Road Structure Act(Design vehicle)	(Design vehicle)
(H520)Road Structure Act(Design vehicle)	(Design vehicle)
(H521)Road Structure Act(Design vehicle)	(Design vehicle)
(H522)Road Structure Act(Design vehicle)	(Design vehicle)
(H979)Road Structure Act(Earthworks, pavements and road structures)	(Earthworks, pavements and road structures)
(H980)Road Structure Act(Earthworks, pavements and road structures)	(Earthworks, pavements and road structures)
(H981)Road Structure Act(Earthworks, pavements and road structures)	(Earthworks, pavements and road structures)
(H982)Road Structure Act(Earthworks, pavements and road structures)	(Earthworks, pavements and road structures)
(H983)Road Structure Act(Earthworks, pavements and road structures)	(Earthworks, pavements and road structures)
(H984)Road Structure Act(Earthworks, pavements and road structures)	(Earthworks, pavements and road structures)
(H985)Road Structure Act(Earthworks, pavements and road structures)	(Earthworks, pavements and road structures)
(H986)Road Structure Act(Earthworks, pavements and road structures)	(Earthworks, pavements and road structures)
(H987)Road Structure Act(Earthworks, pavements and road structures)	(Earthworks, pavements and road structures)
(H988)Road Structure Act(Earthworks, pavements and road structures)	(Earthworks, pavements and road structures)

(H1057)Road Structure Act(Earthworks, pavements and road structures)	(Earthworks, pavements and road structures)
(H1058)Road Structure Act(Earthworks, pavements and road structures)	(Earthworks, pavements and road structures)
(H1059)Road Structure Act(Earthworks, pavements and road structures)	(Earthworks, pavements and road structures)
(H1060)Road Structure Act(Earthworks, pavements and road structures)	(Earthworks, pavements and road structures)
(H1061)Road Structure Act(Earthworks, pavements and road structures)	(Earthworks, pavements and road structures)
(H1062)Road Structure Act(Earthworks, pavements and road structures)	(Earthworks, pavements and road structures)
(H1063)Road Structure Act(Earthworks, pavements and road structures)	(Earthworks, pavements and road structures)
(H1064)Road Structure Act(Earthworks, pavements and road structures)	(Earthworks, pavements and road structures)
(H1065)Road Structure Act(Earthworks, pavements and road structures)	(Earthworks, pavements and road structures)
(H1066)Road Structure Act(Earthworks, pavements and road structures)	(Earthworks, pavements and road structures)
(H1067)Road Structure Act(Earthworks, pavements and road structures)	(Earthworks, pavements and road structures)
(H1068)Road Structure Act(Earthworks, pavements and road structures)	(Earthworks, pavements and road structures)
(H1069)Road Structure Act(Earthworks, pavements and road structures)	(Earthworks, pavements and road structures)
(H1070)Road Structure Act(Earthworks, pavements and road structures)	(Earthworks, pavements and road structures)
(H1071)Road Structure Act(Earthworks, pavements and road structures)	(Earthworks, pavements and road structures)
(H1072)Road Structure Act(Earthworks, pavements and road structures)	(Earthworks, pavements and road structures)
(H755)Road Structure Act(Effect of gradient on braking distance)	(Effect of gradient on braking distance)
(H763)Road Structure Act(Ensuring sight distance)	(Ensuring sight distance)
(H764)Road Structure Act(Ensuring sight distance)	(Ensuring sight distance)
(H765)Road Structure Act(Ensuring sight distance)	(Ensuring sight distance)
(H599)Road Structure Act(Example of road width configuration for bridges and elevated roads)	(Example of road width configuration for bridges)
(H767)Road Structure Act(Forces acting on a car)	(Forces acting on a car)
(H771)Road Structure Act(Gradient value and limit length)	(Gradient value and limit length)
(H833)Road Structure Act(Guideway -Traffic island-Corner cut)	(Guideway -Traffic island-Corner cut)
(H681)Road Structure Act(Curve radius)	(H681)Road Structure Act(Curve radius)
(H649)Road Structure Act(Harmony with topography and local land use)	(Harmony with topography and local land use)
(H680)Road Structure Act(Horizontal and Vertical alignments)	(Horizontal and Vertical alignments)
(H766)Road Structure Act(Horsepower per unit weight of automobiles)	(Horsepower per unit weight of automobiles)
(H768)Road Structure Act(Horsepower per unit weight of automobiles)	(Horsepower per unit weight of automobiles)
(H769)Road Structure Act(Horsepower per unit weight of automobiles)	(Horsepower per unit weight of automobiles)
(H805)Road Structure Act(Intersection angle)	(Intersection angle)
(H806)Road Structure Act(Intersection angle)	(Intersection angle)
(H807)Road Structure Act(Intersection angle)	(Intersection angle)
(H808)Road Structure Act(Intersection shapes)	(Intersection angle)

(H809)Road Structure Act(Intersection shapes)	(Intersection angle)
(H810)Road Structure Act(Intersection shapes)	(Intersection angle)
(H811)Road Structure Act(Intersection shapes)	(Intersection shapes)
(H812)Road Structure Act(Intersection shapes)	(Intersection shapes)
(H813)Road Structure Act(Intersection spacing)	(Intersection spacing)
(H814)Road Structure Act(Intersection spacing)	(Intersection spacing)
(H815)Road Structure Act(Intersection spacing)	(Intersection spacing)
(H816)Road Structure Act(Intersection spacing)	(Intersection spacing)
(H817)Road Structure Act(Intersection spacing)	(Intersection spacing)
(H818)Road Structure Act(Intersection spacing)	(Intersection spacing)
(H819)Road Structure Act(Intersection spacing)	(Intersection spacing)
(H974)Road Structure Act(Intersections with railways)	(Intersections with railways)
(H975)Road Structure Act(Intersections with railways)	(Intersections with railways)
(H976)Road Structure Act(Intersections with railways)	(Intersections with railways)
(H977)Road Structure Act(Intersections with railways)	(Intersections with railways)
(H978)Road Structure Act(Intersections with railways)	(Intersections with railways)
(H853)Road Structure Act(Intersections)	(Intersections)
(H854)Road Structure Act(Intersections)	(Intersections)
(H855)Road Structure Act(Intersections)	(Intersections)
(H856)Road Structure Act(Intersections)	(Intersections)
(H857)Road Structure Act(Intersections)	(Intersections)
(H858)Road Structure Act(Intersections)	(Intersections)
(H859)Road Structure Act(Intersections)	(Intersections)
(H860)Road Structure Act(Intersections)	(Intersections)
(H861)Road Structure Act(Intersections)	(Intersections)
(H862)Road Structure Act(Intersections)	(Intersections)
(H863)Road Structure Act(Intersections)	(Intersections)
(H864)Road Structure Act(Intersections)	(Intersections)
(H865)Road Structure Act(Intersections)	(Intersections)
(H866)Road Structure Act(Intersections)	(Intersections)
(H867)Road Structure Act(Intersections)	(Intersections)
(H868)Road Structure Act(Intersections)	(Intersections)
(H869)Road Structure Act(Intersections)	(Intersections)
(H870)Road Structure Act(Intersections)	(Intersections)

(H973)Road Structure Act(Intersections)	(Intersections)
(H486)Road Structure Act(Lane separation)	(Lane separation)
(H823)Road Structure Act(Lane width and lane width)	(Lane width and lane width)
(H824)Road Structure Act(Lane width and number of lanes)	(Lane width and number of lanes)
(H825)Road Structure Act(Lane width and number of lanes)	(Lane width and number of lanes)
(H485)Road Structure Act(Lane width)	(Lane width)
(H536)Road Structure Act(Large vehicle traffic volume)	(Large vehicle traffic volume)
(H537)Road Structure Act(Large vehicle traffic volume)	(Large vehicle traffic volume)
(H690)Road Structure Act(Lateral slip friction coefficient (f))	(Lateral slip friction coefficient (f))
(H828)Road Structure Act(Left turn lane)	(Left turn lane)
(H829)Road Structure Act(Left turn lane)	(Left turn lane)
(H546)Road Structure Act(Length of design section)	(Length of design section)
(H507)Road Structure Act(Length of vertical curve)	(Length of vertical curve)
(H510)Road Structure Act(Level crossing with railways, etc)	(Level crossing with railways)
(H822)Road Structure Act(Longitudinal Alignment)	(Longitudinal Alignment)
(H773)Road Structure Act(Longitudinal gradient and limit length)	(Longitudinal gradient and limit length)
(H505)Road Structure Act(Longitudinal gradient)	(Longitudinal gradient)
(H775)Road Structure Act(Longitudinal gradient)	(Longitudinal gradient)
(H776)Road Structure Act(Longitudinal gradient)	(Longitudinal gradient)
(H826)Road Structure Act(Main line shift)	(Main line shift)
(H698)Road Structure Act(Maximum super-gradient)	(Maximum super-gradient)
(H699)Road Structure Act(Maximum super-gradient)	(Maximum super-gradient)
(H687)Road Structure Act(Minimum Curve Radius)	(Minimum Curve Radius)
(H688)Road Structure Act(Minimum Curve Radius)	(Minimum Curve Radius)
(H689)Road Structure Act(Minimum curve radius)	(Minimum Curve Radius)
(H700)Road Structure Act(Minimum curve radius for cutting off the one-way slope)	(Minimum curve radius)
(H731)Road Structure Act(One-way grade(superelevation), widening)	(One-way grade(superelevation), widening)
(H732)Road Structure Act(One-way grade(superelevation), widening)	(One-way grade(superelevation), widening)
(H733)Road Structure Act(One-way grade(superelevation), widening)	(One-way grade(superelevation), widening)
(H734)Road Structure Act(One-way grade(superelevation), widening)	(One-way grade(superelevation), widening)
(H735)Road Structure Act(One-way grade(superelevation), widening)	(One-way grade(superelevation), widening)
(H736)Road Structure Act(One-way grade(superelevation), widening)	(One-way grade(superelevation), widening)
(H737)Road Structure Act(One-way grade(superelevation), widening)	(One-way grade(superelevation), widening)
(H738)Road Structure Act(One-way grade(superelevation), widening)	(One-way grade(superelevation), widening)

(H543)Road Structure Act(Road classification-Road classification system)	(Road classification-Road classification system)
(H544)Road Structure Act(Road classification-Road classification system)	(Road classification-Road classification system)
(H539)Road Structure Act(Road classification-Type 1 road)	(Road classification-Type 1 road)
(H540)Road Structure Act(Road classification-Type 2 road)	(Road classification-Type 2 road)
(H541)Road Structure Act(Road classification-Type 3 road)	(Road classification-Type 3 road)
(H542)Road Structure Act(Road classification-Type 4 road)	(Road classification-Type 4 road)
(H609)Road Structure Act(Road width)	(Road width)
(H556)Road Structure Act(Roads and lanes)	(Roads and lanes)
(H557)Road Structure Act(Roadways and lanes)	(Roadways and lanes)
(H558)Road Structure Act(Roadways and lanes)	(Roadways and lanes)
(H516)Road Structure Act(Setback: Nose offset)	(Setback: Nose offset)
(H524)Road Structure Act(Shape of container)	(Shape of container)
(H830)Road Structure Act(Shift lanes)	(Shift lanes)
(H831)Road Structure Act(Shift lanes)	(Shift lanes)
(H832)Road Structure Act(Shift lanes)	(Shift lanes)
(H572)Road Structure Act(Shoulder)	(Shoulder)
(H573)Road Structure Act(Shoulder-Width of shoulder on the left side of the lane)	(Shoulder)
(H574)Road Structure Act(Shoulder-Width of side strip on shoulder)	(Shoulder)
(H575)Road Structure Act(Shoulder-Functional classification of shoulders)	(Shoulder)
(H576)Road Structure Act(Shoulder-Functional classification of shoulders)	(Shoulder)
(H577)Road Structure Act(Shoulder- Structure of shoulders)	(Shoulder)
(H578)Road Structure Act(Shoulder- Structure of shoulders)	(Shoulder)
(H579)Road Structure Act(Shoulder- Side strip on the shoulder of the road)	(Shoulder)
(H580)Road Structure Act(Shoulder- Side strip on the shoulder of the road)	(Shoulder)
(H581)Road Structure Act(Shoulder- Protective shoulder)	(Shoulder)
(H582)Road Structure Act(Shoulder- Protective shoulder)	(Shoulder)
(H583)Road Structure Act(Stop zone)	(Shoulder)
(H604)Road Structure Act(Side road(Byway))	(Side road(Byway))
(H605)Road Structure Act(Side road(Byway))	(Side road(Byway))
(H682)Road Structure Act(Side slip angle and side slip friction coefficient)	(Side slip angle and side slip friction coefficient)
(H502)Road Structure Act(Side slope of curved sections)	(Side slope of curved sections)
(H684)Road Structure Act(Side-slip friction coefficient)	(Side-slip friction coefficient)
(H588)Road Structure Act(Sidewalk structure)	(Sidewalk structure)
(H589)Road Structure Act(Sidewalk structure)	(Sidewalk structure)

(H590)Road Structure Act(Sidewalk structure)
(H492)Road Structure Act(Sidewalk width)
(H585)Road Structure Act(Sidewalk width)
(H504)Road Structure Act(Sight distance)
(H514)Road Structure Act(Sight distance)
(H753)Road Structure Act(Sight distance)
(H779)Road Structure Act(Single slope of main line)
(H744)Road Structure Act(Size of buffer vertical curve)
(H707)Road Structure Act(Special value for curve radius and super-gradient in urban areas)
(H770)Road Structure Act(Special values for longitudinal gradient)
(H780)Road Structure Act(Speed gradient diagram)
(H610)Road Structure Act(Standard Cross-sectional Diagram)
(H611)Road Structure Act(Standard Cross-sectional Diagram)
(H612)Road Structure Act(Standard Cross-sectional Diagram)
(H613)Road Structure Act(Standard Cross-sectional Diagram)
(H614)Road Structure Act(Standard Cross-sectional Diagram)
(H615)Road Structure Act(Standard Cross-sectional Diagram)
(H616)Road Structure Act(Standard Cross-sectional Diagram)
(H617)Road Structure Act(Standard Cross-sectional Diagram)
(H618)Road Structure Act(Standard Cross-sectional Diagram)
(H619)Road Structure Act(Standard Cross-sectional Diagram)
(H620)Road Structure Act(Standard Cross-sectional Diagram)
(H621)Road Structure Act(Standard Cross-sectional Diagram)
(H622)Road Structure Act(Standard Cross-sectional Diagram)
(H623)Road Structure Act(Standard Cross-sectional Diagram)
(H624)Road Structure Act(Standard Cross-sectional Diagram)
(H625)Road Structure Act(Standard Cross-sectional Diagram)
(H626)Road Structure Act(Standard Cross-sectional Diagram)
(H627)Road Structure Act(Standard Cross-sectional Diagram)
(H628)Road Structure Act(Standard Cross-sectional Diagram)
(H561)Road Structure Act(Standard lane width)
(H608)Road Structure Act(Standard width)
(H749)Road Structure Act(Stretching in case of the number of lanes increases or decreases)
(H750)Road Structure Act(Stretching in case of the number of lanes increases or decreases)

(Sidewalk structure)
(Sidewalk width)
(Sidewalk width)
(Sight distance)
(Sight distance)
(Sight distance)
(Single slope of main line)
(Size of buffer vertical curve)
(Special value for curve radius and super-gradient)
(Special values for longitudinal gradient)
(Speed gradient diagram)
(Standard Cross-sectional Diagram)
(Standard Cross-sectional Diagram)
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(Standard Cross-sectional Diagram)
(Standard lane width)
(Standard width)
(Stretching in case of the number of lanes increases or decreases)
(Stretching in case of the number of lanes increases or decreases)

(H697)Road Structure Act(Super gradient of curved sections)	(Super gradient of curved sections)
(H701)Road Structure Act(Super gradient of curved sections)	(Super gradient of curved sections)
(H702)Road Structure Act(Super gradient of curved sections)	(Super gradient of curved sections)
(H837)Road Structure Act(Traffic islands and medians)	(Traffic islands and medians)
(H838)Road Structure Act(Traffic islands and medians)	(Traffic islands and medians)
(H839)Road Structure Act(Traffic islands and medians)	(Traffic islands and medians)
(H840)Road Structure Act(Traffic islands and medians)	(Traffic islands and medians)
(H841)Road Structure Act(Traffic islands and medians)	(Traffic islands and medians)
(H842)Road Structure Act(Traffic islands and medians)	(Traffic islands and medians)
(H843)Road Structure Act(Traffic islands and medians)	(Traffic islands and medians)
(H844)Road Structure Act(Traffic islands and medians)	(Traffic islands and medians)
(H723)Road Structure Act(Transition curves)	(Transition curves)
(H724)Road Structure Act(Transition curves)	(Transition curves)
(H725)Road Structure Act(Transition curves)	(Transition curves)
(H726)Road Structure Act(Transition curves)	(Transition curves)
(H727)Road Structure Act(Transition curves)	(Transition curves)
(H728)Road Structure Act(Transition curves)	(Transition curves)
(H729)Road Structure Act(Transition curves)	(Transition curves)
(H730)Road Structure Act(Transition curves)	(Transition curves)
(H503)Road Structure Act(transition section)	(transition section)
(H714)Road Structure Act(transition section)	(transition section)
(H566)Road Structure Act(Type and structure of center strip)	(Type and structure of center strip)
(H567)Road Structure Act(Type and structure of center strip)	(Type and structure of center strip)
(H568)Road Structure Act(Type and structure of center strip)	(Type and structure of center strip)
(H569)Road Structure Act(Type and structure of center strip)	(Type and structure of center strip)
(H570)Road Structure Act(Type and structure of center strip)	(Type and structure of center strip)
(H571)Road Structure Act(Type and structure of center strip)	(Type and structure of center strip)
(H549)Road Structure Act(Types of access restrictions)	(Types of access restrictions)
(H550)Road Structure Act(Types of access restrictions)	(Types of access restrictions)
(H551)Road Structure Act(Types of access restrictions)	(Types of access restrictions)
(H552)Road Structure Act(Types of access restrictions)	(Types of access restrictions)
(H553)Road Structure Act(Types of access restrictions)	(Types of access restrictions)
(H559)Road Structure Act(Varies depending on each section)	(Varies depending on each section)
(H523)Road Structure Act(Vehicle limits in other countries)	(Vehicle limits)
(H715)Road Structure Act(Vehicle's transition driving path)	(Vehicle's transition driving path)

(H716)Road Structure Act(Vehicle's transition driving path)	(Vehicle's transition driving path)
(H717)Road Structure Act(Vehicle's transition driving path)	(Vehicle's transition driving path)
(H718)Road Structure Act(Vehicle's transition driving path)	(Vehicle's transition driving path)
(H719)Road Structure Act(Vehicle's transition driving path)	(Vehicle's transition driving path)
(H720)Road Structure Act(Vehicle's transition driving path)	(Vehicle's transition driving path)
(H721)Road Structure Act(Vehicle's transition driving path)	(Vehicle's transition driving path)
(H722)Road Structure Act(Vehicle's transition driving path)	(Vehicle's transition driving path)
(H506)Road Structure Act(Vertical curve radius)	(Vertical curve radius)
(H783)Road Structure Act(Vertical curves)	(Vertical curves)
(H784)Road Structure Act(Vertical curves)	(Vertical curves)
(H785)Road Structure Act(Vertical curves)	(Vertical curves)
(H786)Road Structure Act(Vertical curves)	(Vertical curves)
(H787)Road Structure Act(Vertical curves)	(Vertical curves)
(H788)Road Structure Act(Vertical curves)	(Vertical curves)
(H789)Road Structure Act(Vertical curves)	(Vertical curves)
(H790)Road Structure Act(Vertical curves)	(Vertical curves)
(H791)Road Structure Act(Vertical curves)	(Vertical curves)
(H792)Road Structure Act(Vertical curves)	(Vertical curves)
(H793)Road Structure Act(Vertical curves)	(Vertical curves)
(H794)Road Structure Act(Vertical curves)	(Vertical curves)
(H795)Road Structure Act(Vertical curves)	(Vertical curves)
(H747)Road Structure Act(Widening adjustment)	(Widening adjustment)
(H708)Road Structure Act(Widening of curved sections)	(Widening of curved sections)
(H709)Road Structure Act(Widening of curved sections)	(Widening of curved sections)
(H710)Road Structure Act(Widening of curved sections)	(Widening of curved sections)
(H711)Road Structure Act(Widening of curved sections)	(Widening of curved sections)
(H712)Road Structure Act(Widening of curved sections)	(Widening of curved sections)
(H713)Road Structure Act(Widening of curved sections)	(Widening of curved sections)
(H594)Road Structure Act(Width composition in snowy areas)	(Width composition in snowy areas)
(H595)Road Structure Act(Width composition in snowy areas)	(Width composition in snowy areas)
(H596)Road Structure Act(Width composition in snowy areas)	(Width composition in snowy areas)
(H597)Road Structure Act(Width composition in snowy areas)	(Width composition in snowy areas)
(H598)Road Structure Act(Width composition in snowy areas)	(Width composition in snowy areas)
(H586)Road Structure Act(Width of bicycle lane)	(Width of bicycle lane)
(H491)Road Structure Act(Width of bicycle and pedestrian path)	(Width of bicycle)

(H584)Road Structure Act(Width of bicycle and pedestrian paths)	(Width of bicycle)
(H591)Road Structure Act(Width of central strip of roads in snowy regions)	(Width of central strip of roads in snowy regions)
(H592)Road Structure Act(Width of central strip of roads in snowy regions)	(Width of central strip of roads in snowy regions)
(H593)Road Structure Act(Width of central strip of roads in snowy regions)	(Width of central strip of roads in snowy regions)
(H562)Road Structure Act(Width of central strip)	(Width of central strip)
(H587)Road Structure Act(Width of pedestrian lane)	(Width of pedestrian lane)
(H563)Road Structure Act(Width of side strip in center strip)	(Width of side strip in center strip)
(H487)Road Structure Act(Width of side strip in center strip)	(Width of side strip)
(H488)Road Structure Act(Width of shoulder on the left side of the road)	(Width of side strip)
(H489)Road Structure Act(Width of shoulder on the right side of the road)	(Width of side strip)
(H490)Road Structure Act(Width of the side strip on the road shoulder)	(Width of side strip)
(H535)Road Structure Act(Zone level and target road network)	(Zone level and target road network)
(H845)Road Structure Act(How to pass through intersections and corner cutting)	Intersections and corner cutting)
(H846)Road Structure Act(How to pass through intersections and corner cutting)	Intersections and corner cutting)
(H847)Road Structure Act(How to pass through intersections and corner cutting)	Intersections and corner cutting)
(H848)Road Structure Act(How to pass through intersections and corner cutting)	Intersections and corner cutting)
(H849)Road Structure Act(How to pass through intersections and corner cutting)	Intersections and corner cutting)
(H850)Road Structure Act(How to pass through intersections and corner cutting)	Intersections and corner cutting)
(H474)Road Structure Act	Road Structure Act

(H474)Road Structure Act

(H474) Road Structure Act

Road Structure Act

Road classification

Road: Region	Rural areas	Urban areas
National expressways and motorways		
Other road types	Type 1	Type 2
National expressways and motorways	Type 3	Type 4

(H475)Road Structure Act(Road classification)

Road Structure Act

Road classification

○Type 1 road

①Planned traffic volume: unit (vehicles per day)		②Over 30,000	③20,000-30,000	④10,000-20,000	⑤Less than 10,000
⑥Type of road	⑦Topography of the area where the road exists				
⑧National expressway	⑩Plain areas	⑭1st class	⑮2nd class		⑳3rd class
	⑪Mountain areas	⑰2nd class	⑲3rd class		㉑4th class
⑨Roads other than national expressways	⑫Plain areas	⑰2nd class		㉒3rd class	
	⑬Mountain areas	⑱3rd class		㉓4th class	

(H476)Road Structure Act(Road classification)

Road Structure Act

Road classification

○Type 2 road

④Type of road	①Districts where roads exist	②Districts other than the central areas of large cities	③Central areas of large cities
⑤National expressways	Class 1		
⑥Roads other than national expressways	Class 1	Class 2	

(H477)Road Structure Act(Road classification)

Road Structure Act

Road classification

○Type 3 road

①Planned traffic volume: unit: vehicles per day)		②Over 20,000	③4,000–20,000	④1,500–4,000	⑤500–1,500	⑥Less than 500
⑦Type of road	⑧Topography of area where road					
⑨General national highway	⑩Plain area	1st class	2nd class	3rd class		
	⑪Mountain Land area	2nd class	3rd class	4th class		
⑫ Prefectural roads	⑬ Flat land area	2nd class		3rd class		
	⑭ Mountain area	3rd class		4th class		
⑮ Municipal roads	⑯ Flat land area	2nd class	3rd class	4th class	5th class	
	⑰ Mountain area	3rd class		4th class		5th class

(H478)Road Structure Act(Road classification)

Road Structure Act

Road classification

○Type 4 road

①Planned traffic volume: unit: vehicles per day)	②Over 10,000	③4,000-10,000	④500-4,000	⑤Less than 500
⑥Road type				
⑦General national highway	1st class		2nd class	
⑧Prefectural road	1st class	2nd class	3rd class	
⑨Municipal road	1st class	2nd class	3rd class	4th class

(H479)Road Structure Act(Design vehicle)

Road Structure Act

Road classification

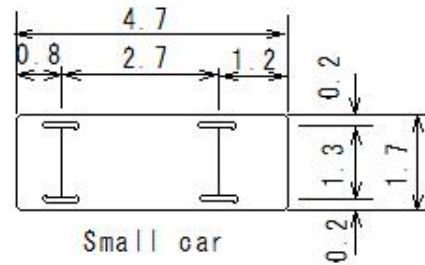
○Design vehicle

①Specifications (unit: meters)	②Length	③Width	④Height	⑤Front overhang	⑥Wheelbase	⑦Rear overhang	⑧ Minimum turning radius
⑩Small car	4.7	1.7	2	0.8	2.7	1.2	6

⑤Front overhang: Distance from the front of the vehicle to the center of the front axle

⑥Wheelbase: Distance from the center of the front axle to the center of the rear axle

⑦Rear overhang: Distance from the center of the rear axle to the rear of the vehicle



(H480)Road Structure Act(Design vehicle)

Road Structure Act

Road classification

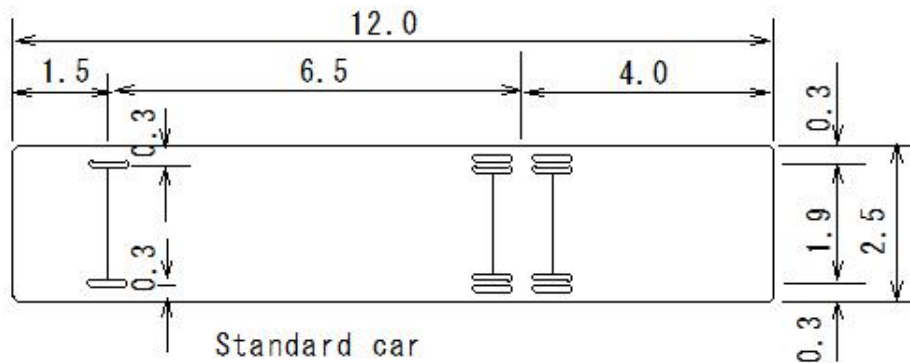
○Design vehicle

①Specifications (unit: meters)	②Length	③Width	④Height	⑤Front overhang	⑥Wheelbase	⑦Rear overhang	⑧ Minimum turning radius
⑪ Standard car	12	2.5	3.8	1.5	6.5	4	12

⑤Front overhang: Distance from the front of the vehicle to the center of the front axle

⑥Wheelbase: Distance from the center of the front axle to the center of the rear axle

⑦Rear overhang: Distance from the center of the rear axle to the rear of the vehicle



(H481)Road Structure Act(Design vehicle)

Road Structure Act

Road classification

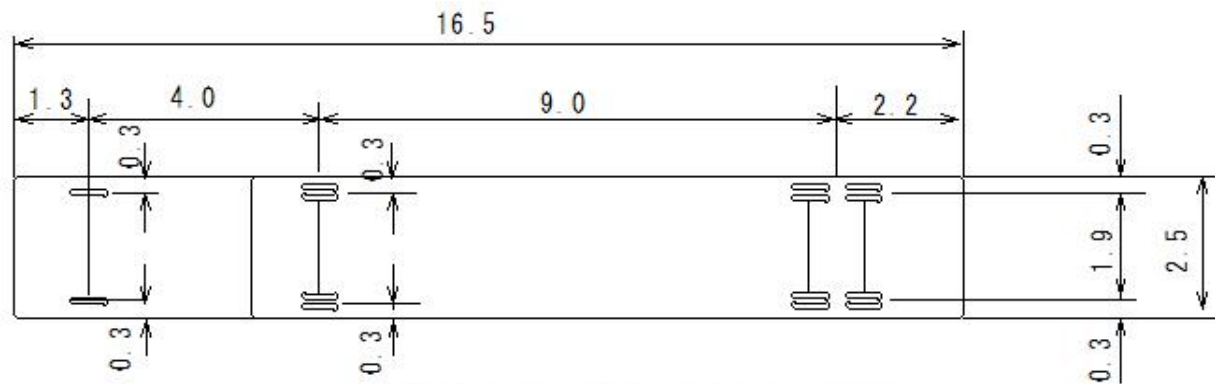
○Design vehicle

① Specifications (unit: meters)	② Length	③ Width	④ Height	⑤ Front overhang	⑥ Wheelbase	⑦ Rear overhang	⑧ Minimum turning radius
⑫ Semi-trailer Articulated vehicle	16.5	2.5	3.8	1.3	Front wheelbase 4 Rear wheelbase 9	2.2	12

⑤ Front overhang: Distance from the front of the vehicle to the center of the front axle

⑥ Wheelbase: Distance from the center of the front axle to the center of the rear axle

⑦ Rear overhang: Distance from the center of the rear axle to the rear of the vehicle



(H482)Road Structure Act(Road Classification)

Road Structure Act

Road Classification

○Classification-Design Standard Traffic Volume (unit: vehicles per day)

Classification		Terrain	Design Standard Traffic Volume (unit: vehicles per day)
Type 1	Class 2	Flat area	14,000
	Class 3	Plain area	14,000
		Mountain area	10,000
	Class 4	Plain area	13,000
		Mountain area	9,000

(1) For Type 4 roads with many intersections, the design standard traffic volume shall be calculated by multiplying the design standard traffic volume in this table by 0.8.

(H483)Road Structure Act(Road Classification)

Road Structure Act

Road Classification

○Classification-Design Standard Traffic Volume (unit: vehicles per day)

Classification		Terrain	Design Standard Traffic Volume (unit: vehicles per day)
Type 3	Class 2	Flat area	9,000
	Class 3	Plain area	8,000
		Mountain area	6,000
	Class 4	Plain area	8,000
		Mountain area	6,000

(1) For Type 4 roads with many intersections, the design standard traffic volume shall be calculated by multiplying the design standard traffic volume in this table by 0.8.

(H484)Road Structure Act(Road Classification)

Road Structure Act

Road Classification

○Classification-Design Standard Traffic Volume (unit: vehicles per day)

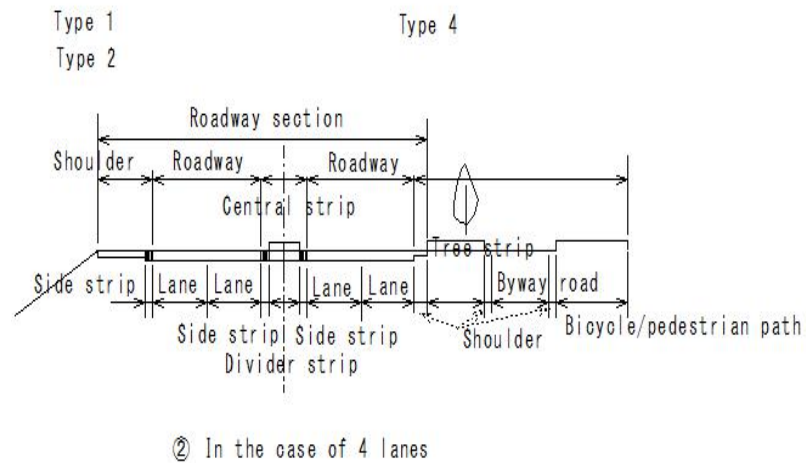
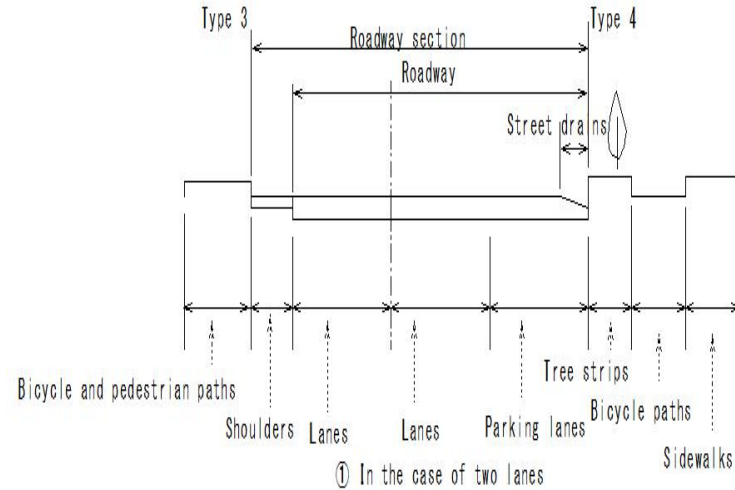
Classification		Terrain	Design Standard Traffic Volume (unit: vehicles per day)
Type 4	Class 1		12,000
	Class 2		10,000
	Class 3		9,000

(1) For Type 4 roads with many intersections, the design standard traffic volume shall be calculated by multiplying the design standard traffic volume in this table by 0.8.

(H485)Road Structure Act(Lane width)

Road Structure Act

Lane width		
Classification		Lane width (unit: meters)
Type 1	Class 1	3.5
	Class 2	
	Class 3	
	Class 4	3.25
Type 2	Class 1	3.5
	Class 2	3.25
Type 3	Class 1	3.5
	Class 2	3.25
	Class 3	3
	Class 4	2.75
Type 4	Class 1	3.25
	Class 2	3
	Class 3	

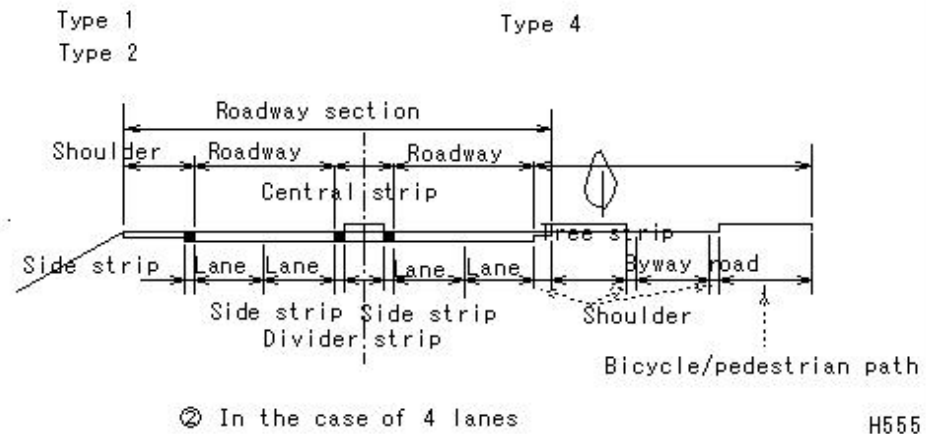
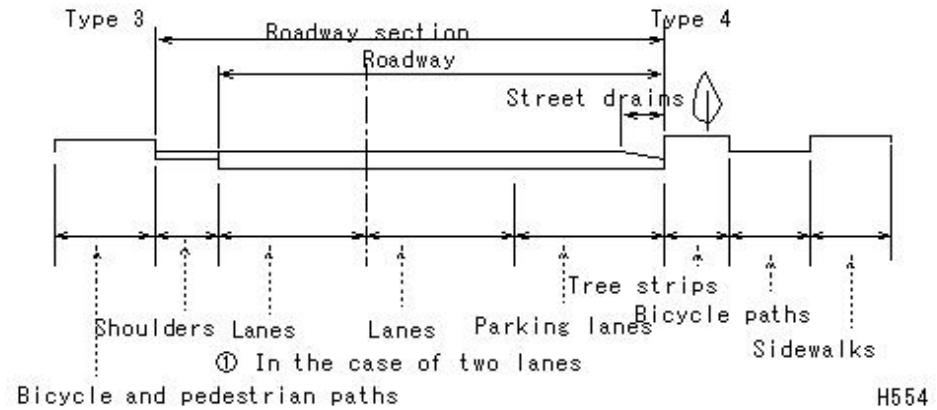


(H486)Road Structure Act(Lane separation)

(H486) Road Structure Act (Lane separation)

Road Structure Act
Lane separation, etc.
Classification

Division		Width of central strip (unit: meters)	
Type 1	Class 1	4.5	3
	Class 2		
	Class 3	3	2.25
	Class 4		1.75
Type 2	Class 1	2.25	
	Class 2	1.75	
Type 3	Class 1	1.75	1
	Class 2		
	Class 3		
	Class 4		
Type 4	Class 1	1	
	Class 2		
	Class 3		



(H487)Road Structure Act(Width of side strip in center strip)

(H487)Road Structure Act(Width of side strip in center strip)

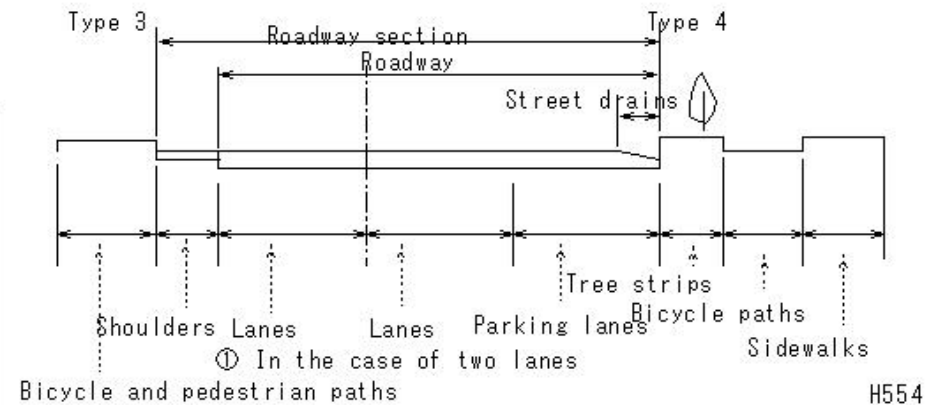
Road Structure Act

Width of side strip in center strip

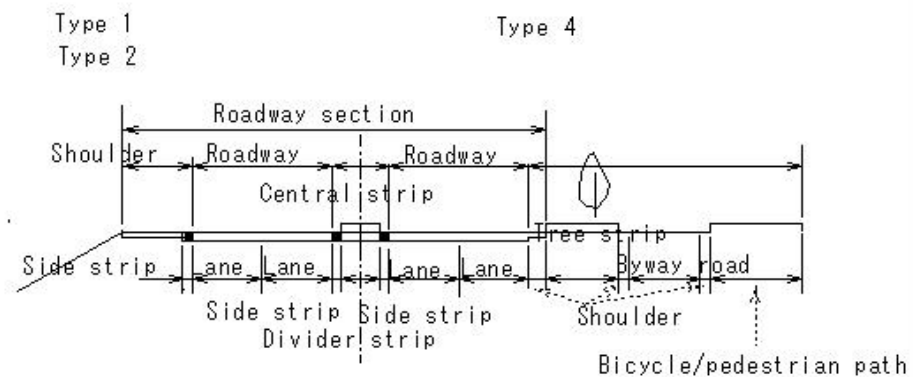
Classification

Division		Width of side strip in center strip
Type 1	Class 1	0.75
	Class 2	
	Class 3	0.5
	Class 4	
Type 2		0.5
Type 3	Class 1	0.25
	Class 2	
	Class 3	
	Class 4	
Type 4	Class 1	0.25
	Class 2	
	Class 3	

(unit: meters)



H554



② In the case of 4 lanes

H555

(H488)Road Structure Act(Width of shoulder on the left side of the road)

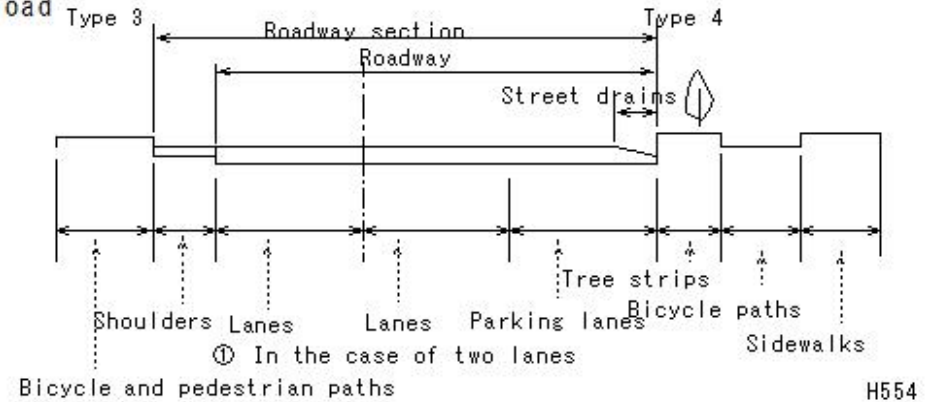
(H488)Road Structure Act(Width of shoulder on the left side of the road)

Road Structure Act

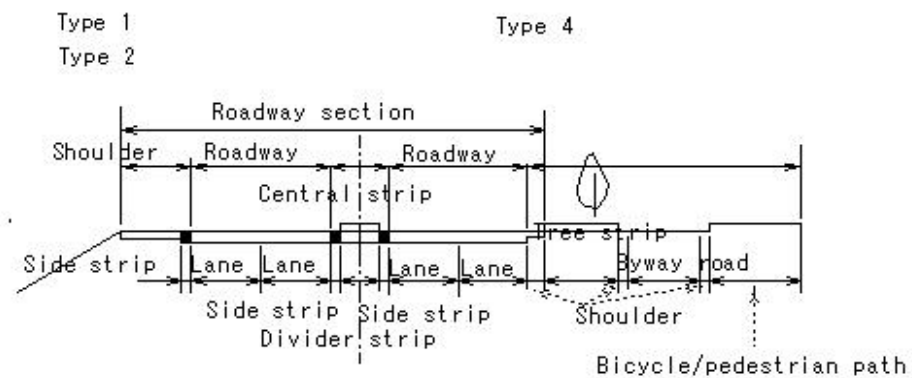
Width of shoulder on the left side of the road

Division		Width of shoulder on the left side of the road	
Type 1	Class 1	2.5	1.75
	Class 2		
	Class 3	1.75	1.25
	Class 4		
Type 2	Class 1	1.25	
	Class 2		
Type 3	Class 1	1.25	0.75
	Class 2		
	Class 3	0.75	0.5
	Class 4		
	Class 5		
Type 4	Class 1	0.5	
	Class 2		
	Class 3		
	Class 4		

(unit: meters)



H554



② In the case of 4 lanes

H555

(H489)Road Structure Act(Width of shoulder on the right side of the road)

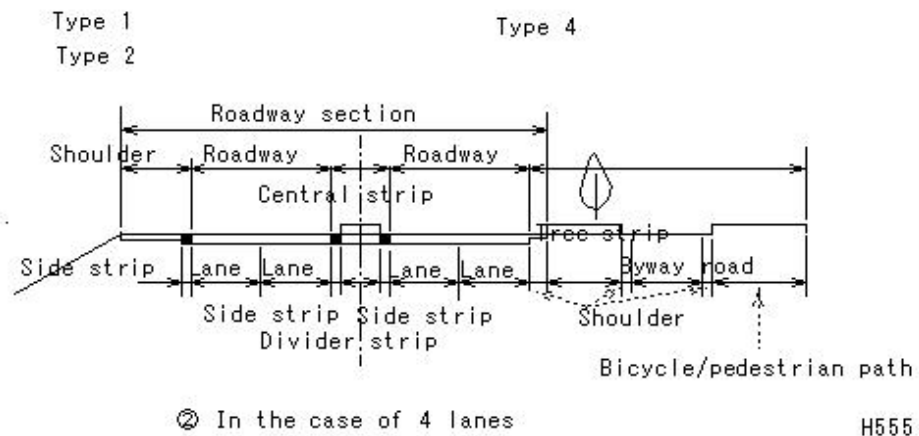
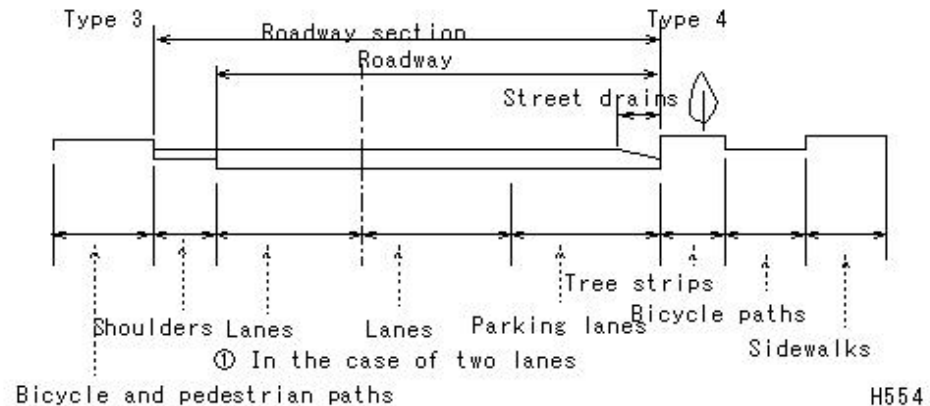
(H489)Road Structure Act(Width of shoulder on the right side of the road)

Road Structure Act

Width of shoulder on the right side of the road

Division		Width of shoulder on the right side of the road
Type 1	Class 1	1.25
	Class 2	
	Class 3	0.75
	Class 4	
Type 2		0.75
Type 3		0.5
Type 4		0.5

(unit: meters)



(H490)Road Structure Act(Width of the side strip on the road shoulder)

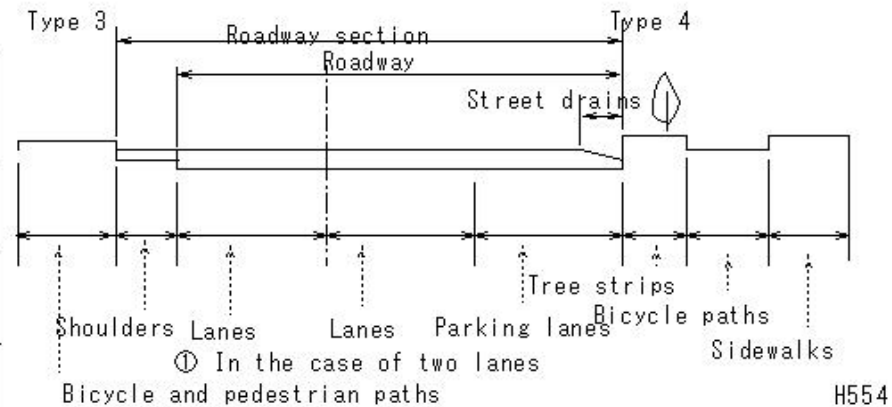
(H490)Road Structure Act(Width of the side strip on the road shoulder)

Road Structure Act

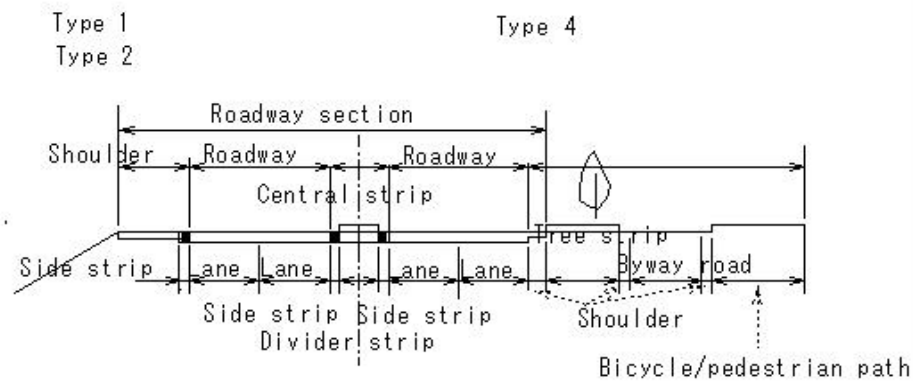
Width of the side strip on the road shoulder

Division		Width of the side strip on the road shoulder	
Type 1	Class 1	0.75	0.5
	Class 2		
	Class 3	0.5	0.25
	Class 4		
Type 2	Class 1	0.5	-
	Class 2		

(unit: meters)



H554



② In the case of 4 lanes

H555

(H491)Road Structure Act(Width of bicycle and pedestrian path)

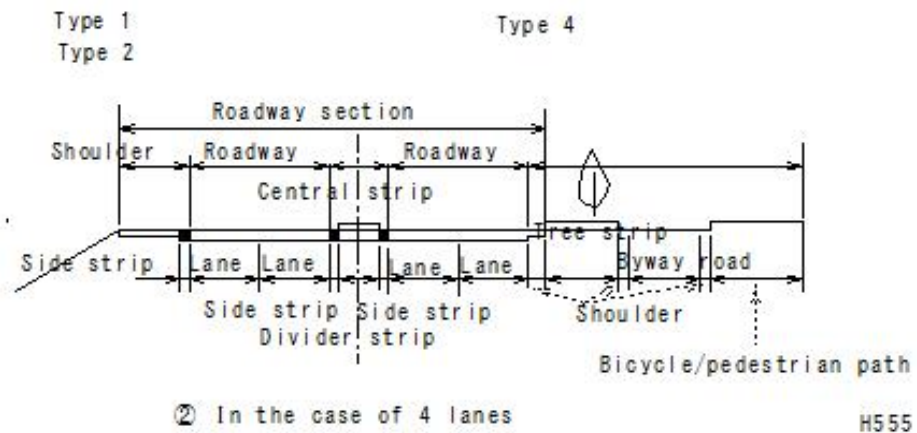
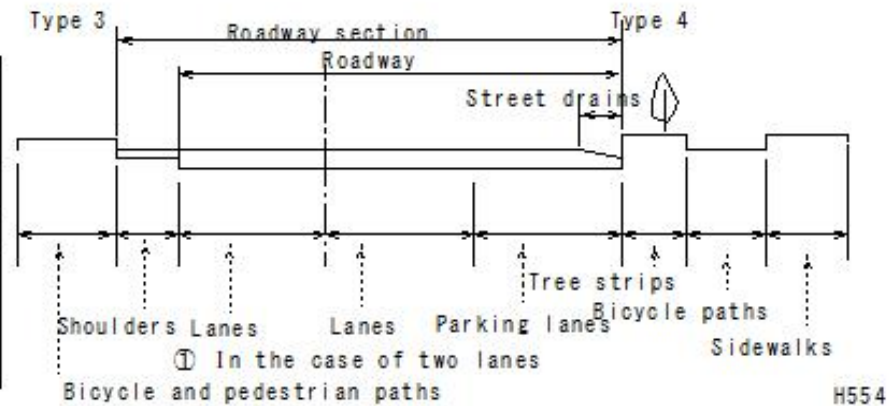
(H491)Road Structure Act(Width of bicycle and pedestrian path)

Road Structure Act

Width of bicycle and pedestrian path

Division		Width of bicycle and pedestrian path		
Type 3		2	1.5	1.5
Type 1	Class 1	3.5	2.75	2
	Class 2		2	1.5
	Class 3	2	1.5	
	Class 4			

(unit: meters)



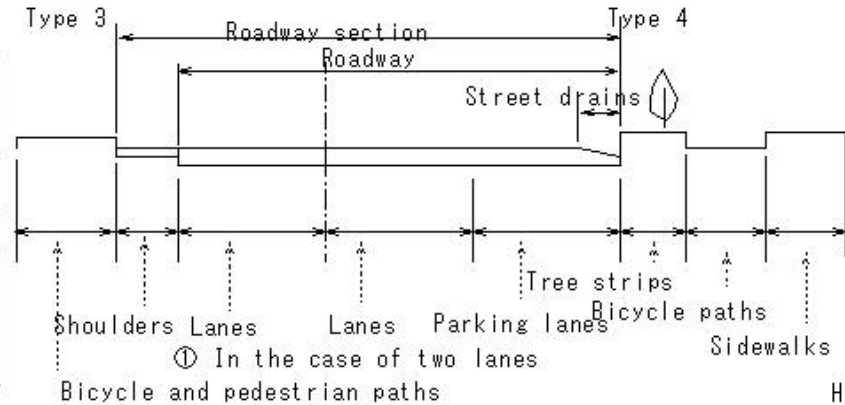
(H492)Road Structure Act(Sidewalk width)

(H492)Road Structure Act(Sidewalk width)

Road Structure Act
Sidewalk width

Division		Sidewalk width		
Type 3		1.5	1	1
Type 4	Class 1	3	2.25	1.5
	Class 2		1.5	
	Class 3	1.5	1	1
	Class 4			

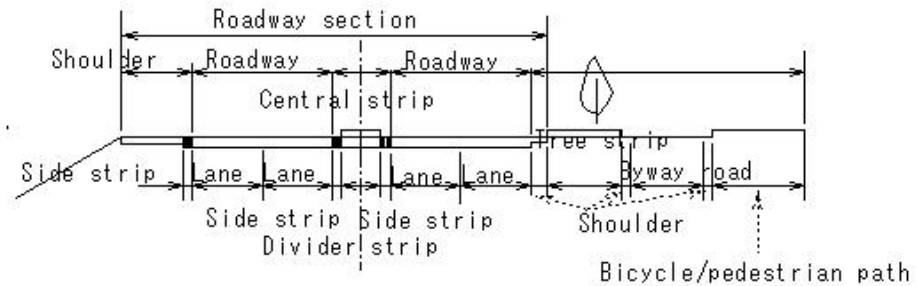
(unit: meters)



H554

Type 1
Type 2

Type 4



② In the case of 4 lanes

H555

(H493)Road Structure Act(Construction Limit:Construction Gauge)

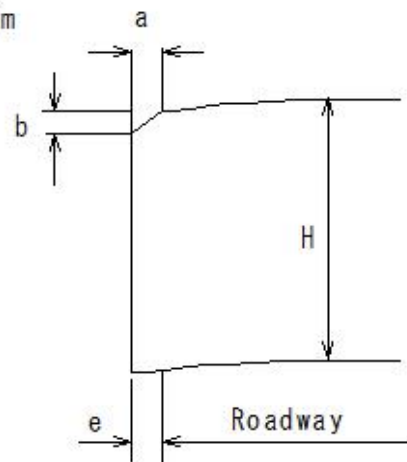
(H493)Road Structure Act(Construction Limit:Construction Gauge)

Road Structure Act

Construction Limit:Construction Gauge

There must be no obstructions within 4.5 meters above the roadway or 2.5 meters above the sidewalk.

- ① Roadway of roads that are connected to the roadway and have shoulders
- Tunnels without sidewalks or bicycle paths
 - Roadway of roads other than tunnels without sidewalks or bicycle paths, bridges or elevated roads over 50m



H: 4.8m (ordinary roads that are important logistics roads) 4.5m (other ordinary roads)
(however, for Type 3 Class 5 (Type 4 Class 4), 4m in unavoidable cases)

a, e: Width of shoulder connecting to road

b: Value obtained by subtracting 4.1m (important logistics roads) and 3.8m (other roads) from H

(H494)Road Structure Act(Construction Limit:Construction Gauge)

(H494)Road Structure Act(Construction Limit:Construction Gauge)

Road Structure Act

Construction Limit:Construction Gauge

There must be no obstructions within 4.5 metres above the roadway or 2.5 metres above the sidewalk.

① Roadway of roads that are connected to the roadway and have shoulders

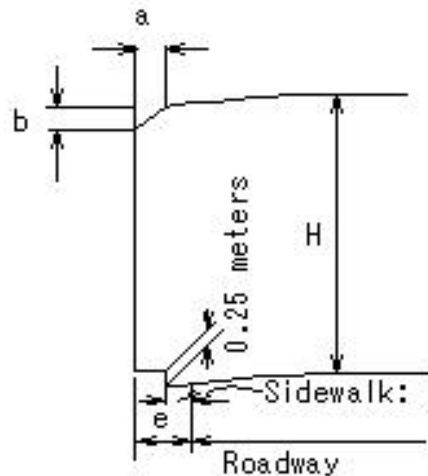
- Roadway of tunnels, bridges over 50m long, and elevated roads that do not have sidewalks or bicycle paths

Tunnels, bridges, and elevated roads (length 50m or more)

in case of sidewalks, bicycle paths, etc. are not provided

H: 4.8m (ordinary roads that are important logistics roads) 4.5m (other ordinary roads)

(however, for Type 3 Class 5 (Type 4 Class 4), 4m in unavoidable cases)



a, e: Width of shoulder connecting to road

b: H minus 4.1m (ordinary roads that are important logistics roads)
3.8m (other ordinary roads)

(H495)Road Structure Act(Construction Limit:Construction Gauge)

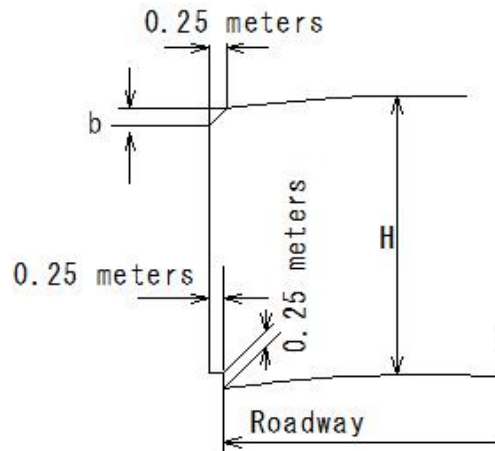
(H495)Road Structure Act (Construction Limit:Construction Gauge)

Road Structure Act

Construction Limit:Construction Gauge Article 12

There must be no obstructions within 4.5 metres above the roadway or 2.5 metres above the sidewalk.

- ② Roadway of a road that is connected to the roadway and does not have a shoulder
Except for (H496)



- H: 4.8m (ordinary roads that are important logistics roads)
4.5m (other ordinary roads)
(however, for Class 3, Class 5 (Class 4, Class 4), 4m if unavoidable)
- a, e: width of shoulder connecting to roadway
- b: value obtained by subtracting 4.1m
(ordinary roads that are important logistics roads)
3.8m (other ordinary roads) from H

(H496)Road Structure Act(Construction Limit:Construction Gauge)

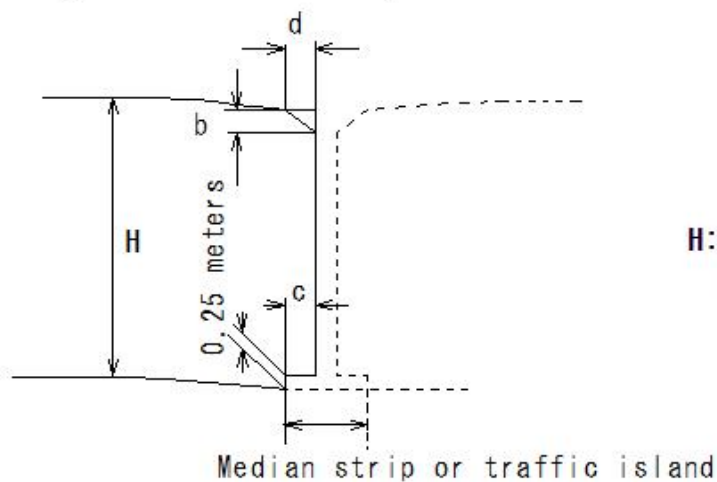
(H496)Road Structure Act(Construction Limit:Construction Gauge)

Road Structure Act

Construction Limit:Construction Gauge Article 12

There must be no obstructions within 4.5 metres above the roadway or 2.5 metres above the sidewalk.

③Part of the roadway that is related to the median strip or traffic island



H: 4.8m (ordinary roads that are important logistics roads)
4.5m (other ordinary roads)

(H497)Road Structure Act(Construction Limit:Construction Gauge)

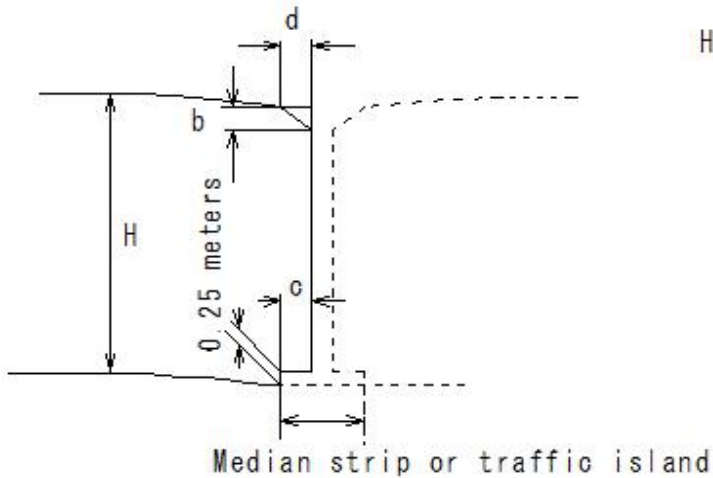
(H497)Road Structure Act(Construction Limit:Construction Gauge)

Road Structure Act

Construction Limit:Construction Gauge Article 12

There must be no obstructions within 4.5 metres above the roadway or 2.5 metres above the sidewalk.

③Part of the roadway that is related to the median strip or traffic island



H: 4.8m (ordinary roads that are important logistics roads)

4.5m (other ordinary roads)

Division		c	d
Type 1	Class 1	0.5	1
	Class 2		
	Class 3	0.25	0.75
	Class 4		
Type 2	Class 1	0.25	0.75
	Class 2		
Type 3		0.25	0.5
Type 4		0.25	0.5

(unit: meters)

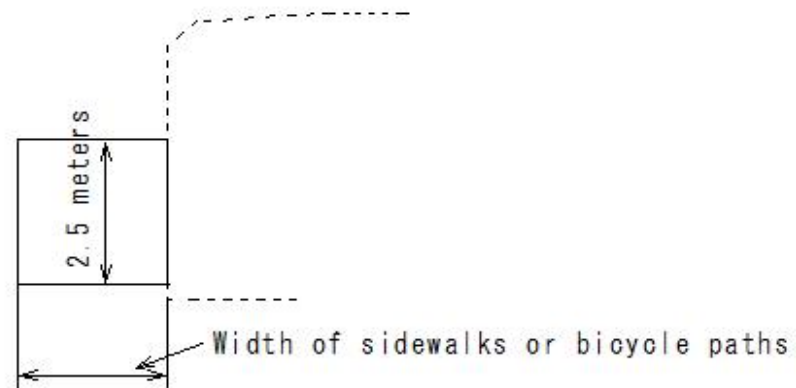
(H498)Road Structure Act(Construction Limit:Construction Gauge)

(H498) Road Structure Act(Construction Limit:Construction Gauge)

Road Structure Act

Construction Limit:Construction Gauge Article 12

There must be no obstructions within 4.5 metres above the roadway or 2.5 metres above the sidewalk.



○ Sidewalks and bicycle paths without roadside facilities

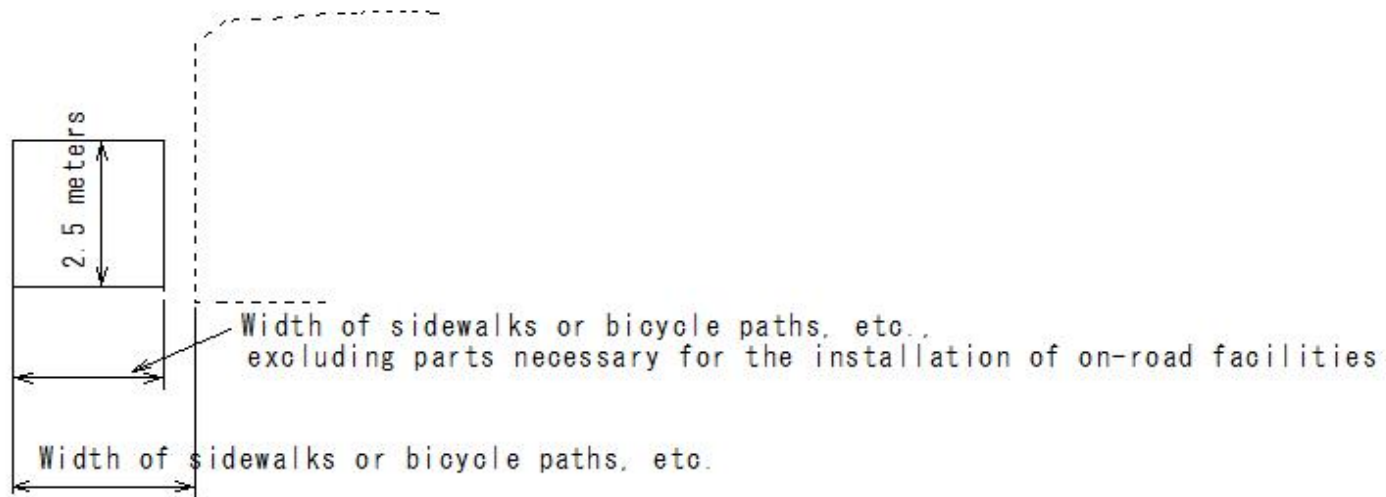
(H499)Road Structure Act(Construction Limit:Construction Gauge)

(H499)Road Structure Act(Construction Limit:Construction Gauge)

Road Structure Act

Construction Limit:Construction Gauge Article 12

There must be no obstructions within 4.5 metres above the roadway or 2.5 metres above the sidewalk.



○ Sidewalks and bicycle paths with on-road facilities

(H500)Road Structure Act(Design speed (unit: kilometers per hour))

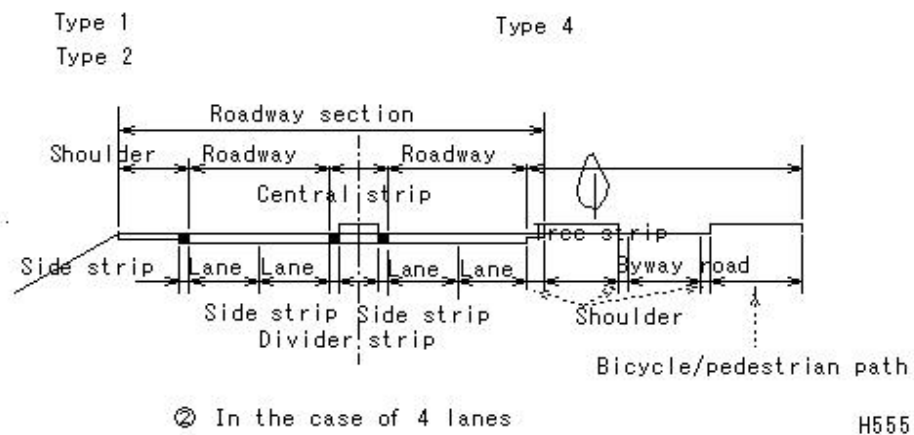
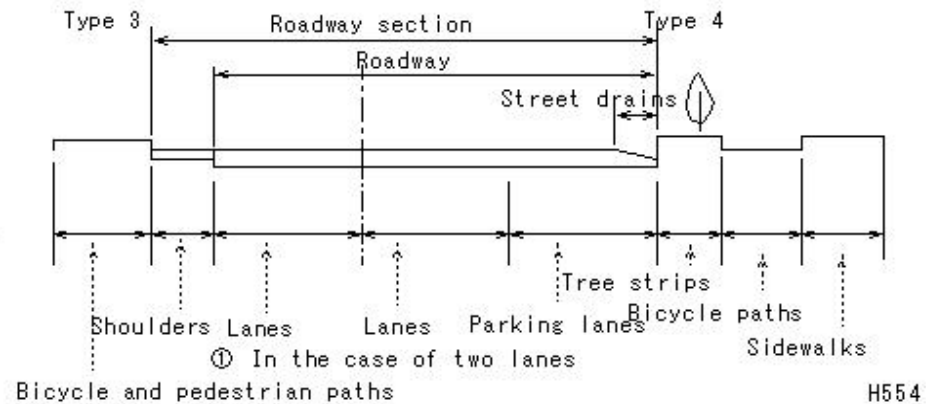
(H500)Road Structure Act(Design speed (unit: kilometers per hour))

Road Structure Act

Article 13

Design speed (unit: kilometers per hour)

Division		Design speed (unit: kilometers per hour)	
Type 1	Class 1	120	100
	Class 2	100	80
	Class 3	80	60
	Class 4	60	50
Type 2	Class 1	80	60
	Class 2	60	50, 40
Type 3	Class 1	80	60
	Class 2	60	50, 40
	Class 3	60, 50, 40	30
	Class 4	50, 40, 30	20
	Class 5	40, 30, 20	
Type 4	Class 1	60	50, 40
	Class 2	60, 50, 40	30
	Class 3	50, 40, 30	20
	Class 4	40, 30, 20	



(H501)Road Structure Act(Curve radius)

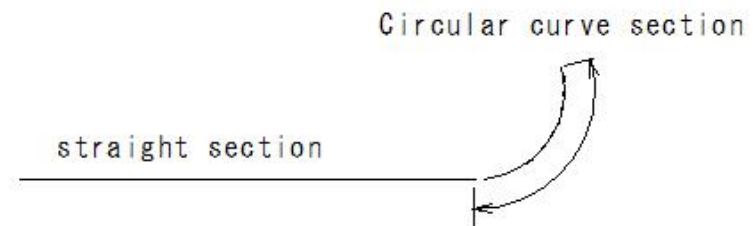
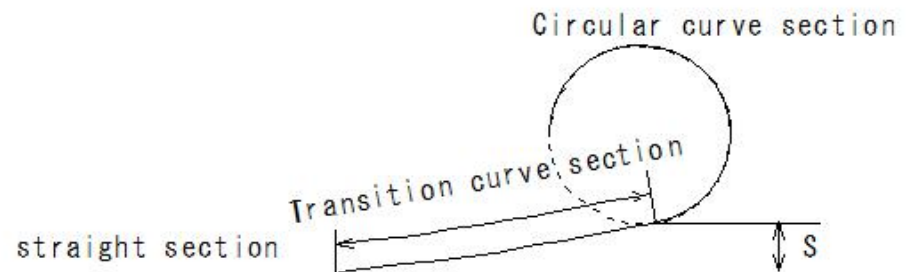
(H501)Road Structure Act(Curve radius)

Road Structure Act

Article 15

Curve radius

Design speed (unit: kilometers per hour)	Curve radius (unit: meters)	
120	710	570
100	460	380
80	280	230
60	150	120
50	100	80
40	60	50
30	30	
20	15	



H723

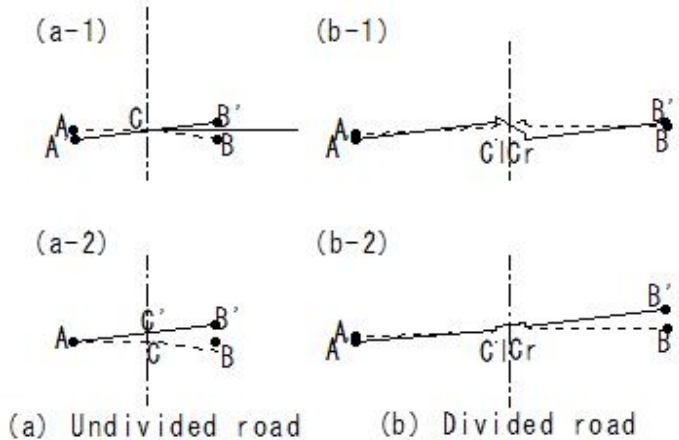
(H502)Road Structure Act(Side slope of curved sections)

(H502)Road Structure Act(Side slope of curved sections)

Road Structure Act
 Side slope of curved sections
 Article 16

Classification	Areas where roads exist		Maximum side slope (%)
Type 1, 2, 3	Snowy and cold regions	Areas with high snowfall and cold	6
		Other regions	8
	Other regions		10
Type 4			6

Figure 4-29

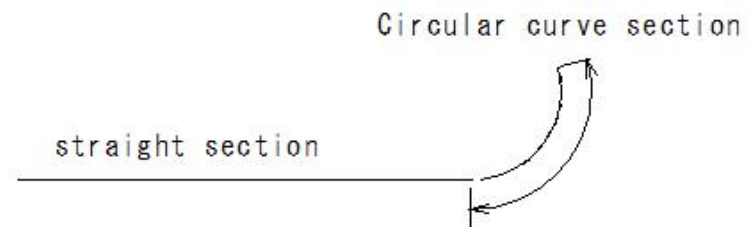
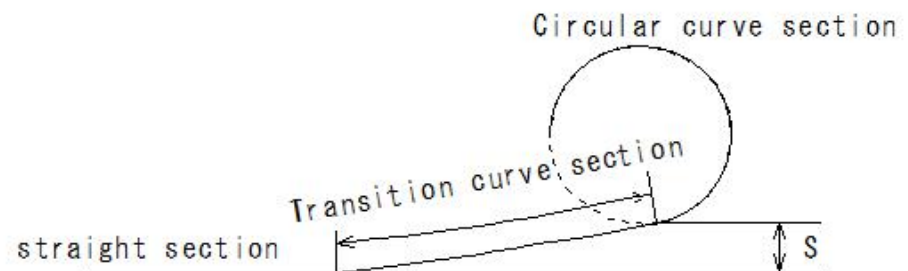


(H503)Road Structure Act(transition section)

(H503)Road Structure Act(transition section)

Road Structure Act
transition section
Article 18

Design speed (unit: kilometers per hour)	Length of transition section (unit: meters)
120	100
100	85
80	70
60	50
50	40
40	35
30	25
20	20



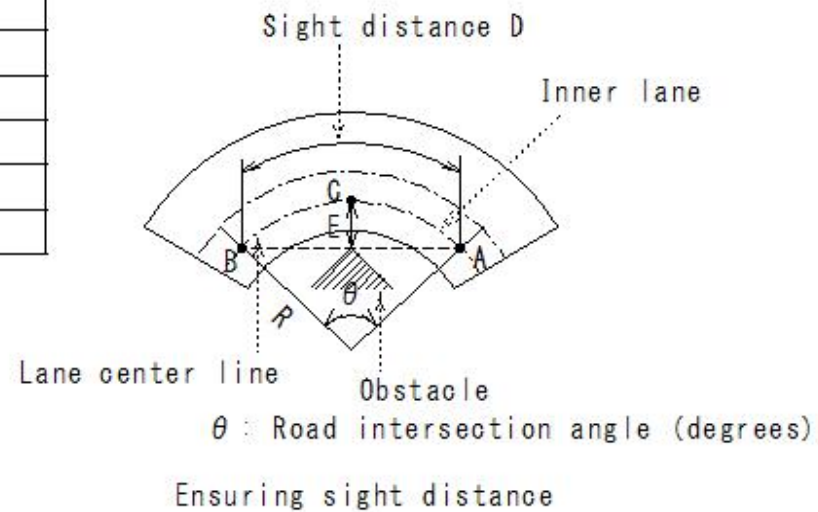
H723

(H504)Road Structure Act(Sight distance)

(H504)Road Structure Act(Sight distance)

Road Structure Act
transition section
Article 19

Design speed (unit: kilometers per hour)	Sight distance (unit: meters)
120	210
100	160
80	110
60	75
50	55
40	40
30	30
20	20



H753

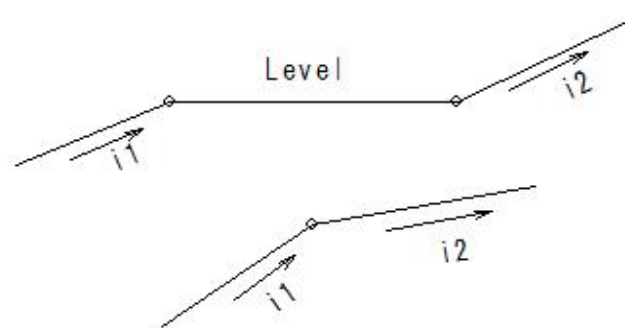
(H505)Road Structure Act(Longitudinal gradient)

(H505)Road Structure Act(Longitudinal gradient)

Road Structure Act
Longitudinal gradient
Article 20

Longitudinal gradient (unit: %)

Design speed (unit: kilometers per hour)	Longitudinal gradient (unit: %)
120	2
100	3
80	4
60	5
50	6
40	7
30	8
20	9

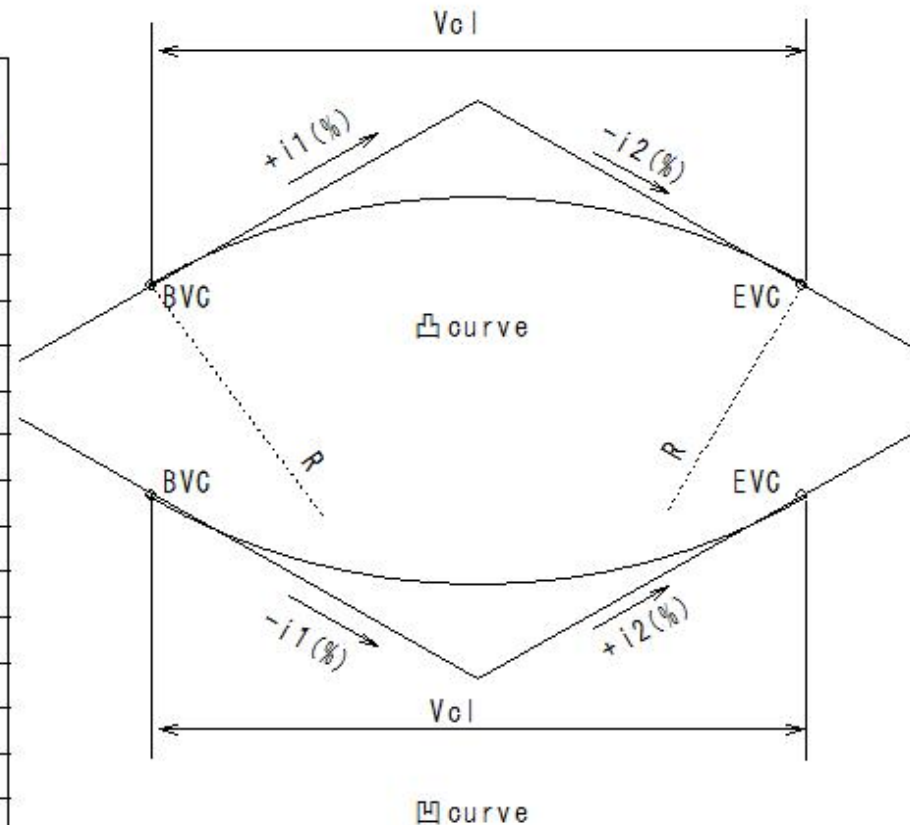


(H506)Road Structure Act(Vertical curve radius)

(H506)Road Structure Act(Vertical curve radius)

Road Structure Act
Vertical curves
Article 22

Design speed (unit: kilometers per hour)	Curve shape	Vertical curve radius (m)
120	凸curve	11000
	凹curve	4000
100	凸curve	6500
	凹curve	3000
80	凸curve	3000
	凹curve	2000
60	凸curve	1400
	凹curve	1000
50	凸curve	800
	凹curve	700
40	凸curve	450
	凹curve	450
30	凸curve	250
	凹curve	250
20	凸curve	100
	凹curve	100



(H508)Road Structure Act(Cross slope)

(H508)Road Structure Act(Cross slope)

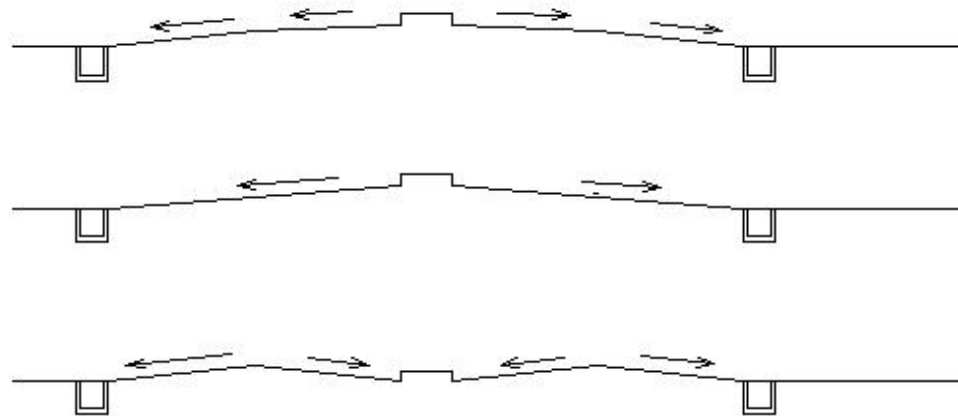
Road Structure Act

Cross slope

Article 24

Type of road surface	Gross slope (unit: %)
Cement concrete pavement and asphalt concrete pavement	1.5 to 2
Other	3 to 5

Gross slope



(H509)Road Structure Act(Composite gradient)

(H509)Road Structure Act(Composite gradient)

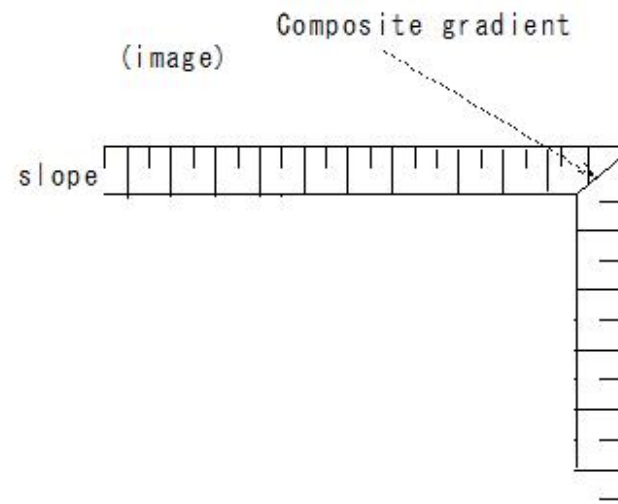
Road Structure Act

Composite gradient

(Gradient obtained by combining longitudinal gradient and single gradient or cross gradient)

Article 25

Design speed (unit: kilometers per hour)	Composite gradient (unit: %)
120	10
100	
80	10.5
60	
50	11.5
40	
30	
20	



(H510)Road Structure Act(Level crossing with railways, etc)

(H510)Road Structure Act(Level crossing with railways, etc)

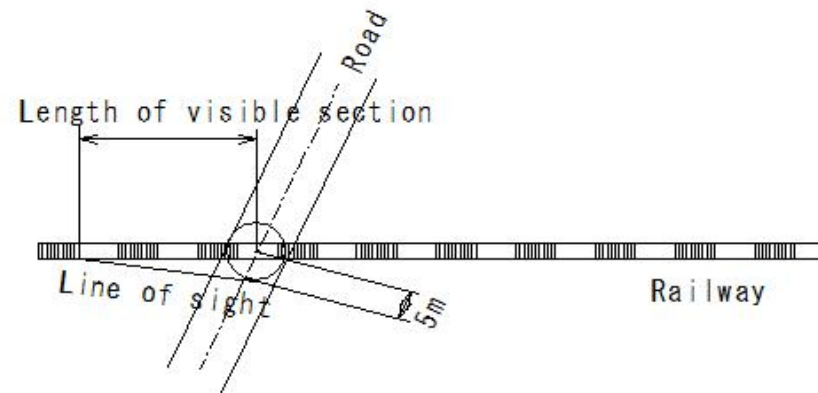
Road Structure Act

Level crossing with railways, etc.

Length of visible section

Article 29

Maximum speed of railway vehicles at level crossings	Length of visible section curve (unit: meters)
Less than 50	110
50 to less than 70	160
70 to less than 80	200
80 to less than 90	230
90 to less than 100	260
100 to less than 110	300
110 or more	350



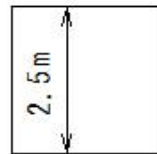
(H511)Road Structure Act(Bicycle-only road or bicycle-pedestrian-only road)

(H511)Road Structure Act(Bicycle-only road or bicycle-pedestrian-only road)

Road Structure Act

Bicycle-only road or bicycle-pedestrian-only road

Article 39



Bicycle-only road or bicycle-pedestrian-only road

(excluding areas necessary for providing roadside facilities)

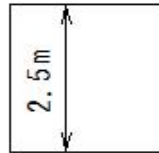
(H512)Road Structure Act(Pedestrian-only road)

(H512) Road Structure Act (Pedestrian-only road)

Road Structure Act

Pedestrian-only road (excluding areas necessary for providing roadside facilities)

Article 40



Pedestrian-only road

(excluding areas necessary for providing roadside facilities)

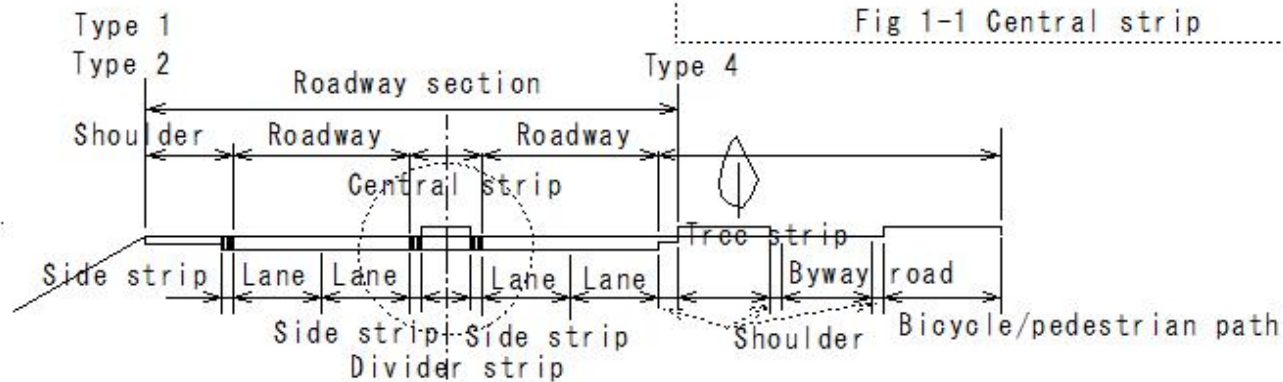
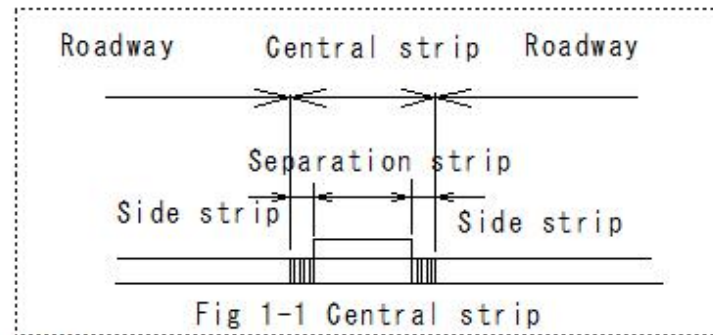
(H513)Road Structure Act(Central strip)

(H513)Road Structure Act(Central strip)

Road Structure Act

Central strip

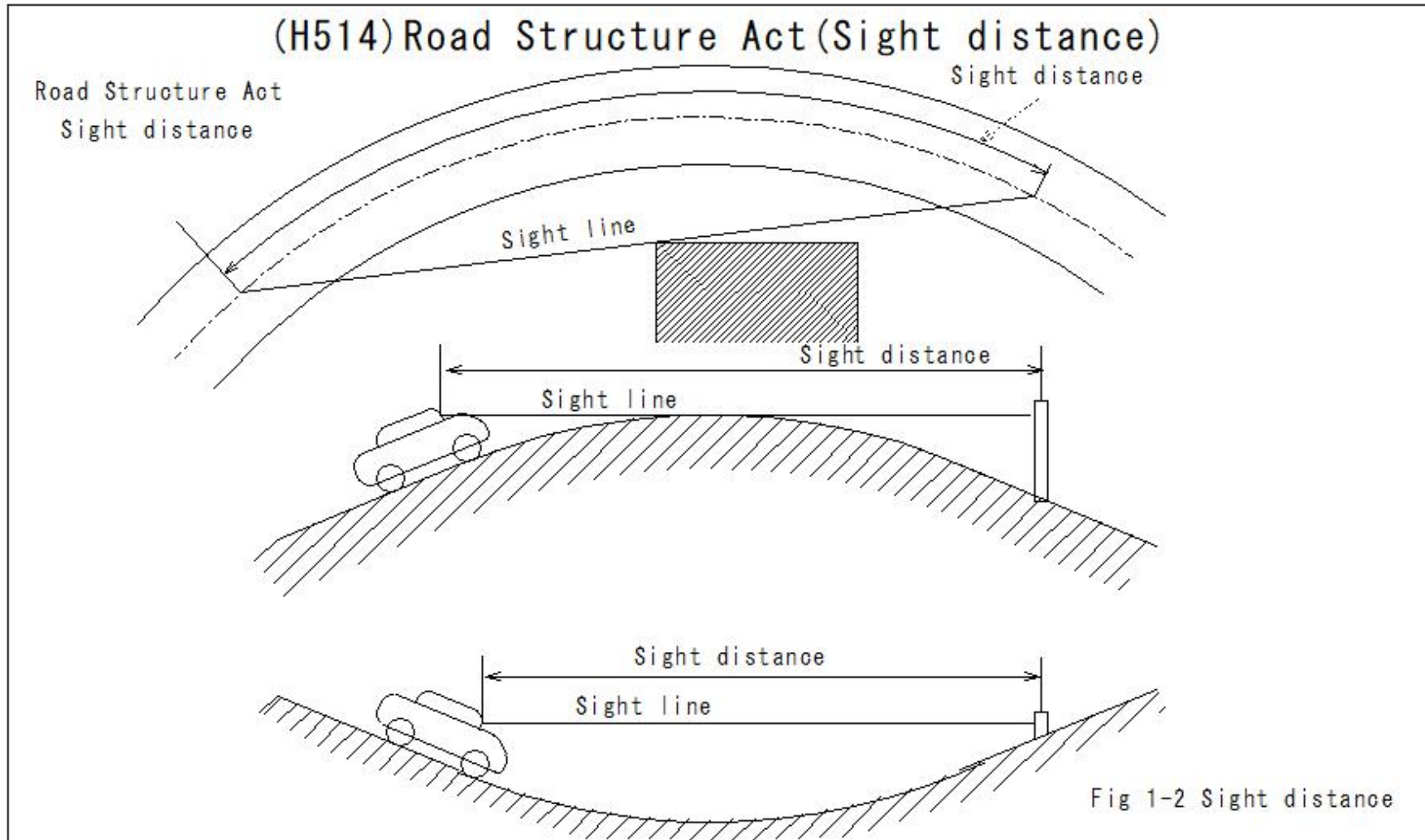
Established to separate two or more lanes in the forward and backward directions



② In the case of 4 lanes

H555

(H514)Road Structure Act(Sight distance)



(H515)Road Structure Act(Additional lanes)

(H515)Road Structure Act(Additional lanes)

Road Structure Act
Additional lanes
Fig1-3

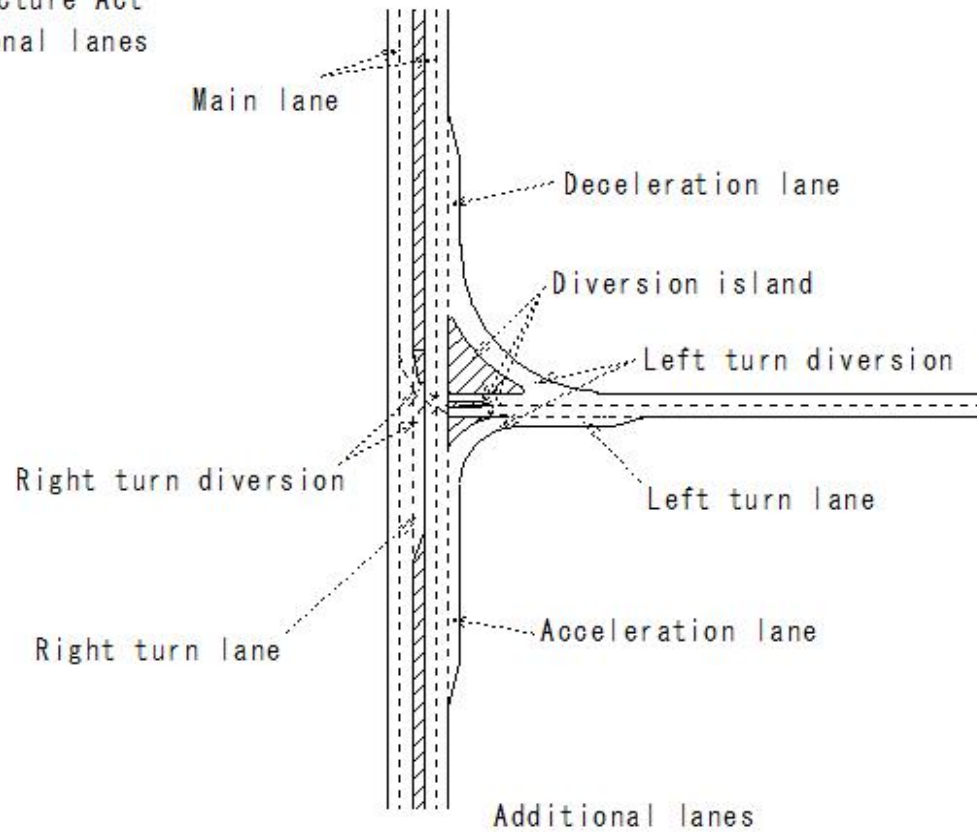
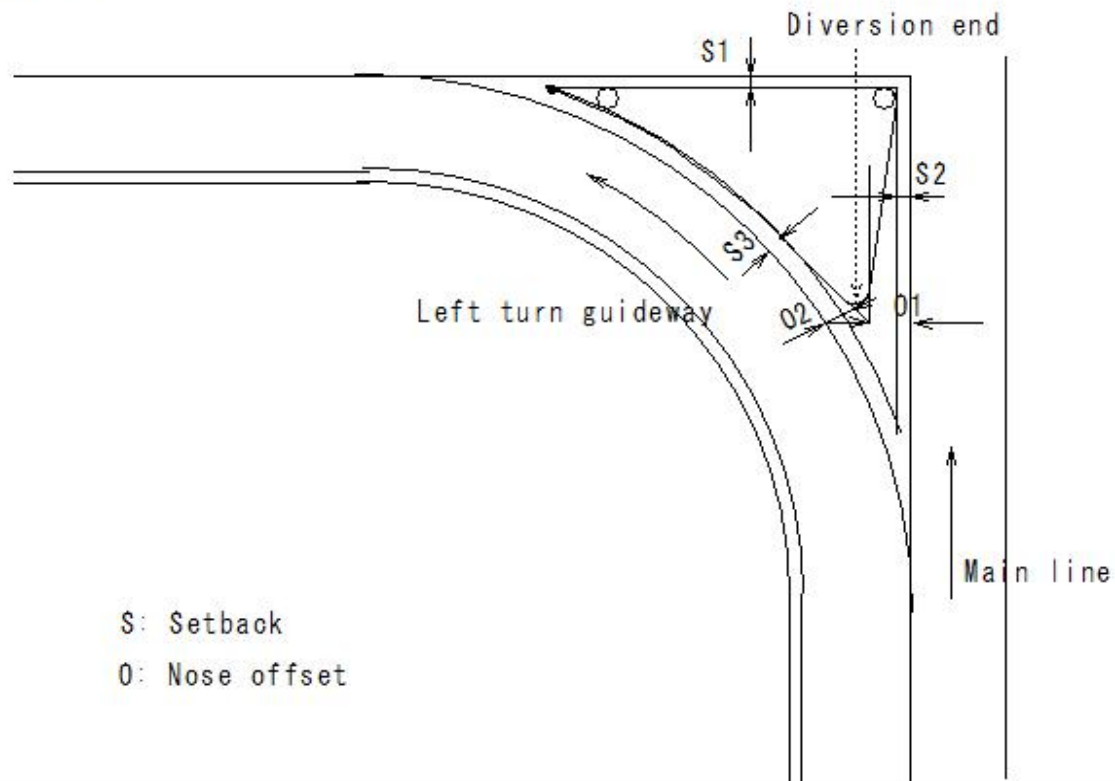


Fig1-3

(H516)Road Structure Act(Setback: Nose offset)

(H516)Road Structure Act(Setback: Nose offset)

Road Structure Act
Setback: Nose offset
Fig1-4



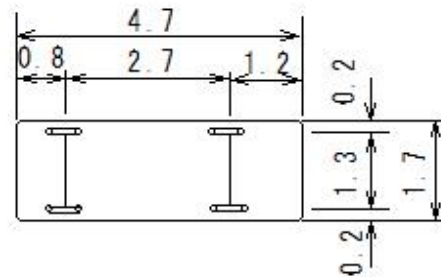
(H517)Road Structure Act(Design vehicle)

(H517)Road Structure Act(Design vehicle)

Road Structure Act

1-4 Design vehicle

Specifications (unit: m)	Length	Width	Height	Front overhang	Wheelbase	Rear overhang	Minimum turning radius
Design vehicle							
Small car (Compact cars)	4.7	1.7	2	0.8	2.7	1.2	6



Small car (Compact cars)

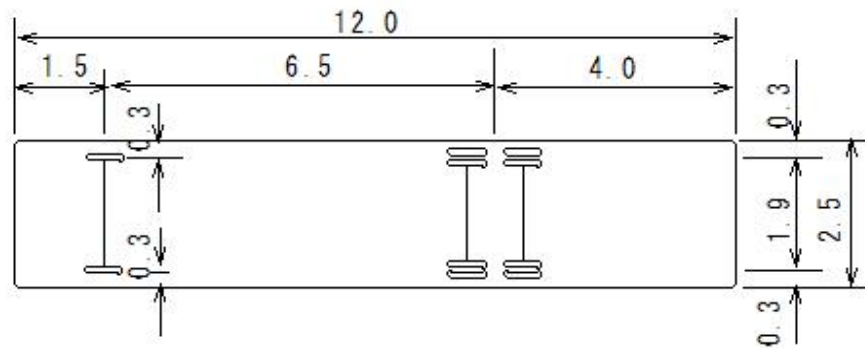
(H518)Road Structure Act(Design vehicle)

(H518)Road Structure Act(Design vehicle)

Road Structure Act

1-4 Design vehicle

Specifications (unit: m)	Length	Width	Height	Front overhang	Wheelbase	Rear overhang	Minimum turning radius
Design vehicle							
Regular Car (Standard car)	12	2.5	3.8	1.5	6.5	4	12



Regular Car (Standard car)

H480

(H519)Road Structure Act(Design vehicle)

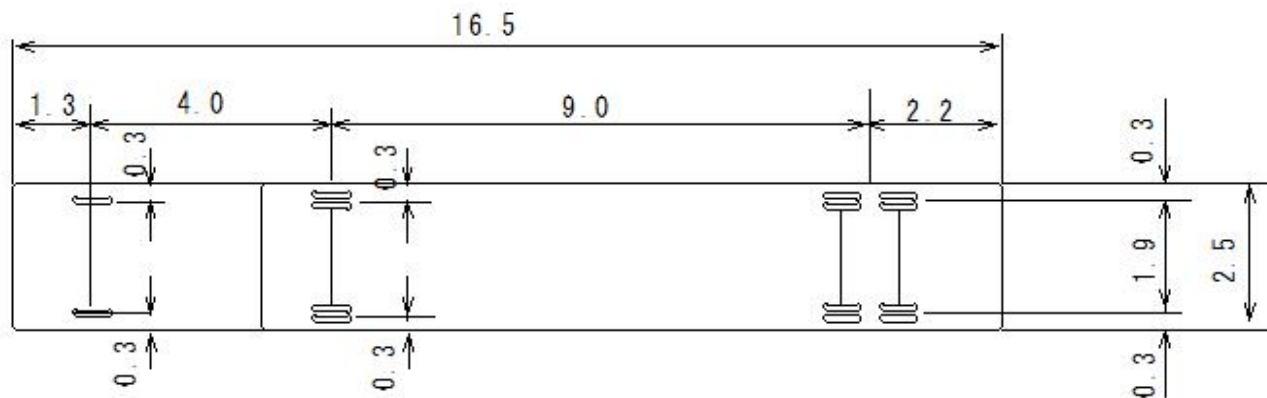
(H519)Road Structure Act(Design vehicle)

Road Structure Act

1-4 Designed vehicles

Specifications (unit: m)	Length	Width	Height	Front overhang	Wheelbase	Rear overhang	Minimum turning radius
Design vehicle							
Semi-trailer articulated vehicle	16.5	2.5	3.8	1.3	4	2.2	12

Front wheelbase 4
Rear wheelbase 9



Semi-trailer Articulated vehicle

(H520)Road Structure Act(Design vehicle)

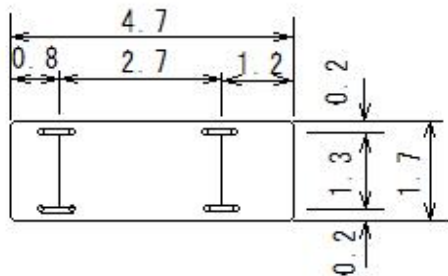
(H520)Road Structure Act(Design vehicle)

Road Structure Act

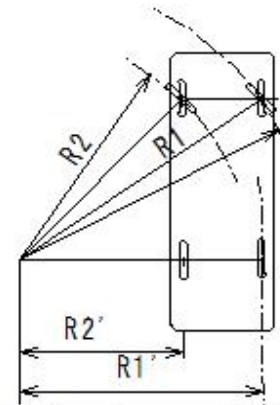
1-4 Design vehicle

Small car (Compact cars)

Specifications (unit: m)	Length	Width	Height	Front overhang	Wheelbase	Rear overhang	Minimum turning radius
Design vehicle							
Small car (Compact cars)	4.7	1.7	2	0.8	2.7	1.2	6



Small car (Compact cars)



Turning radius

- R_1 : Turning radius of the outer front wheel
- R_1' : Turning radius of the outer rear wheel
- R_2 : Turning radius of the inner front wheel
- R_2' : Turning radius of the inner rear wheel

(H521)Road Structure Act(Design vehicle)

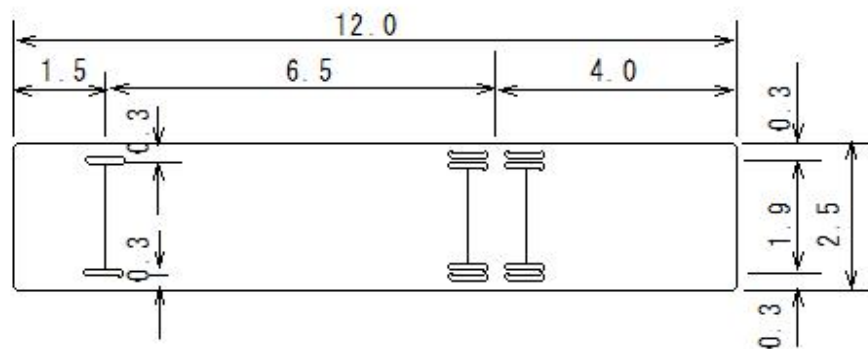
(H521)Road Structure Act(Design vehicle)

Road Structure Act

1-4 Design vehicle

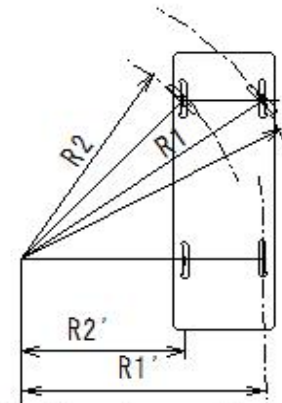
Regular Car (Standard car)

Specifications (unit: m)	Length	Width	Height	Front overhang	Wheelbase	Rear overhang	Minimum turning radius
Design vehicle							
Regular Car (Standard car)	12	2.5	3.8	1.5	6.5	4	12



Regular Car (Standard car)

H480



Turning radius

- R1: Turning radius of the outer front wheel
- R1': Turning radius of the outer rear wheel
- R2: Turning radius of the inner front wheel
- R2': Turning radius of the inner rear wheel

(H522)Road Structure Act(Design vehicle)

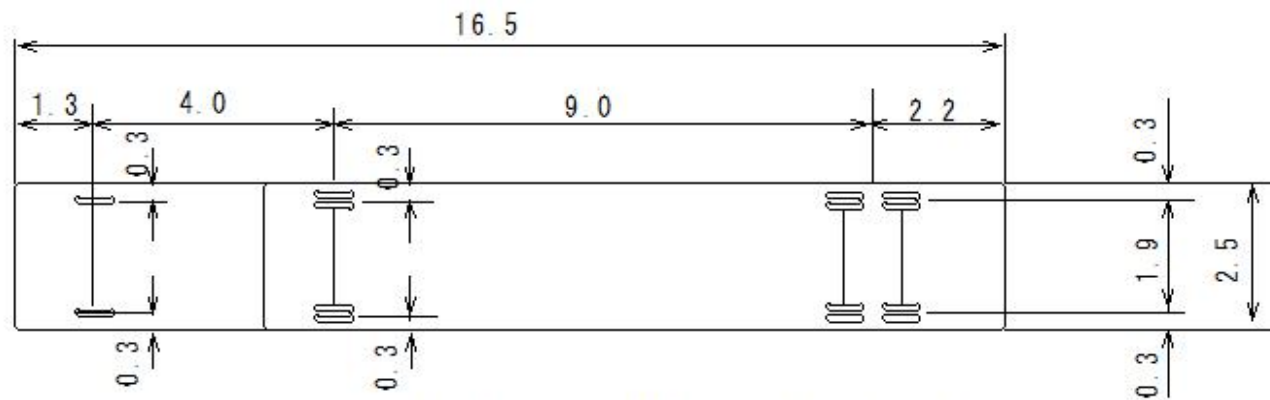
(H522)Road Structure Act(Design vehicle)

Road Structure Act

1-4 Designed vehicles

Specifications (unit: m)	Length	Width	Height	Front overhang	Wheelbase	Rear overhang	Minimum turning radius
Design vehicle							
Semi-trailer articulated vehicle	16.5	2.5	3.8	1.3		2.2	12

Front wheelbase 4
Rear wheelbase 9



Semi-trailer Articulated vehicle

(H523)Road Structure Act(Vehicle limits in other countries)

Road Structure Act

1-4 Design vehicle

Vehicle limits in other countries

Table 1-3 Vehicle limits in other countries

①Limit value Country name	②Length (m)				⑨Width (m)	⑩Height (m)	⑪Axle load (t)				⑭Total vehicle weight (t)				⑰Notes
	③Single vehicle		④Articulated vehicle				⑫Single axle	⑬Tandem	⑮Single vehicle		⑯Articulated vehicle				
	⑤Truck	⑥Bus	⑦Semi-trailer	⑧Full trailer					⑮Two-axle vehicle	⑰Three-axle	⑱Semi-trailer	⑳Full trailer			
⑳International Road Traffic	10(11)	11	14	(2-unit combina	2.5	3.8	8	14.5	22.5	22.5	32	36	() for vehicles with 3 or more		
㉑Belgium	11	12	15.5	18	2.5	4	13	20	19	26	38	40			
㉒France	11	12	15	18	2.5	-	13	21	19	26	38	38			
㉓Italy	12	12	15.5	18	2.5	4	12	19	18	24	30-44	40-44			
㉔Netherlands	11	12	15	18	2.5	4	10	18	16	24	24-40	32-48			
㉕Sweden	-	-	24	24	2.5	-	10	16	16.5	22.5	26.5-38.5	36.5-42.5			
㉖England	11	12	15	25.9	2.5	4.6	10	20	16	24	24-32	32			
㉗West Germany	12	12	15	18	2.5	4	10	16	16	22	26-38	38			
㉘Switzerland	10	12	16	18	2.3	4	10	14	16	19	26-38	28			
㉙Spain	11(12)	12	16.5	18	2.5	4	13	14.7	20	26	38	38		() for vehicles with 3 or more	
㉚United States	12.2	12.2	16.8	19.8	2.6	4.11	9.1	15.5	Specified according to wheelbase					AASHO POLICY-1979	
㉛Japan	12	12	12(16.5)	12	2.5	3.8	10	-	20	20	(27-34)	-			

①Limit value

②Length (m)

③Single vehicle

④Articulated vehicle

⑤Truck

⑥Bus

⑦Semi-trailer

⑧Full trailer

⑨Width (m)

⑩Height (m)

⑪Axle load (t)

⑫Single axle

⑬Tandem

⑭Total vehicle weight (t)

⑮Single vehicle

⑯Two-axle vehicle

⑰Three-axle vehicle

⑱Articulated vehicle

⑲Semi-trailer

⑳Full trailer

㉰Notes

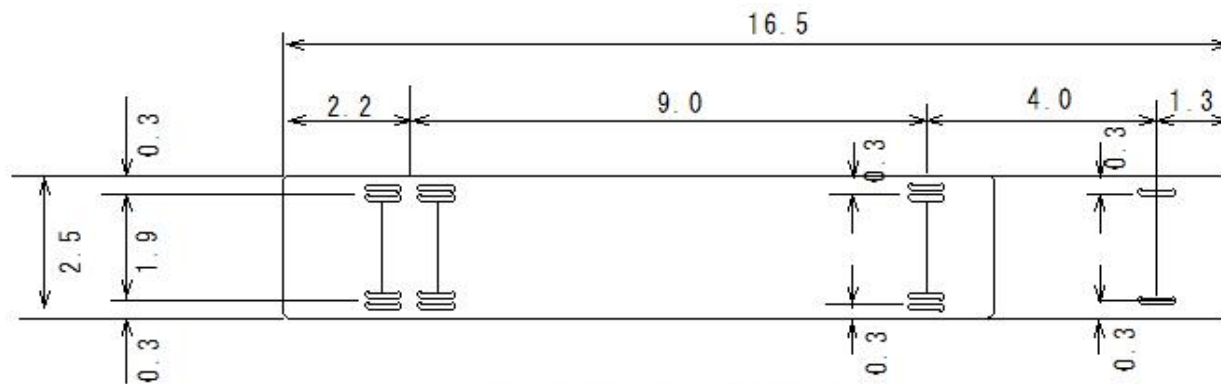
(H524)Road Structure Act(Shape of container and specifications of semi-trailer combination vehicle when container is loaded)

Road Structure Act

1-4 Design vehicle

Table 1-4 Shape of container and specifications of semi-trailer combination vehicle when container is loaded

① Shape ⑪Type of container	⑤Width (m)	⑥Height (m)	⑦Length (m)	⑧Height (m)	⑨Length (m)	⑩Weight (t)	④Notes
⑫JNR 5t container	2.438	2.350	3.658	3.680	11.485	18.270	2-piece load
⑬8ft-8ft-20ft marine container	2.438	2.438	6.058	3.785	11.190	29.300	
⑭8ft-8ft-20ft marine container	2.438	2.591	6.058	3.785	12.340	30.230	Low-bed trailer
⑮8ft-8ft-35ft marine container	2.438	2.591	10.668	3.785	14.105	31.505	"
⑯8ft-8ft-40ft marine container	2.438	2.591	12.192	3.790	16.005	32.360	"



Semi-trailer Articulated vehicle

H481

(H525)Road Structure Act(Bicycles and pedestrians)

(H525)Road Structure Act(Bicycles and pedestrians)

Road Structure Act

1-4-2 Bicycles and pedestrians

① Occupied width (m)	② Height (m)	③ Length (m)	④ Pedal height (m)
1.00	2.25	1.90	0.05

The standard occupied width for pedestrians is 0.75m

(H526)Road Structure Act(Bicycles and pedestrians)

(H526)Road Structure Act(Bicycles and pedestrians)

Road Structure Act

1-4-2 Bicycles and pedestrians

① Occupied width (m)	② Height (m)	③ Length (m)	④ Pedal height (m)
1.00	2.25	1.90	0.05

The standard occupied width for pedestrians is 0.75m

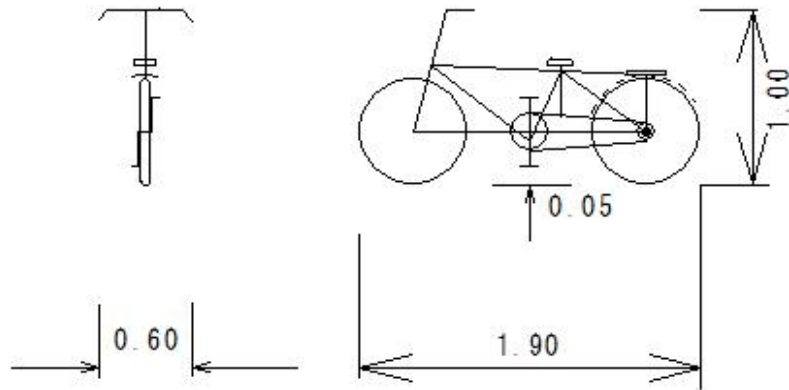


Fig 1-6

(unit: m)

(H527)Road Structure Act(Bicycles and pedestrians)

(H527)Road Structure Act(Bicycles and pedestrians)

Road Structure Act

1-4-2 Bicycles and pedestrians

① Occupied width (m)	② Height (m)	③ Length (m)	④ Pedal height (m)
1.00	2.25	1.90	0.05

The standard occupied width for pedestrians is 0.75m

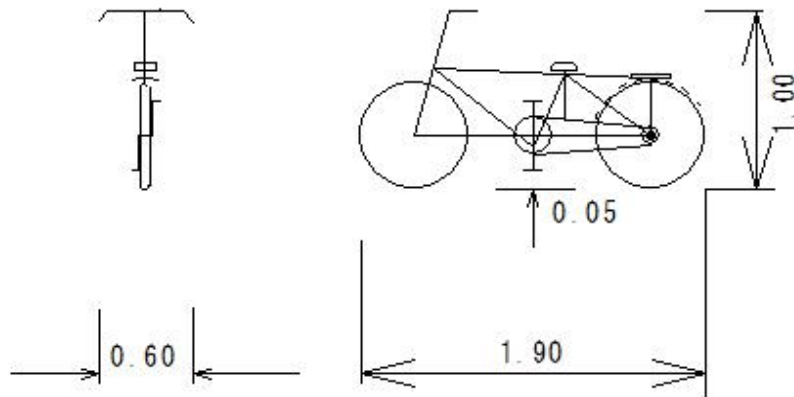


Fig 1-6

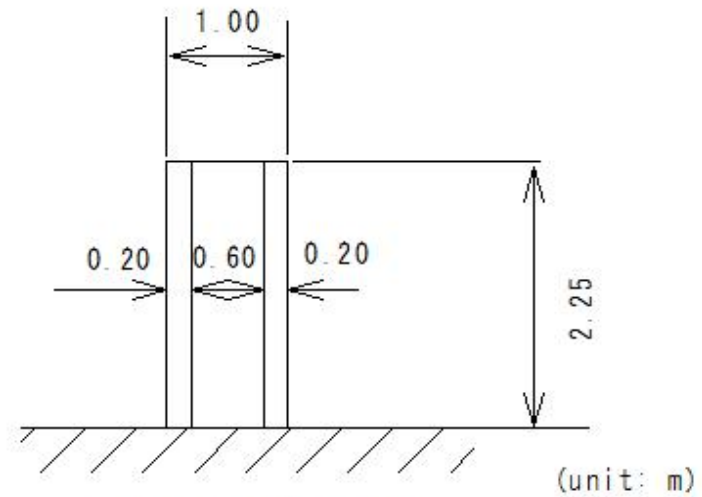


Fig 1-7 Bicycle width

(unit: m)

(H528)Road Structure Act(Bicycles and pedestrians)

(H528)Road Structure Act(Bicycles and pedestrians)

Road Structure Act

1-4-2 Bicycles and pedestrians

① Occupied width (m)	② Height (m)	③ Length (m)	④ Pedal height (m)
1.00	2.25	1.90	0.05

The standard occupied width for pedestrians is 0.75m

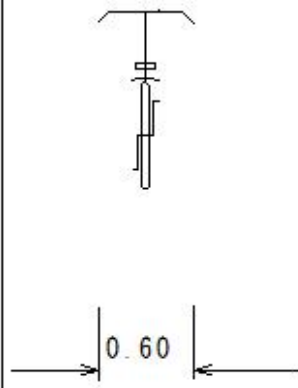


Fig 1-6

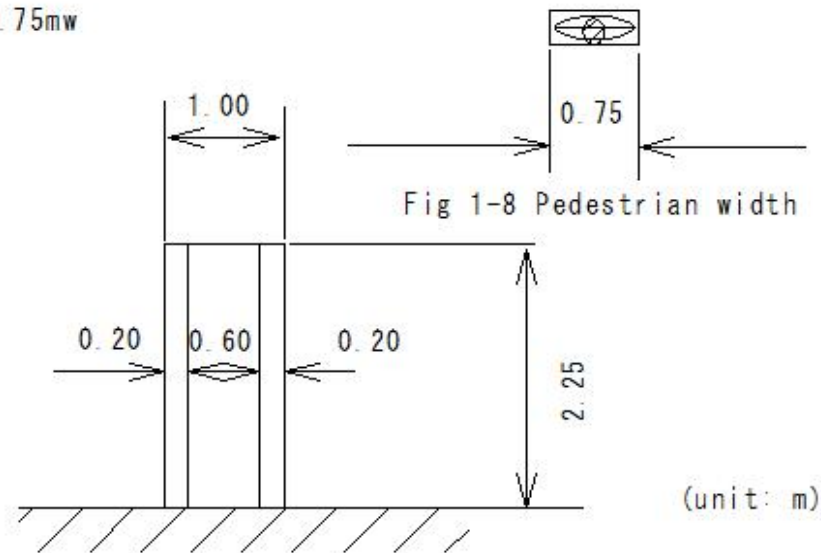
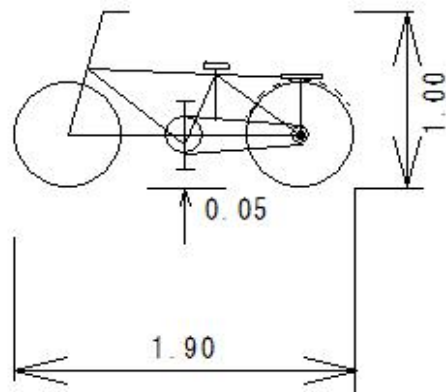


Fig 1-7 Bicycle width

Fig 1-8 Pedestrian width

(unit: m)

(H529)Road Structure Act(Basic concepts of road planning)

(H529) Road Structure Act(Basic concepts of road planning)

Road Structure Act

2-1-3 Basic concepts of road planning

Fig 2-1 Basic concepts of road planning

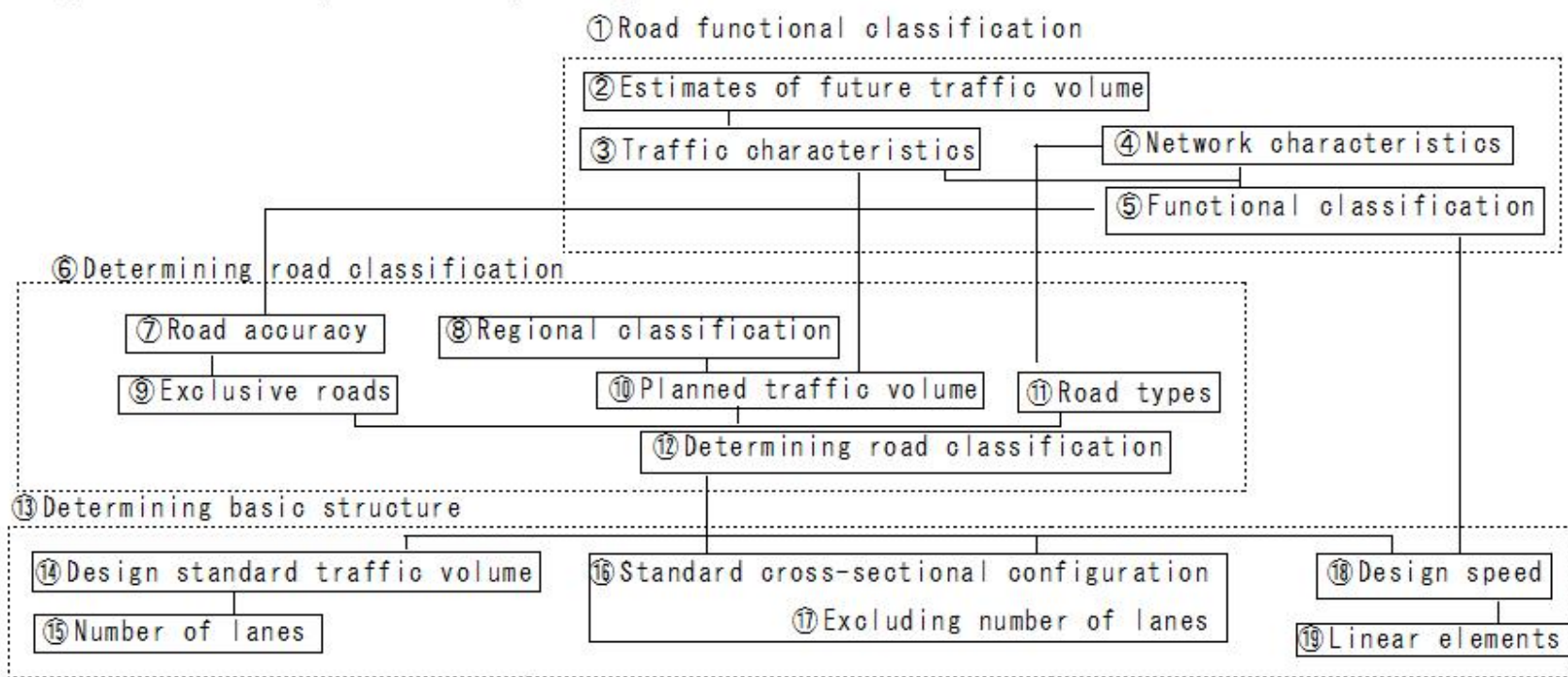
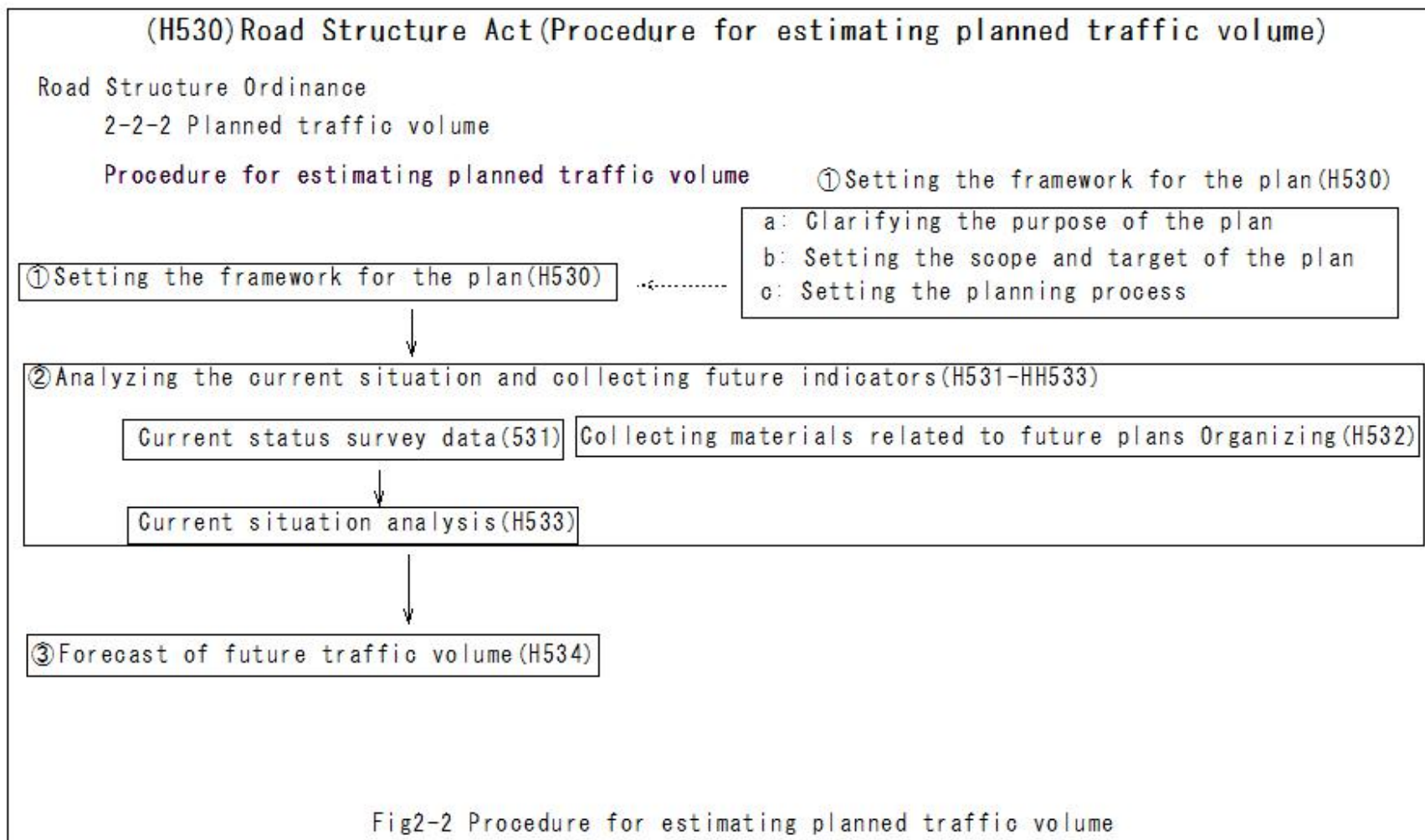
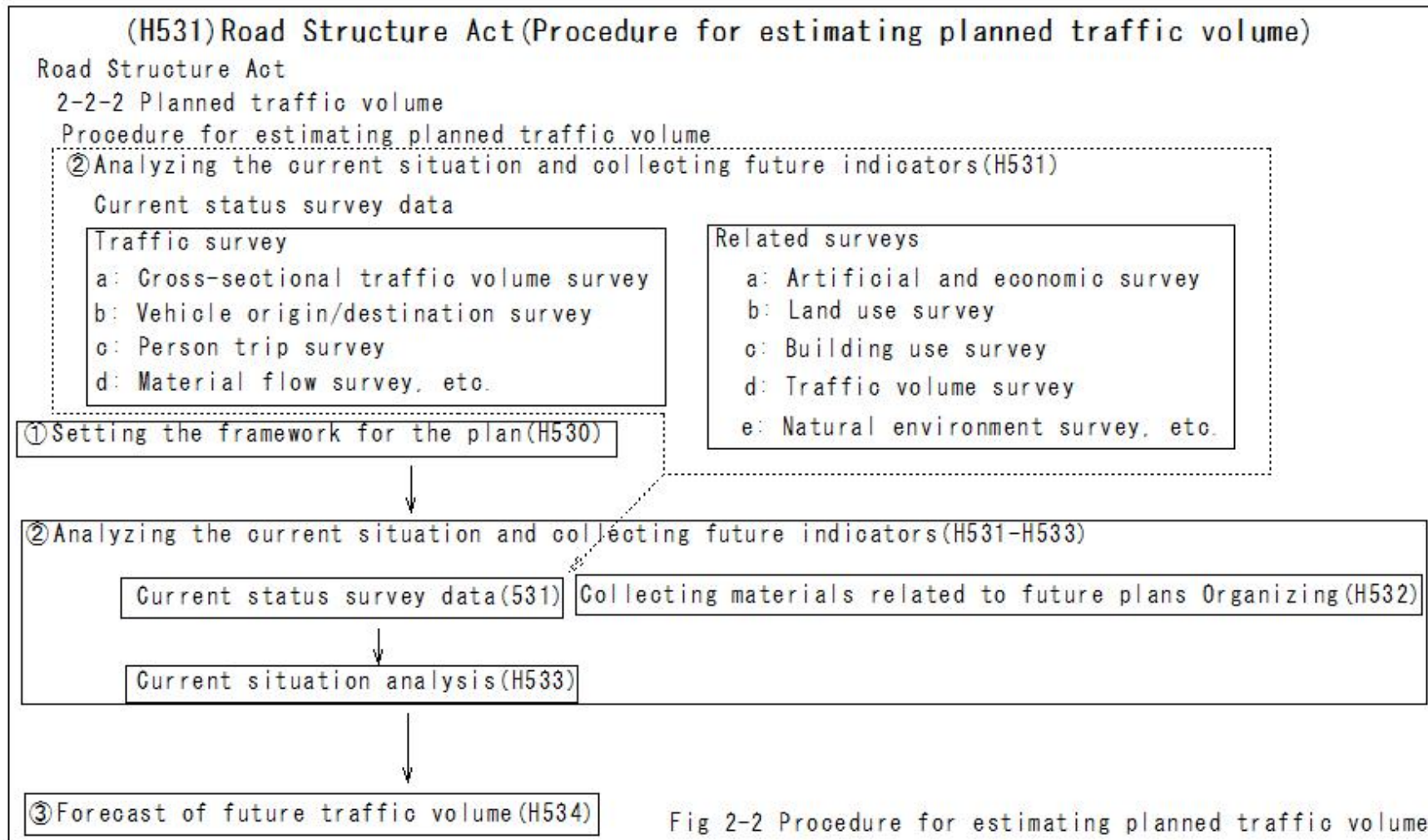


Fig 2-1 Basic concepts of road planning

(H530)Road Structure Act(Procedure for estimating planned traffic volume)



(H531)Road Structure Act(Procedure for estimating planned traffic volume)



(H532)Road Structure Act(Procedure for estimating planned traffic volume)

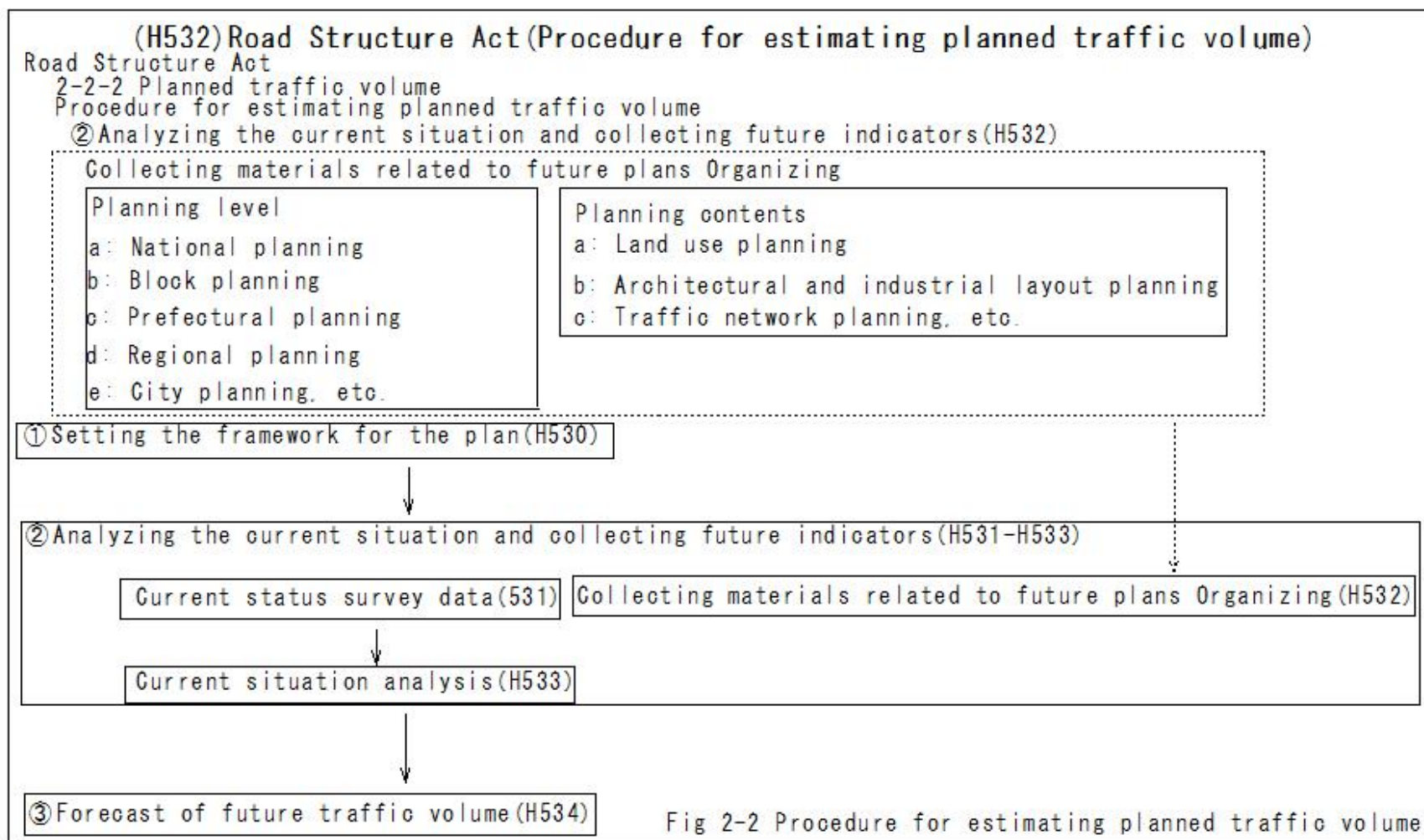
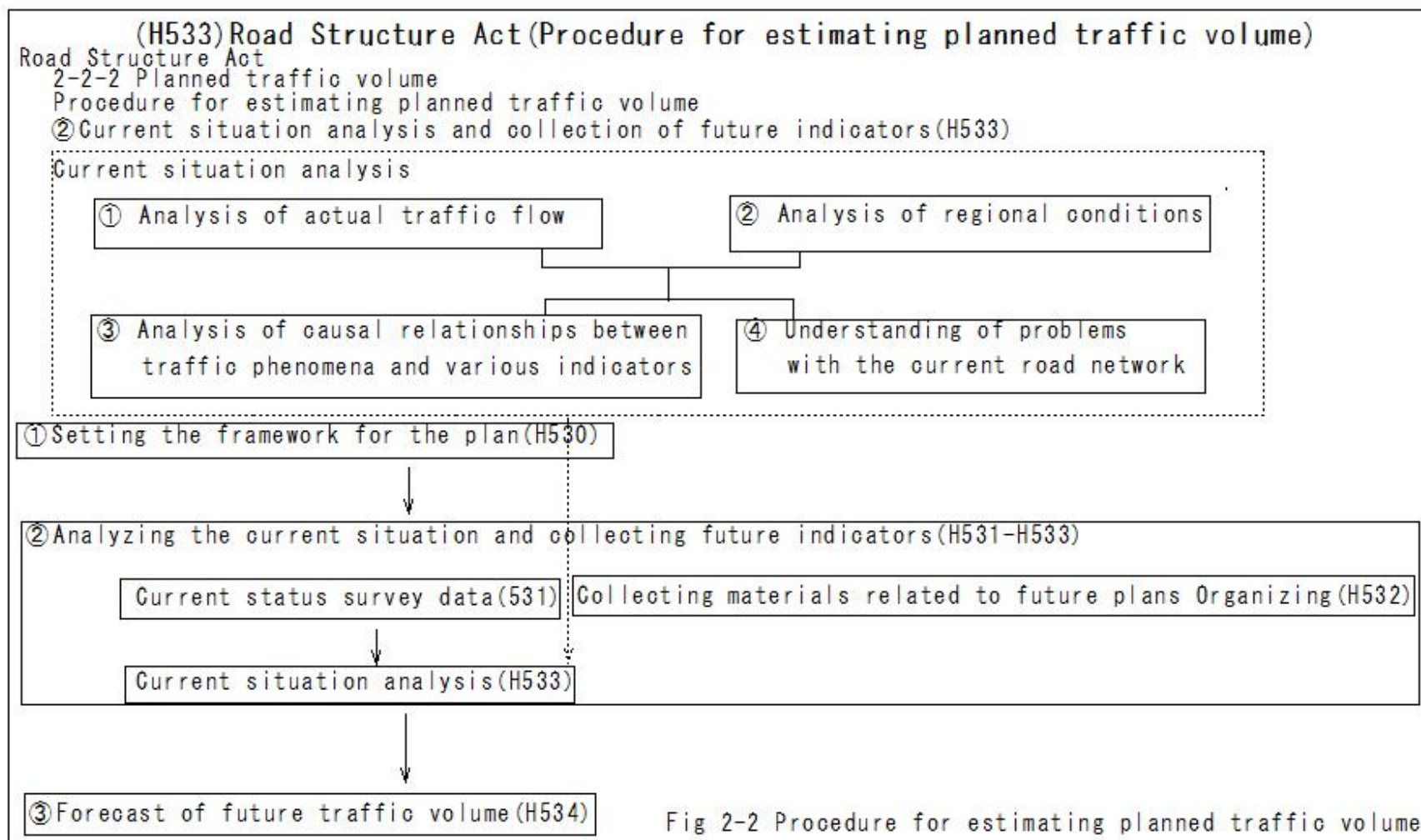
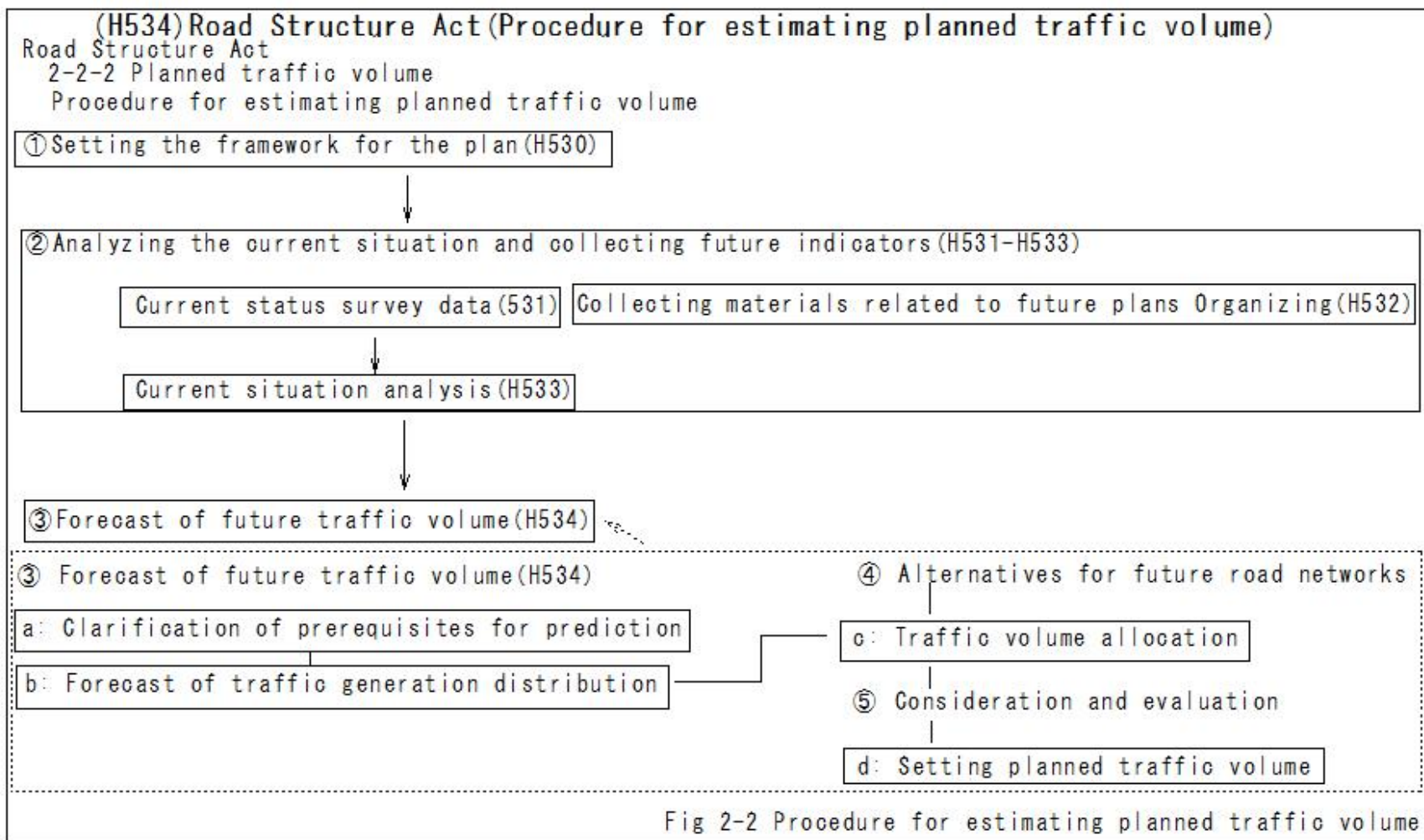


Fig 2-2 Procedure for estimating planned traffic volume

(H533)Road Structure Act(Procedure for estimating planned traffic volume)



(H534)Road Structure Act(Procedure for estimating planned traffic volume)



(H535)Road Structure Act(Zone level and target road network)

(H535)Road Structure Act(Zone level and target road network)

Road Structure Act

2-2-2 Planned traffic volume

Zone level and target road network

Table 2-2 Zone level and target road network

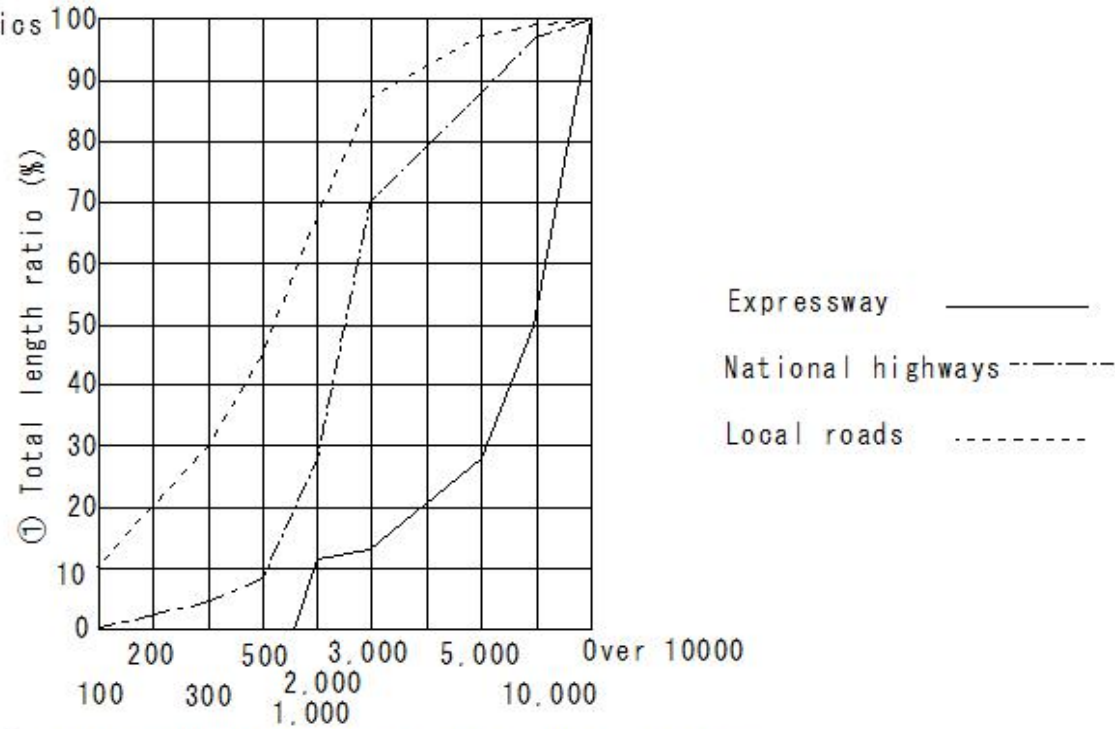
Zone level	Target road network
① Between prefectures	① Expressways, general national roads
② Between regional areas	② Expressways, general national roads, major regional roads
③ City/county sections	③ Expressways, general national roads, major regional roads, general prefectural roads
④ Within city wards	④ Expressways, general national roads, major regional roads, general prefectural roads, municipal roads

(H536)Road Structure Act(Large vehicle traffic volume)

(H536)Road Structure Act(Large vehicle traffic volume)

Road Structure Act

2-2-3 Road traffic characteristics
Large vehicle traffic volume



② Large vehicle traffic volume (vehicles/12h)

③ Urban areas

Fig 2-3 12-hour large vehicle traffic volume

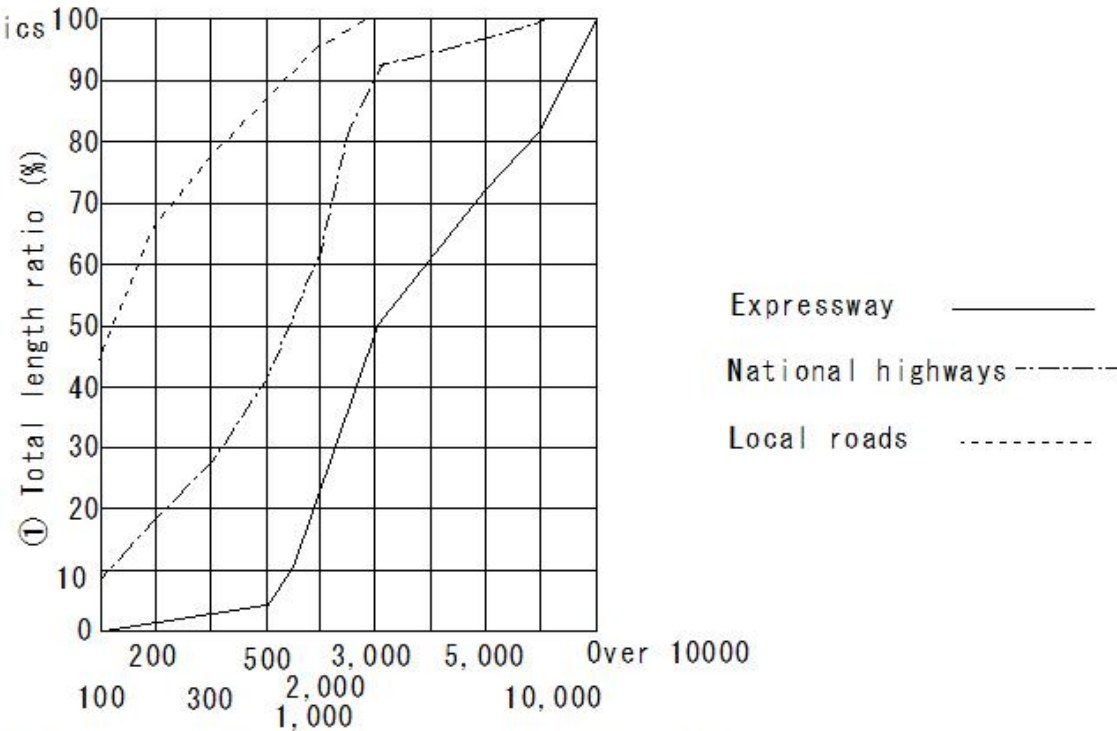
(H537)Road Structure Act(Large vehicle traffic volume)

(H537)Road Structure Act(Large vehicle traffic volume)

Road Structure Act

2-2-3 Road traffic characteristics

Large vehicle traffic volume



② Large vehicle traffic volume (vehicles/12h)

③ Local roads

Fig 2-3 12-hour large vehicle traffic volume

(H538)Road Structure Act(Road classification)

(H538) Road Structure Act(Road classification)

Road Structure Act
2-3 Road classification
Article 3

① Areas where roads exist	② Rural areas	③ Urban areas
④ National expressways and motorways Other roads		
⑤ National expressways and motorways	Type 1	Type 2
⑥ Other roads	Type 3	Type 4

(H539)Road Structure Act(Road classification-Type 1 road)

(H539)Road Structure Act(Road classification-Type 1 road)

Road Structure Act

2-3 Road classification

Type 1 road

Article 3

①Planned traffic volume: unit: vehicles per day ⑥Topography of the area in which the road exists ⑦Type of road	②Over 30,000	③Over 20,000 and under 30,000	④Over 10,000 and under 20,000	⑤Under 10,000
	⑧National expressway	⑨Plain area	Class 1	Class 2
	⑩Mountain area	Class 2	Class 3	Class 4
⑪Roads other than national expressways	⑫Plain area	Class 2		Class 3
	⑬Mountain area	Class 3		Class 4

(H540)Road Structure Act(Road classification-Type 2 road)

(H540) Road Structure Act (Road classification-Type 2 road)

Road Structure Act
2-3 Road classification
Article 3
Type 2 road

① Districts where roads exist	② Districts other than the urban center of a large city	③ Central area of a large city
④ Type of road		
⑤ National expressway	Type 1	
⑥ Roads other than national expressways	Type 1	Type 2

(H541)Road Structure Act(Road classification-Type 3 road)

(H541)Road Structure Act(Road classification-Type 3 road)

Road Structure Act

2-3 Road classification

Type 3 road

①Planned traffic volume: unit: vehicles per day ②Over 20,000 ③Over 4,000 and under 20,000 ④Over 1,500 and under 4,000 ⑤Over 500 and under 1,500 ⑥Under 500		②Over 20,000	③Over 4,000 and under 20,000	④Over 1,500 and under 4,000	⑤Over 500 and under 1,500	⑥Under 500
		⑦Topography on which the road is located				
⑨ General national highway	Plain area	Class 1	Class 2	Class 3		
	Mountain area	Class 2	Class 3	Class 4		
⑩ Prefectural road	Plain area	Class 2		Class 3		
	Mountain area	Class 3		Class 4		
⑪ Municipal road	Plain area	Class 2	Class 3	Class 4	Class 5	
	Mountain area	Class 3	Class 4		Class 5	

(H542)Road Structure Act(Road classification-Type 4 road)

(H542)Road Structure Act(Road classification-Type 4 road)

Road Structure Act

2-3 Road classification

Type 3 road

①Planned traffic volume: unit: vehicles per day ⑥Type of road	②Over 10,000	③Over 4,000 and under 10,000	④Over 500 and under 4,000	⑤Under 500
⑦General national highway	Class 1		Class 2	
⑧Prefectural road	Class 1	Class 2	Class 3	
⑨Municipal road	Class 1	Class 2	Class 3	Class 4

(H543)Road Structure Act(Road classification-Road classification system)

Road Structure Act
2-3 Road classification

F: Complete entry/exit restrictions
P: Partial entry/exit restrictions

N: No entry/exit restrictions

Table 2-8 Road classification system

	①Region	②Type	③Class	④Design speed		⑤Entry and exit restrictions	⑥Planned traffic volume (vehicles/day)				⑪Summary
							⑦Over 30,000	⑧30,000-20,000	⑨20,000-10,000	⑩Less than 10,000	
⑫National expressways and expressways	⑬Rural areas	⑭Type 1	Class 1	120	100	F	⑰Expressway, flat				
			Class 2	100	80	F · P	⑱Expressway, mountainous	⑲Expressway, flat			
							⑳Exclusive, flat				
			Class 3	80	60	F · P		㉑Expressway, mountainous areas	㉒Expressway, flat		
							㉓Exclusive, mountainous areas		㉔Exclusive, flat		
			Class 4	60	80	F · P			㉕Exclusive, mountainous areas		㉖Expressway design speed is
							㉗Expressway, mountainous areas				
	⑮Urban areas	⑯Type 2	Class 1	80	60	F	㉘Expressway, exclusive				㉙Exclusive except in the urban centers of large cities
Class 2			60	50/40	F	㉚Exclusive, urban center					

(H544)Road Structure Act(Road classification-Road classification system)

Road Structure Act 2-3 Road classification
Table 2-8 Road classification system

F: Complete entry/exit restrictions N: No entry/exit restrictions
P: Partial entry/exit restrictions

	①Region	②Type	③Class	④Design speed		⑤Entry and exit restrictions	⑥Planned traffic volume (vehicles/day)						⑪Summary		
							Over 20,000	20,000-10,000	10,000-4,000	4,000-1,500	1,500-500	Less than 500			
⑫Other roads	⑬Rural areas	⑭Type 1	Class 1	80	60	P · N	⑰National highways, flat land								
			Class 2	60	50 40	N	⑱Expressway, mountainous		National highways, flat						
									⑲Prefectural roads, city roads, flat land						
			Class 3	60 50 40	30	N	⑳National highways, mountainous areas		㉑Expressway, flat						
									㉒Prefectural roads, city roads, mountainous areas		㉓City roads, flat land				
	Class 4	50 40 30	20	N	㉔Exclusive, flat										
							㉕Exclusive, mountainous		㉖City roads, flat land,						
	Class 5	40 30 20	-	N							㉗Expressway, mountainous areas	㉘Exclusive except in the urban centers of large cities			
	⑮Urban areas	⑯Type 4	Class 1	60	50 40	P · N	㉙Exclusive, urban center								
									㉚Prefectural roads, City roads						
			Class 2	60 50 40	30	N							㉛National highways		
									㉜Prefectural roads, city						
Class 3	50 40 30	20	N							㉝Prefectural roads					
						㉞City roads									
Class 4	40 30 20	-	N							㉟City roads		㊱One-lane road			

(H545)Road Structure Act(Design speed)

(H545) Road Structure Act (Design speed)

Road Structure Act
2-4 Design speed

Division		Design speed (unit: kilometers per hour)	
Type 1	Class 1	120	100
	Class 2	100	80
	Class 3	80	60
	Class 4	60	50
Type 2	Class 1	80	60
	Class 2	60	50 40
Type 3	Class 1	80	60
	Class 2	60	50 40
	Class 3	60 50 40	30
	Class 4	50 40 30	20
	Class 5	40 30 20	
Type 4	Class 1	60	50 40
	Class 2	60 50 40	30
	Class 3	50 40 30	20
	Class 4	40 30 20	

(H546)Road Structure Act(Length of design section)

(H546)Road Structure Act(Length of design section)

Road Structure Act

2-5 Length of design section

Table2-9 Length of design section

Road classification	Standard minimum section	Minimum section length for lowering design speed only in unavoidable cases
Type 1, Type 3 Class 1, Type 3 Class 2	30-20km	5km
Type 2, Type 3 Class 3, Type 3 Class 4	15-10km	2km
Type 4	Spacing of major intersections	

(H547)Road Structure Act(Connection of different design sections)

(H547)Road Structure Act(Connection of different design sections)

Road Structure Act
2-5 Design Section
Connection of different design sections

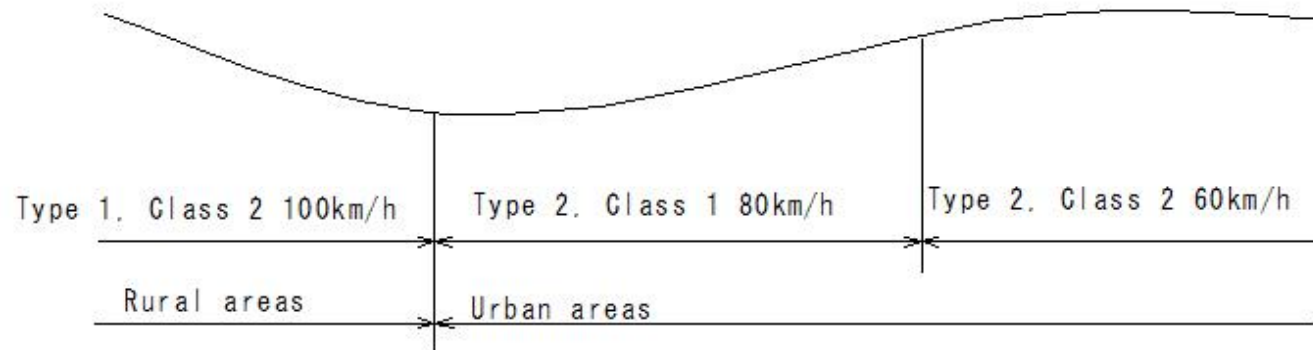


Fig2-7 Connection of different design sections

(H548)Road Structure Act(Connecting different design sections by class)

(H548)Road Structure Act(Connecting different design sections by class)

Road Structure Act
2-5 Design Section

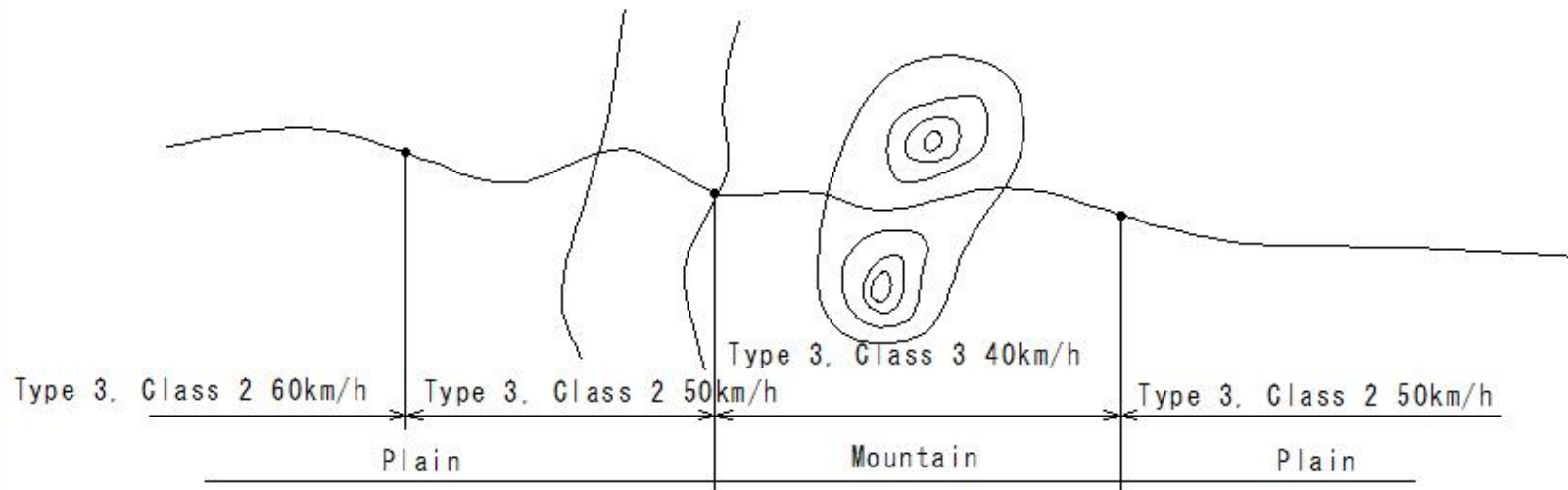


Fig 2-8 Connection of different design sections by Class

(H549)Road Structure Act(Types of access restrictions)

(H549)Road Structure Act(Types of access restrictions)

Road Structure Act

2-6 Access restrictions

2-6-1 Types of access restrictions

Full access restrictions for Type 1.2 roads

(a) Full access restrictions (Full control of access)

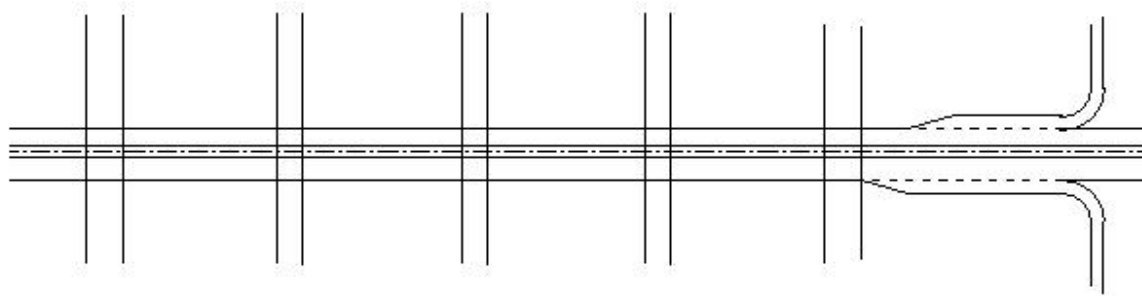


Fig 2-9 Types of access restrictions

(H550)Road Structure Act(Types of access restrictions)

(H550)Road Structure Act(Types of access restrictions)

Road Structure Act

2-6 Access restrictions

2-6-1 Types of access restrictions

Full access restrictions for Type 1.2 roads

(b) Full access restrictions (Full control of access)

in case of integrating crossing structures with side roads

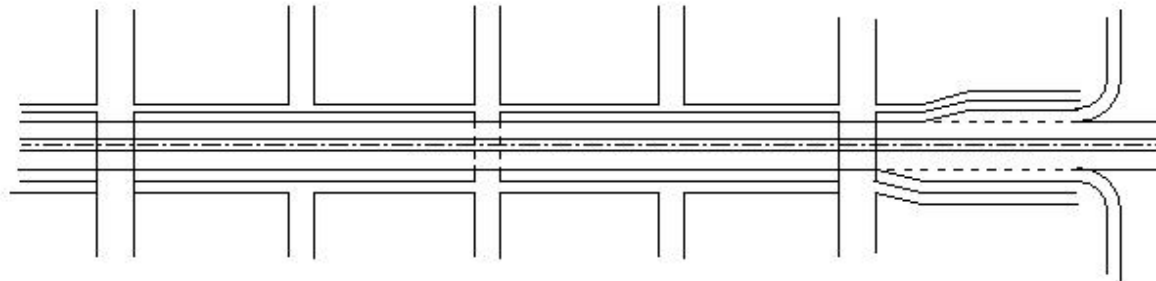


Fig 2-9 Types of access restrictions

(H551)Road Structure Act(Types of access restrictions)

(H551)Road Structure Act(Types of access restrictions)

Road Structure Act

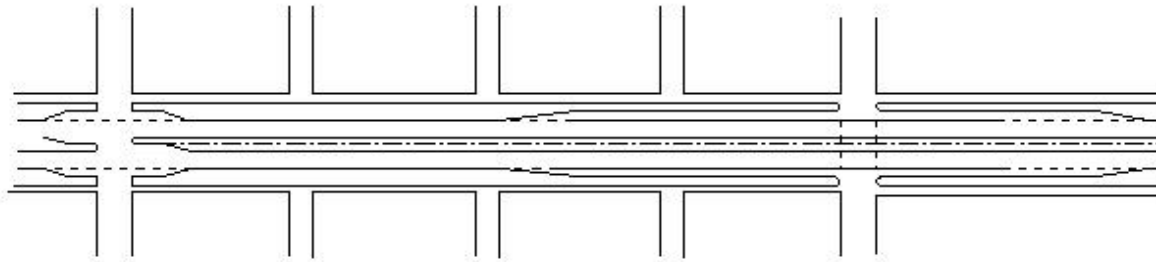
2-6 Access restrictions

2-6-1 Types of access restrictions

Full access restrictions for Type 1.2 roads

(c) Partial access restrictions

in case of integrating crossing structures with side roads



(c) Partial access restrictions

Fig 2-9 Types of access restrictions

(H552)Road Structure Act(Types of access restrictions)

(H552)Road Structure Act(Types of access restrictions)

Road Structure Act

2-6 Access restrictions

2-6-1 Types of access restrictions

Full access restrictions for Type 1.2 roads

(d) Free access

in case of a major road is multi-level
(Non control of access)

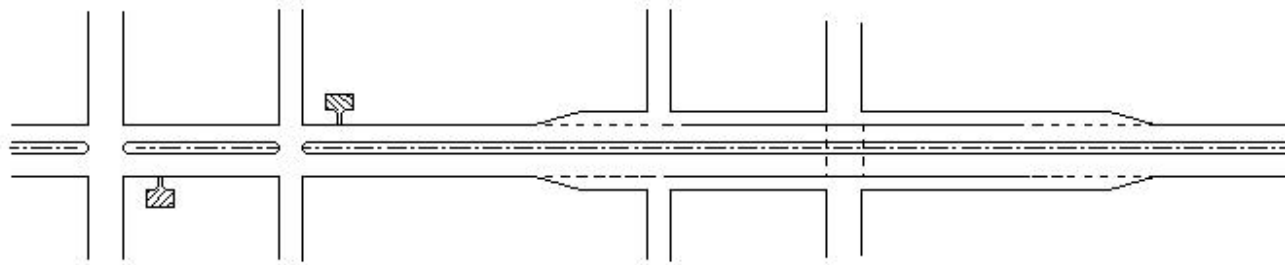


Fig 2-9 Types of access restrictions

(H553)Road Structure Act(Types of access restrictions)

(H553)Road Structure Act(Types of access restrictions)

Road Structure Act

2-6-1 Types of access restrictions

Full access restrictions for Type 1.2 roads

(e) Free access (level intersection)

(Non-control of access)

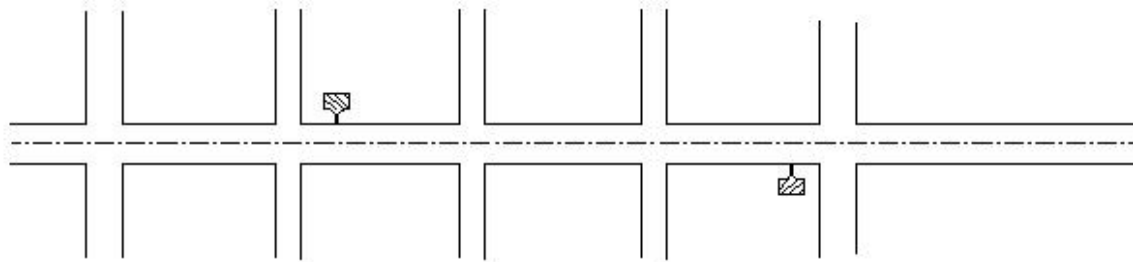


Fig 2-9 Types of access restrictions

(H554)Road Structure Act(Components of cross section and combinations)

(H554)Road Structure Act(Components of cross section and combinations)

Road Structure Act

3-1-3 Components of cross section and combinations

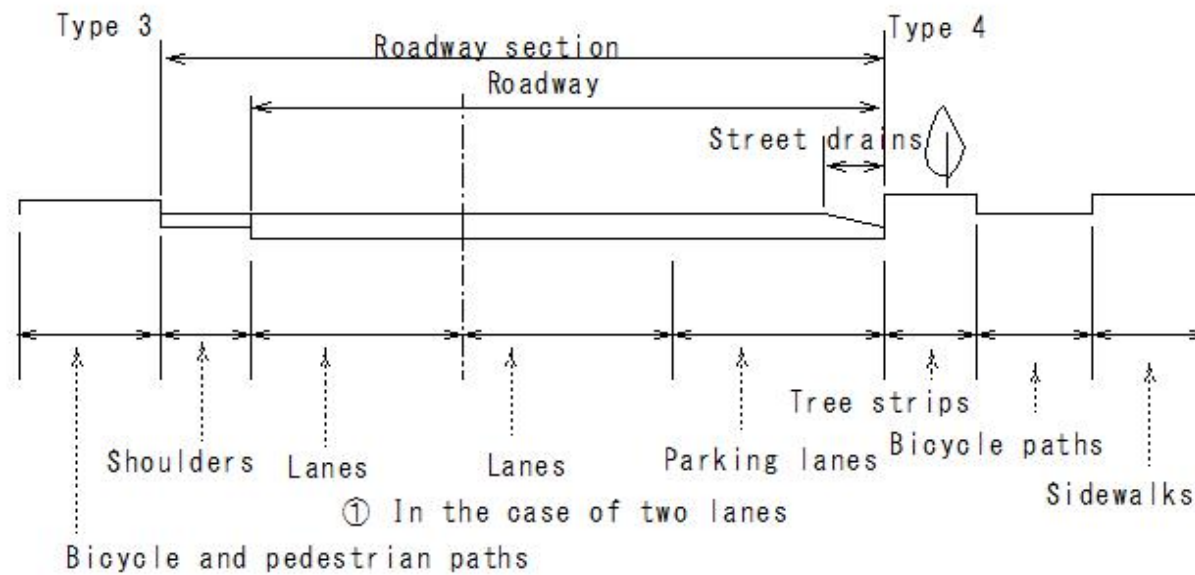


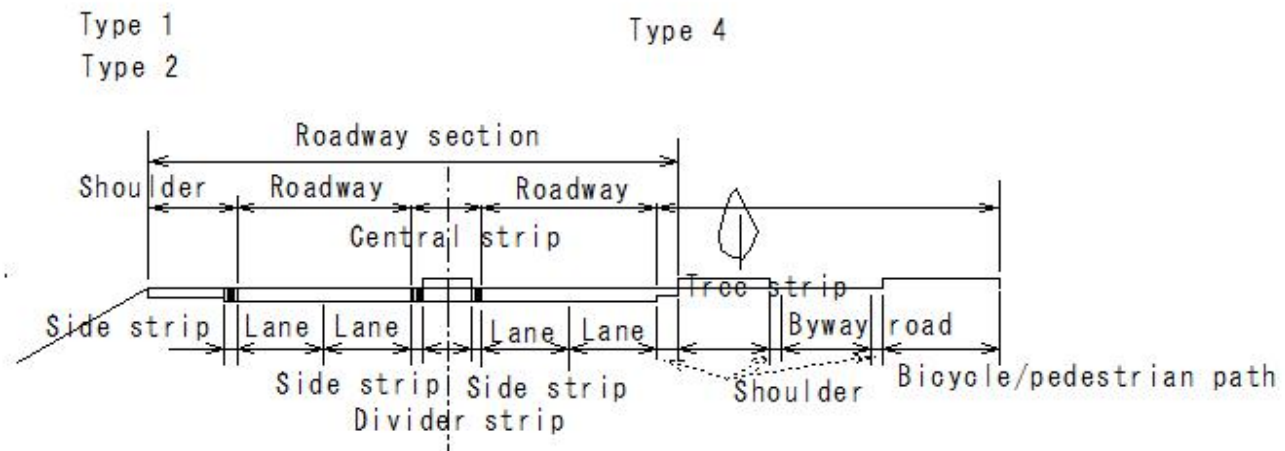
Fig 3-1 Components of cross section and combinations

(H555)Road Structure Act(Components of cross section and combinations)

(H555)Road Structure Act(Components of cross section and combinations)

Road Structure Act

3-1-3 Components of cross section and combinations



② In the case of 4 lanes

Fig 3-1 Components of cross section and combinations

(H556)Road Structure Act(Roads and lanes)

(H556) Road Structure Act (Roads and lanes)

Road Structure Act

3-2 Roads and lanes

Division		terrain	Design standard traffic volume (unit: vehicles per day)
Type 1	Class 2	Plains	14,000
	Class 3	Plains	14,000
		Mountains	10,000
	Class 4	Plains	13,000
		Mountains	9,000
Type 3	Class 2	Plains	9,000
	Class 3	Plains	8,000
		Mountains	6,000
	Class 4	Plains	8,000
		Mountains	6,000
Type 4	Class 1		12,000
	Class 2		10,000
	Class 3		9,000

(H557)Road Structure Act(Roadways and lanes)

(H557)Road Structure Act(Roadways and lanes)

Road Structure Act

3-2 Roadways and lanes

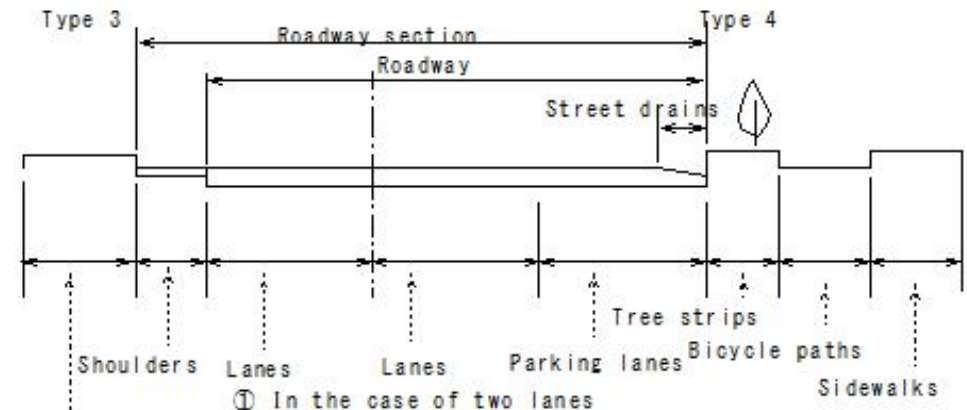
Classification		Terrain	Design standard traffic volume per lane (unit: vehicles per day)
Type 1	Class 1	flatland	12.000
	Class 2	flatland	12.000
		mountainous	9.000
	Class 3	flatland	11.000
		mountainous	8.000
	Class 4	flatland	11.000
		mountainous	8.000
	Type 2	Class 1	
Class 2			17.000
Type 3	Class 1	flatland	11.000
	Class 2	flatland	9.000
		mountainous	7.000
	Class 3	flatland	8.000
		mountainous	6.000
	Class 4	mountainous	5.000
Type 4	Class 1		12.000
	Class 2		10.000
	Class 3		10.000

(H558)Road Structure Act(Roadways and lanes)

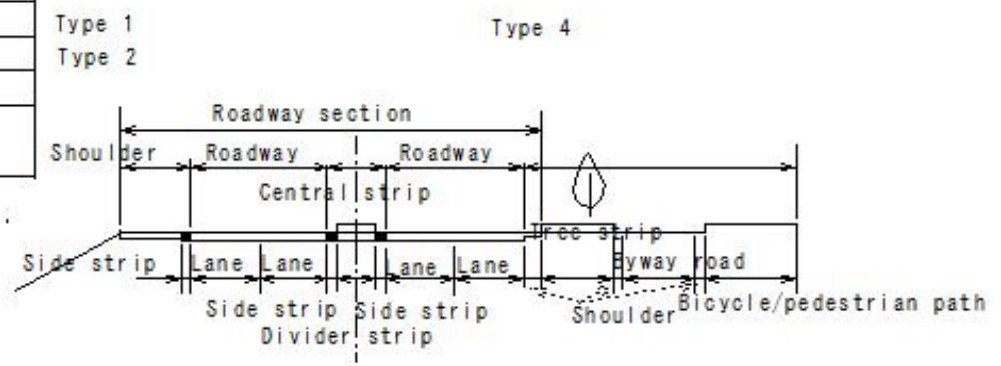
(H558)Road Structure Act(Roadways and lanes)

Road Structure Act
3-2 Roadways and lanes

Classification		Lane width (unit: meters)
Type 1	Class 1	3.5
	Class 2	
	Class 3	
	Class 4	
Type 2	Class 1	3.5
	Class 2	3.25
Type 3	Class 1	3.5
	Class 2	3.25
	Class 3	3
Type 4	Class 4	2.75
	Class 1	3.25
	Class 3	3



H554



H555

(H559) Road Structure Act (Varies depending on each section - roadside conditions, etc.)

(H559) Road Structure Act (Varies depending on each section - roadside conditions, etc.)

Road Structure Act

3-2-2 Number of lanes

Design standard traffic volume

Varies depending on each section - roadside conditions, etc.

Differs even within the design section

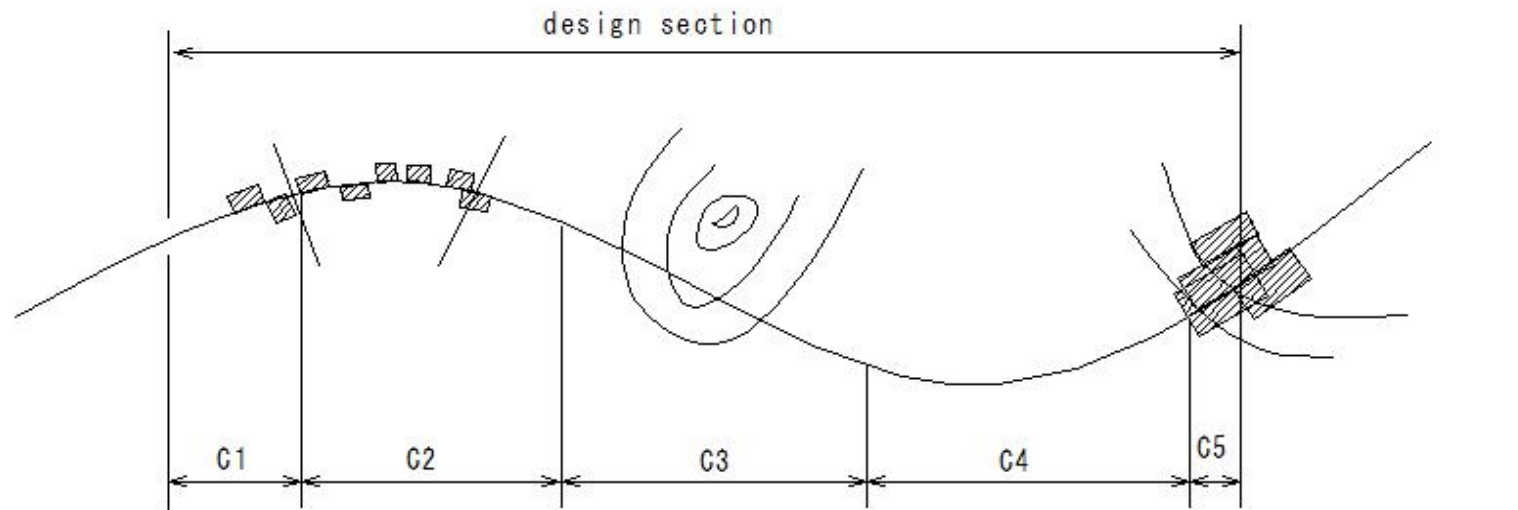


Fig 3-2 Design standard traffic volume

C: Traffic capacity

(H560)Road Structure Act(2-lane road width determined from experiments (KANEKO))

(H560)Road Structure Act(2-lane road width determined from experiments (KANEKO))

Road Structure Act

3-2-3 Road width (m)

2-lane road width determined from experiments (KANEKO)

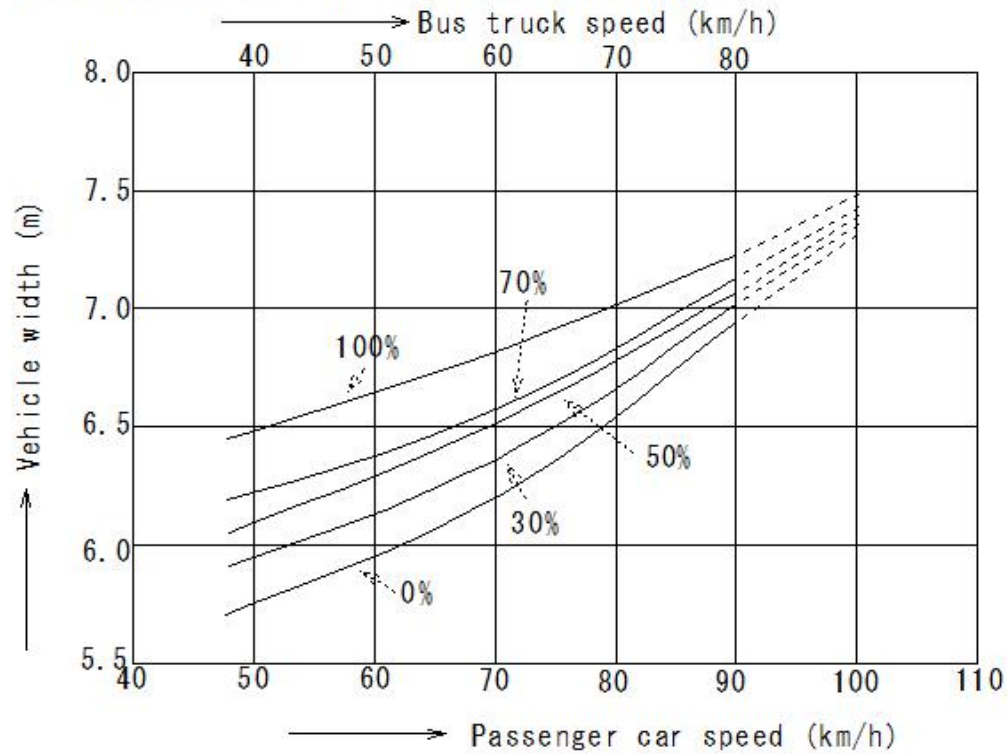


Figure 3-3 2-lane road width determined from experiments (KANEKO)

(H561)Road Structure Act(Standard lane width)

(H561)Road Structure Act(Standard lane width)

Road Structure Act

Standard lane width

3-2-3 Lane width

Table 3-1 Standard lane width

Design speed (km/h)	Standard lane width (m)	Applicable class
80 or more	3.5	Type 1 (excluding Class 4), Type 2 Class 1, Type 3 Class 1
60	3.25	Type 1 Class 4, Type 2 Class 2, Type 3 Class 2, Type 4 Class 1
60, 50, 40	3	Type 3 Class 3, Type 4 Class 2, Type 4 Class 3
50, 40, 30	2.75	Type 3 Class 4

(H562)Road Structure Act(Width of central strip)

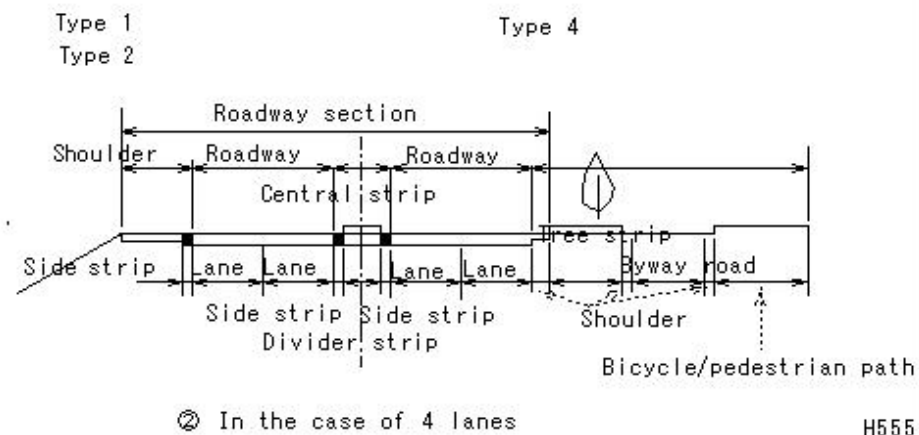
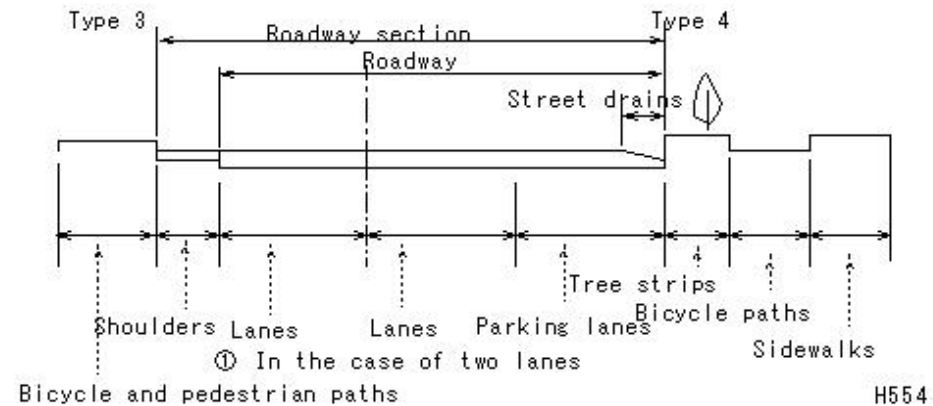
(H562)Road Structure Act(Width of central strip)

Road Structure Act
3-3 Central strip

Width of central strip (unit: meters)

Division		Width of central strip (unit: meters)	
Type 1	Class 1	4.5	3
	Class 2		
	Class 3	3	2.25
	Class 4		1.75
Type 2	Class 1	2.25	
	Class 2	1.75	
Type 3	Class 1	1.75	1
	Class 2		
	Class 3		
	Class 4		
Type 4	Class 1	1	
	Class 2		
	Class 3		

H486



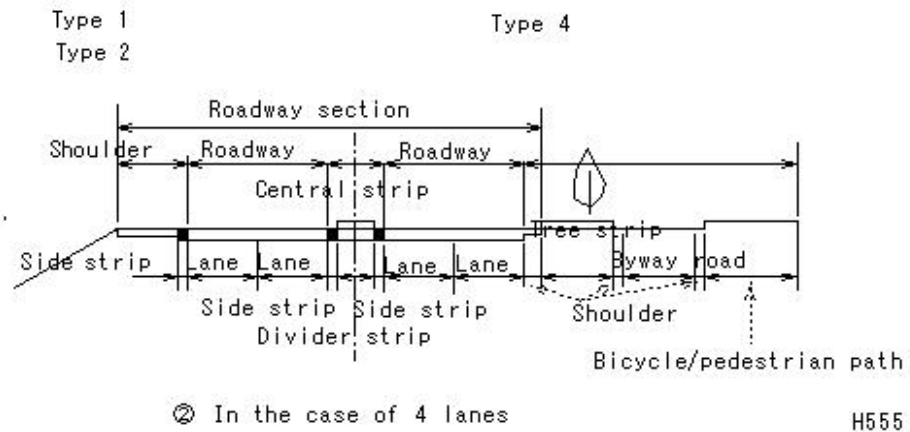
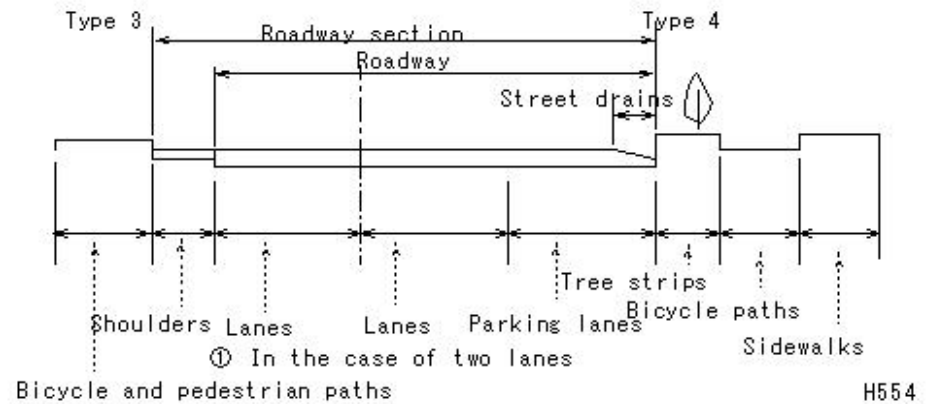
(H563)Road Structure Act(Width of side strip in center strip)

(H563) Road Structure Act(Width of side strip in center strip)

Road Structure Act
3-3 Central strip
Width of side strip in center strip
Classification

Division	Width of side strip in center strip	
Type 1	Class 1	0.75
	Class 2	
	Class 3	0.5
	Class 4	
Type 2	0.5	
Type 3	Class 1	0.25
	Class 2	
	Class 3	
	Class 4	
Type 4	Class 1	0.25
	Class 2	
	Class 3	

(unit: meters)
H487



(H564)Road Structure Act(Central strip width)

(H564)Road Structure Act(Central strip width)

Road Structure Act
3-3 Central strip
Central strip width

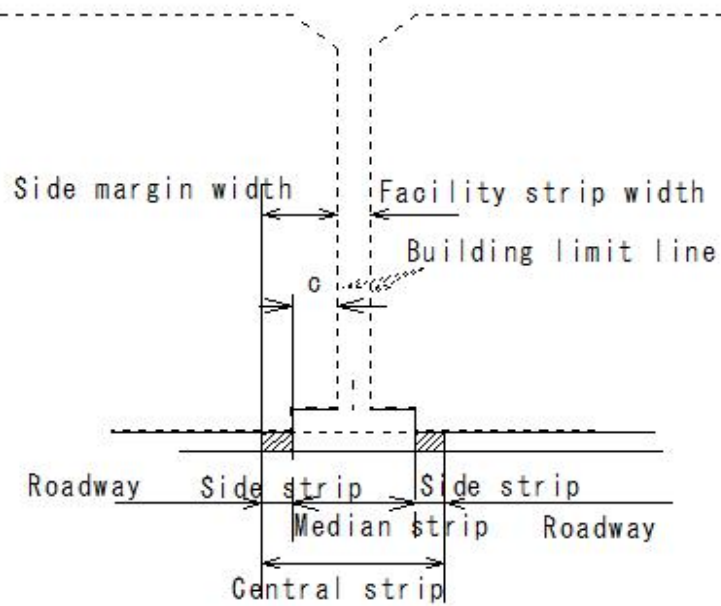


Fig 3-4 Relationship between central strip width, side margin width, and facility strip width

(H565)Road Structure Act(Central strip width)

Road Structure Act

3-3 Central strip

3-3-3 Central strip width

Table 3-2 Central strip width

① Road type/class		②		⑤	⑥		⑨	⑩	⑪	
		③	④		⑦	⑧			⑫	⑬
Type 1	Class 1,2	4.50	3.00	0.75	3.00	1.50	0.50	1.25	2.00	0.50
	Class 3	3.00	2.25	0.50	2.00	1.25	0.25	0.75	1.50	0.75
	Class 4	3.00	1.75	0.50	2.00	0.75	0.25	0.75	1.50	0.25
Type 2	Class 1	2.25		0.50	1.25		0.25	0.75	0.75	
	Class 2	1.75		0.50	0.75		0.25	0.75	0.25	
Type 3		1.75	1.00	0.25	1.25	0.50	0.25	0.50	0.75	0.00
Type 4		1.00		0.25	0.50		0.25	0.50	0.00	

- ① Road type/class
- ② Minimum width of central strip
- ③ Standard value
- ④ Exceptional value
- ⑤ Side strip width
- ⑥ Minimum width of median strip
- ⑦ Standard value
- ⑧ Exceptional value
- ⑨ Value of c
- ⑩ Side margin width
- ⑪ Minimum width of facility strip
- ⑫ Standard value
- ⑬ Exceptional value

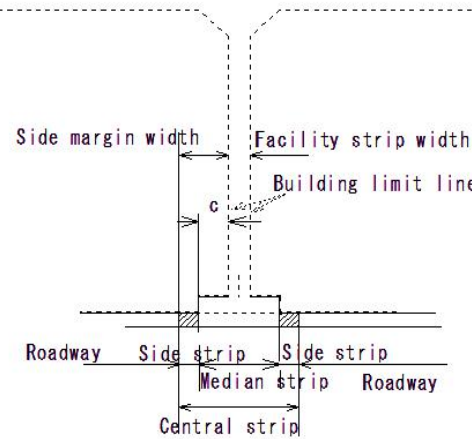


Fig 3-4 Relationship between central strip width, side margin width, and facility strip width

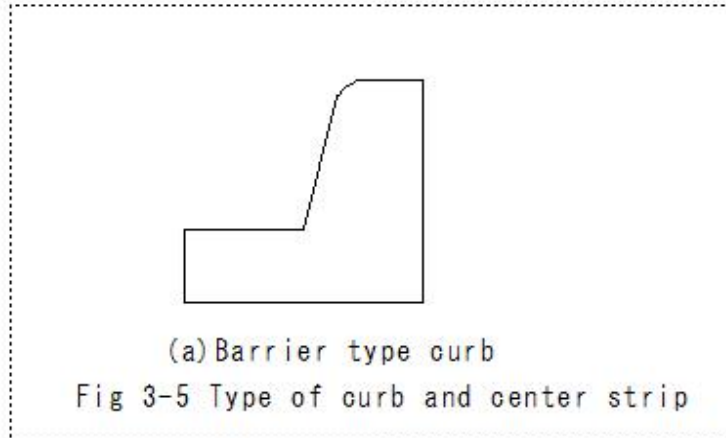
(H566)Road Structure Act(Type and structure of center strip)

(H566)Road Structure Act(Type and structure of center strip)

Road Structure Act

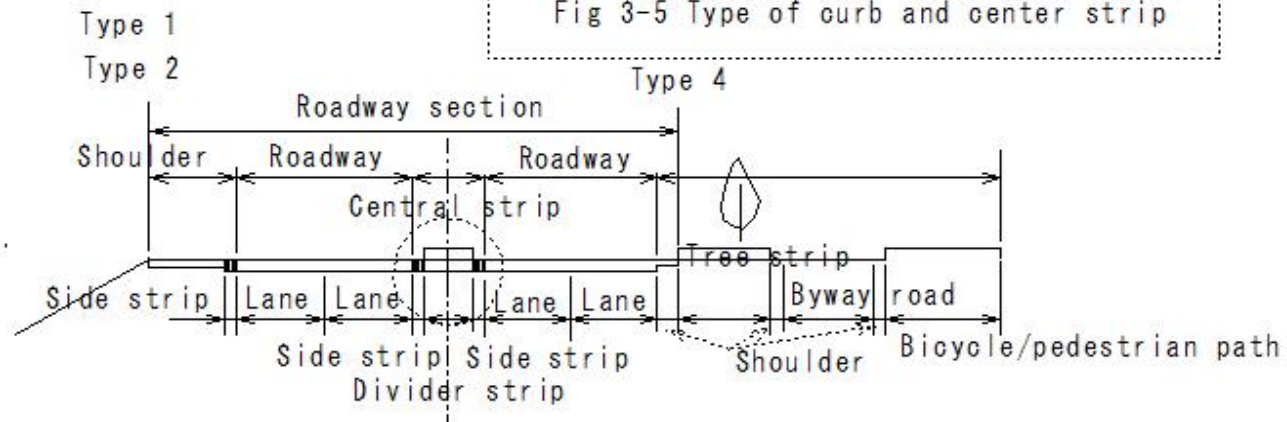
3-3 Central strip

3-3-4 Type and structure of center strip



(a)Barrier type curb

Fig 3-5 Type of curb and center strip



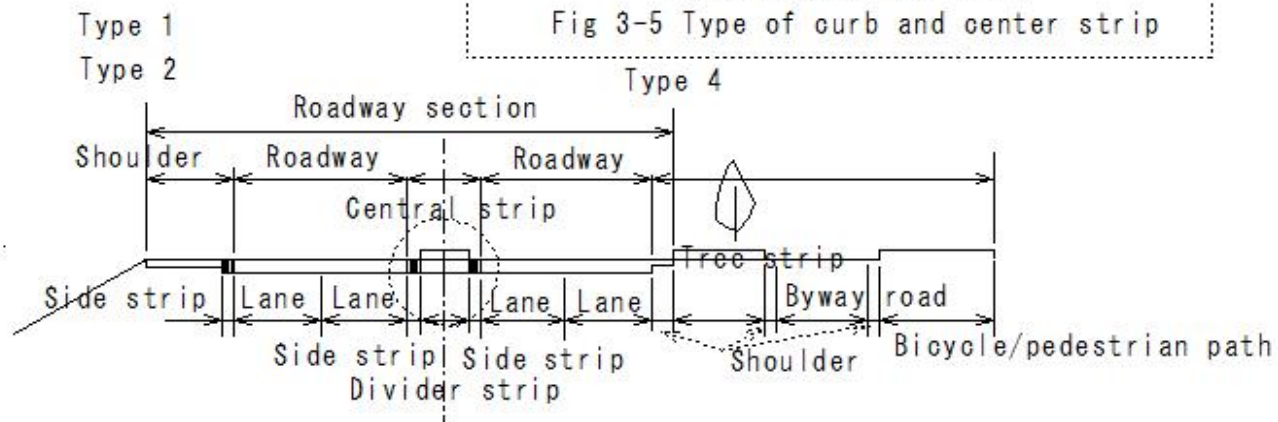
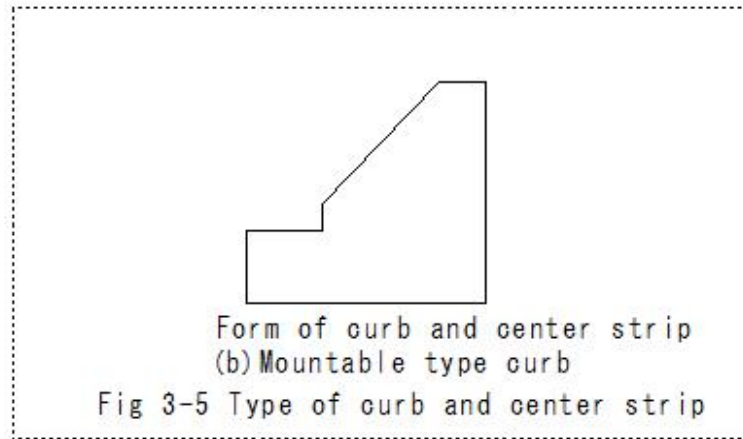
(H567)Road Structure Act(Type and structure of center strip)

(H567)Road Structure Act(Type and structure of center strip)

Road Structure Act

3-3 Central strip

3-3-4 Type and structure of center strip



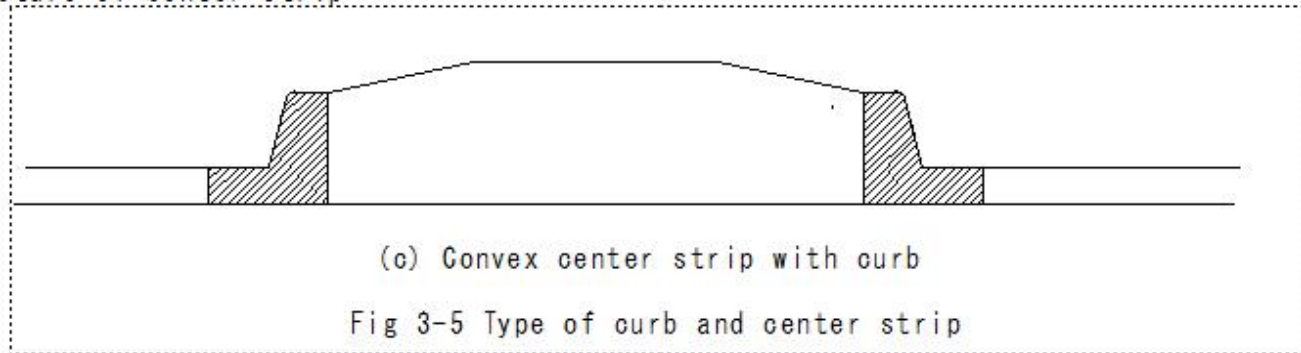
(H568)Road Structure Act(Type and structure of center strip)

(H568)Road Structure Act(Type and structure of center strip)

Road Structure Act

3-3 Central strip

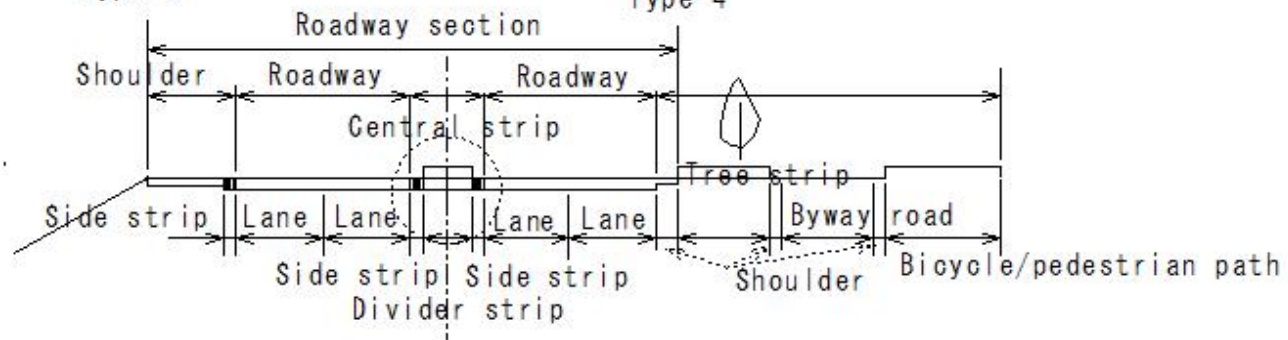
3-3-4 Type and structure of center strip



Type 1

Type 2

Type 4



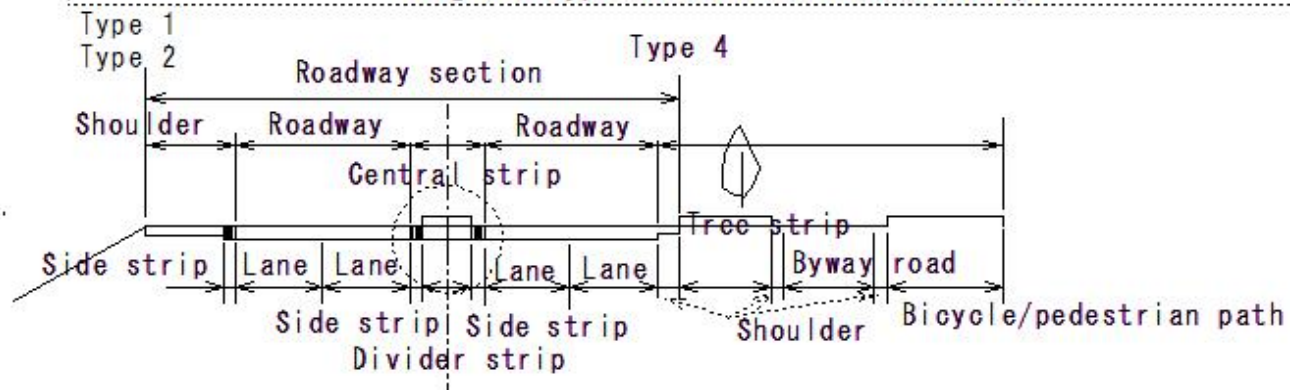
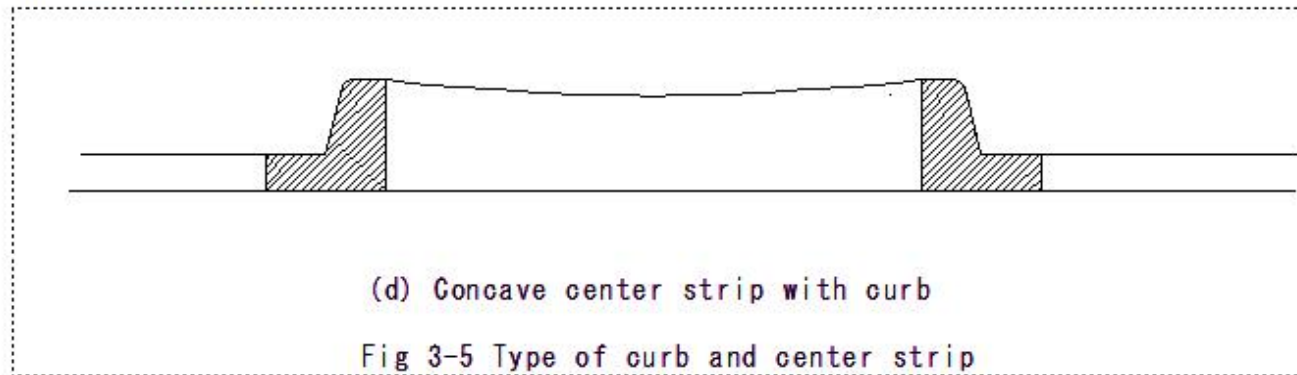
(H569)Road Structure Act(Type and structure of center strip)

(H569)Road Structure Act(Type and structure of center strip)

Road Structure Act

3-3 Central strip

3-3-4 Type and structure of center strip



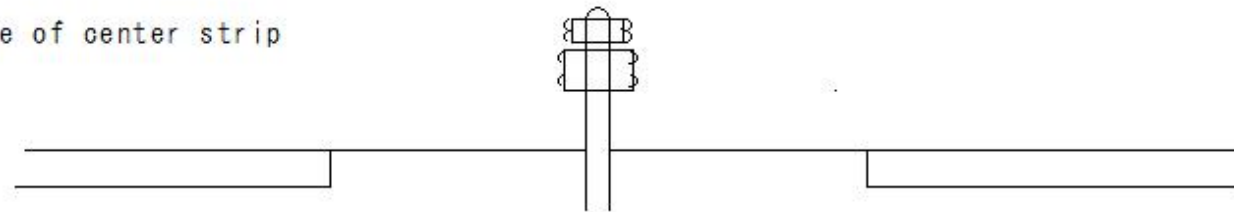
(H570)Road Structure Act(Type and structure of center strip)

(H570)Road Structure Act(Type and structure of center strip)

Road Structure Act

3-3 Central strip

3-3-4 Type and structure of center strip



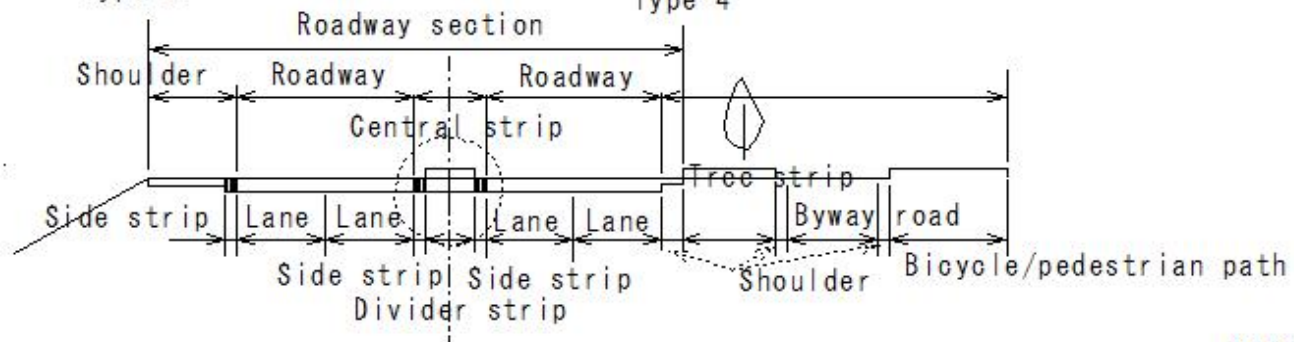
(e) Center strip without curb

Fig 3-5 Type of curb and center strip

Type 1

Type 2

Type 4



H555

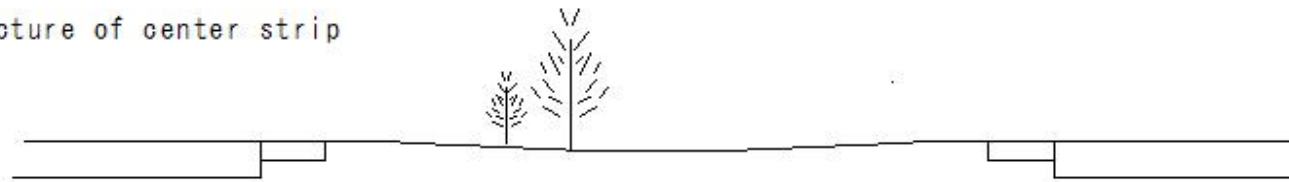
(H571)Road Structure Act(Type and structure of center strip)

(H571)Road Structure Act(Type and structure of center strip)

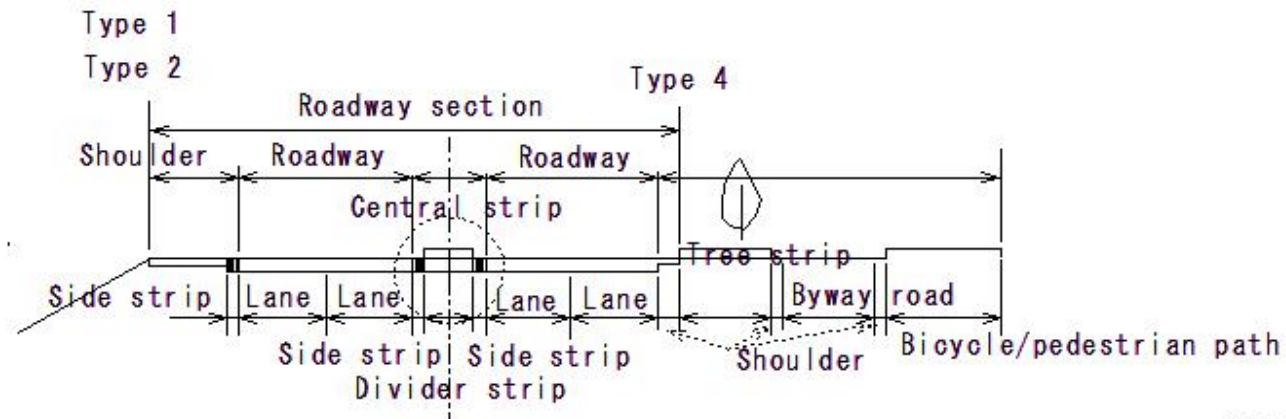
Road Structure Act

3-3 Central strip

3-3-4 Type and structure of center strip



(f) Structure of wide separation
Fig 3-5 Type of curb and center strip



H555

(H572)Road Structure Act(Shoulder)

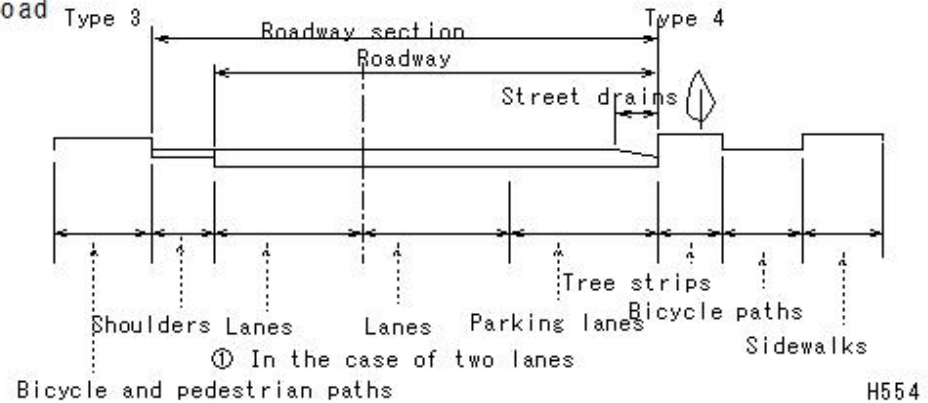
Road Structure Act
3-4 Shoulder

(H572) Road Structure Act (Shoulder)

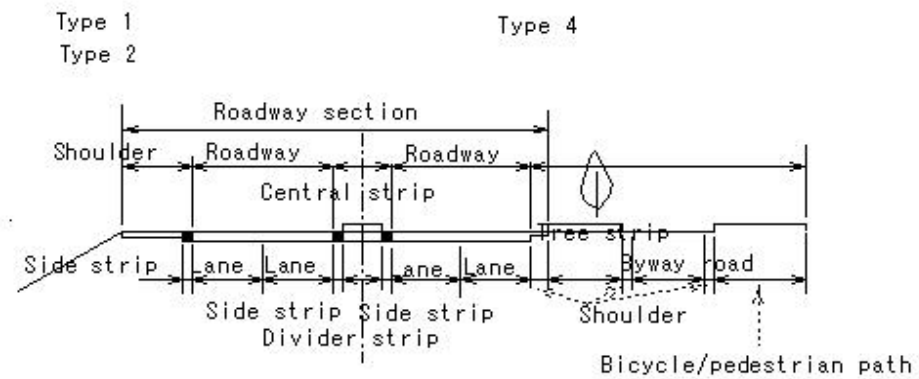
Width of shoulder on the left side of the road

Division		Width of shoulder on the left side of the road	
Type 1	Class 1	2.5	1.75
	Class 2		
	Class 3	1.75	1.25
	Class 4		
Type 2	Class 1	1.25	
	Class 2		
Type 3	Class 1	1.25	0.75
	Class 2		
	Class 3	0.75	0.5
	Class 4		
	Class 5		
Type 4	Class 1	0.5	
	Class 2		
	Class 3		
	Class 4		

(unit: meters)



H54



H55

H488

(H573)Road Structure Act(Shoulder-Width of shoulder on the left side of the lane)

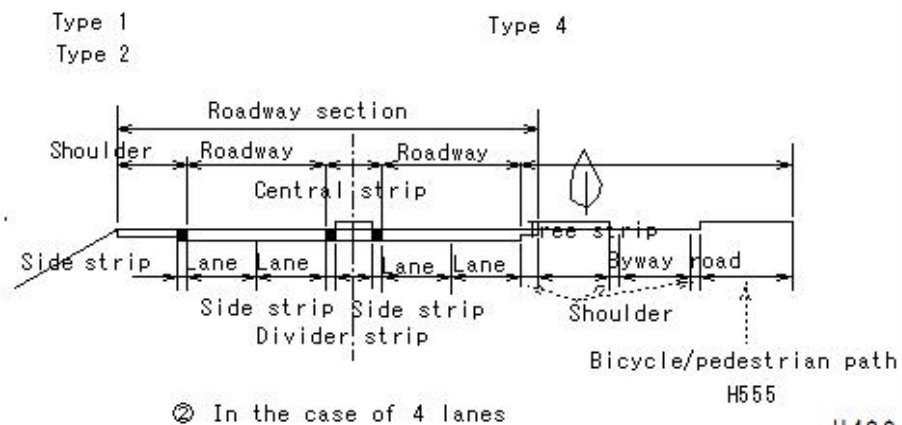
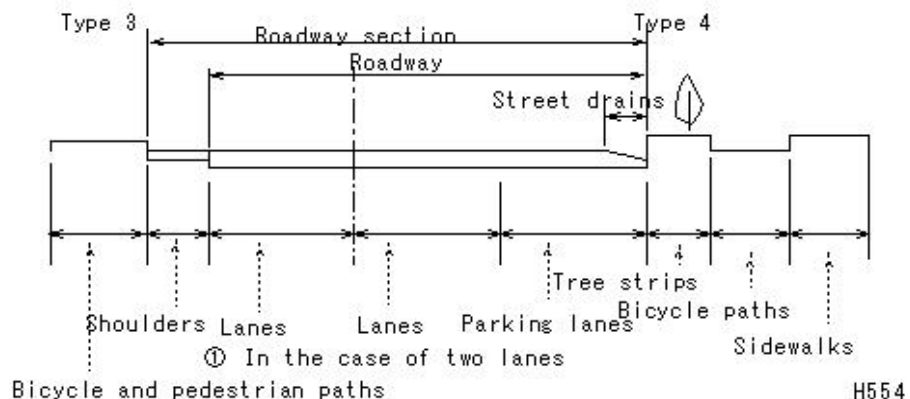
(H573)Road Structure Act(Shoulder-Width of shoulder on the left side of the lane)

Road Structure Act
3-4 Shoulder

Width of shoulder on the right side
of the road

Division		Width of shoulder on the right side of the road
Type 1	Class 1	1.25
	Class 2	
	Class 3	0.75
	Class 4	
Type 2		0.75
Type 3		0.5
Type 4		0.5

(unit: meters)



H489

(H574)Road Structure Act(Shoulder-Width of side strip on shoulder)

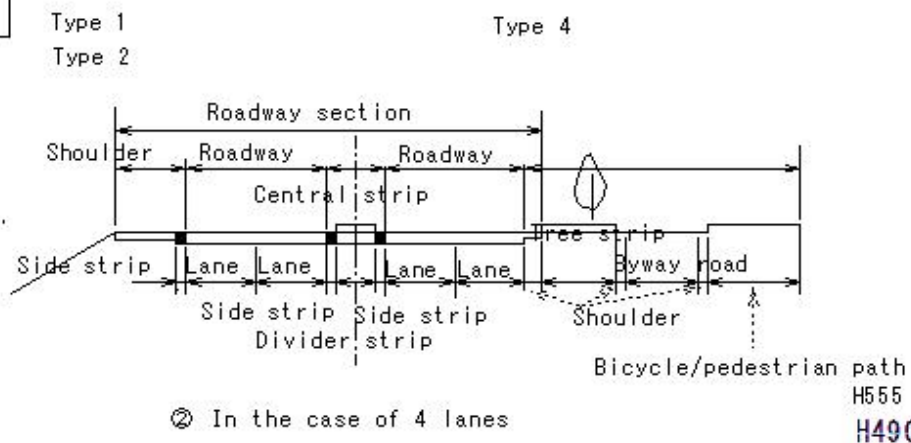
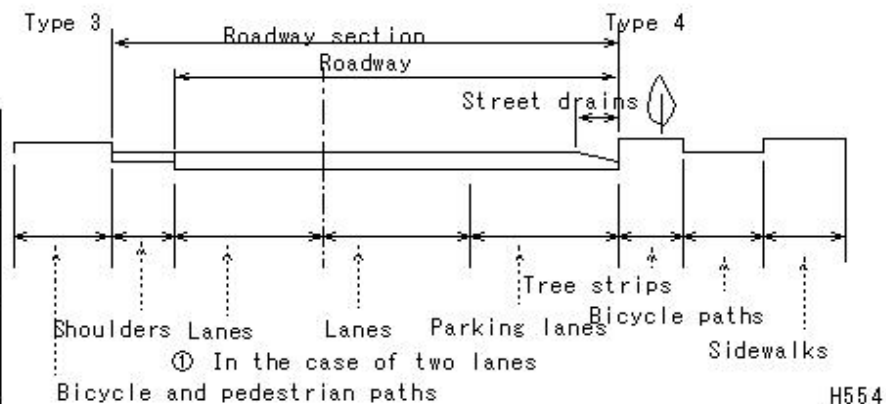
(H574)Road Structure Act(Shoulder-Width of side strip on shoulder)
Road Structure Act

3-4 Shoulder

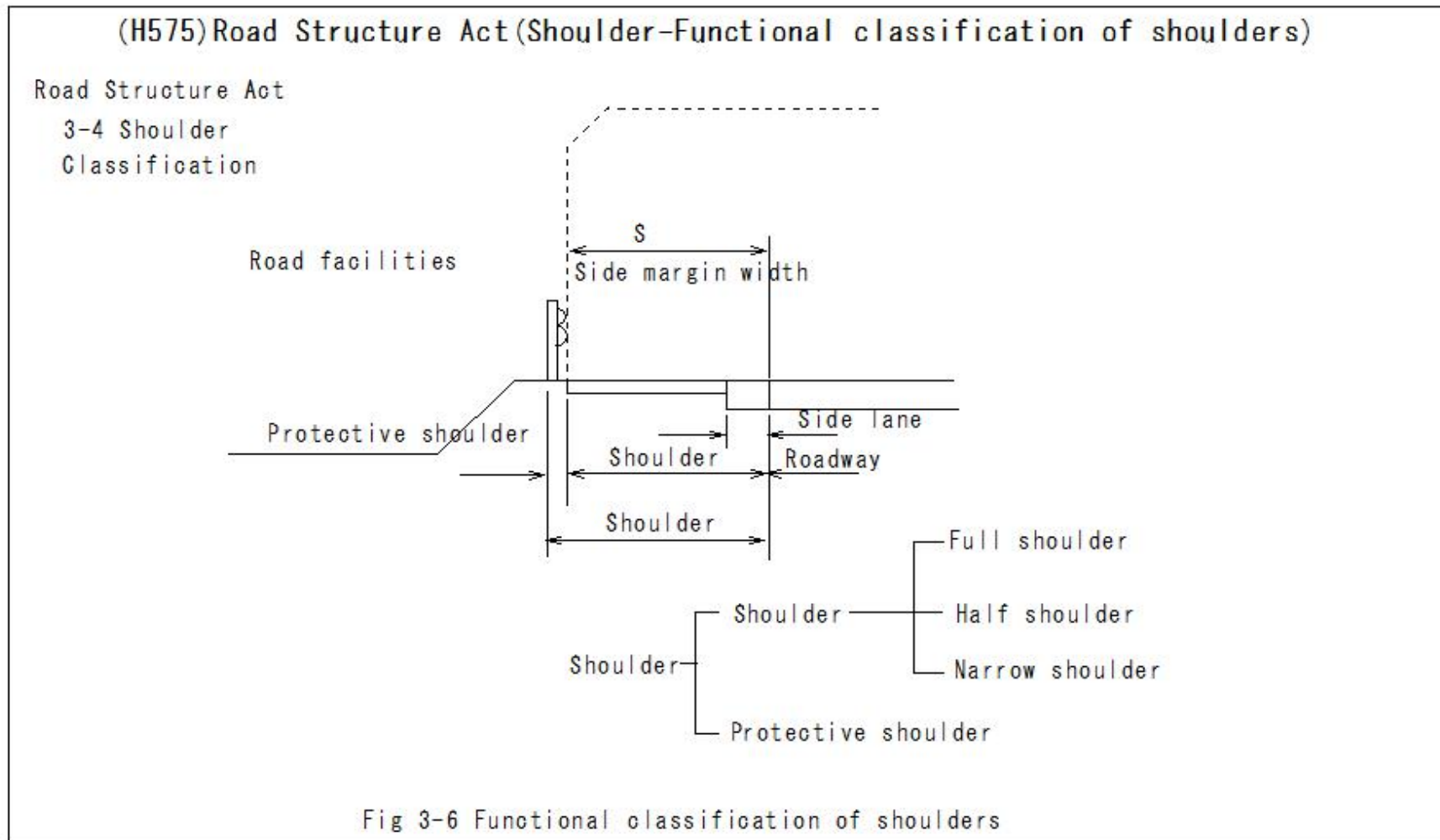
Width of the side strip on the road shoulder

Division		Width of the side strip on the road shoulder	
Type 1	Class 1	0.75	0.5
	Class 2		
	Class 3	0.5	0.25
	Class 4		
Type 2	Class 1	0.5	-
	Class 2		

(unit: meters)



(H575)Road Structure Act(Shoulder-Functional classification of shoulders)



(H576)Road Structure Act(Shoulder-Shoulder width)

Road Structure Act

3-4-2 Shoulder width

Table 3-3 Shoulder width

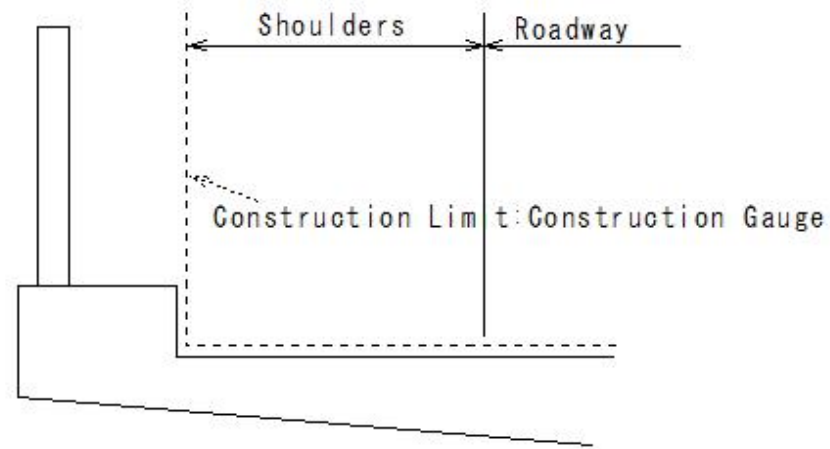
Type	Class	Minimum width of shoulder (excluding protective width) (unit: m)					
		Left side			Right side		Tunnel
		Standard value	Exceptional value	Desired value	Standard value	Desired value	
Type 1	Class 1,2	2.50	1.75	3.25	1.25	1.75	1.00
	Class 3	1.75	1.25	2.50	0.75	1.00	0.75
	Class 4	1.75	1.25	1.75	0.75	1.00	0.75
Type 2	Class 1	1.25		1.75	0.75	1.00	
	Class 2	1.25		1.75	0.75	0.75	
Type 3	Class 1	1.25	0.75	1.75	0.50	0.75	0.50
	Class 2	0.75	0.50	1.00	0.50	0.75	0.50
	Class 3・4	0.75	0.50	0.75	0.50	0.50	0.50
	Class 5	0.50		0.50	0.50	0.50	0.50
Type 4		0.50		0.50	0.50	0.50	0.50

(H577)Road Structure Act(Shoulder- Structure of shoulders)

(H577)Road Structure Act(Shoulder- Structure of shoulders)

Road Structure Act

3-4-4 Structure of shoulders



① General structure

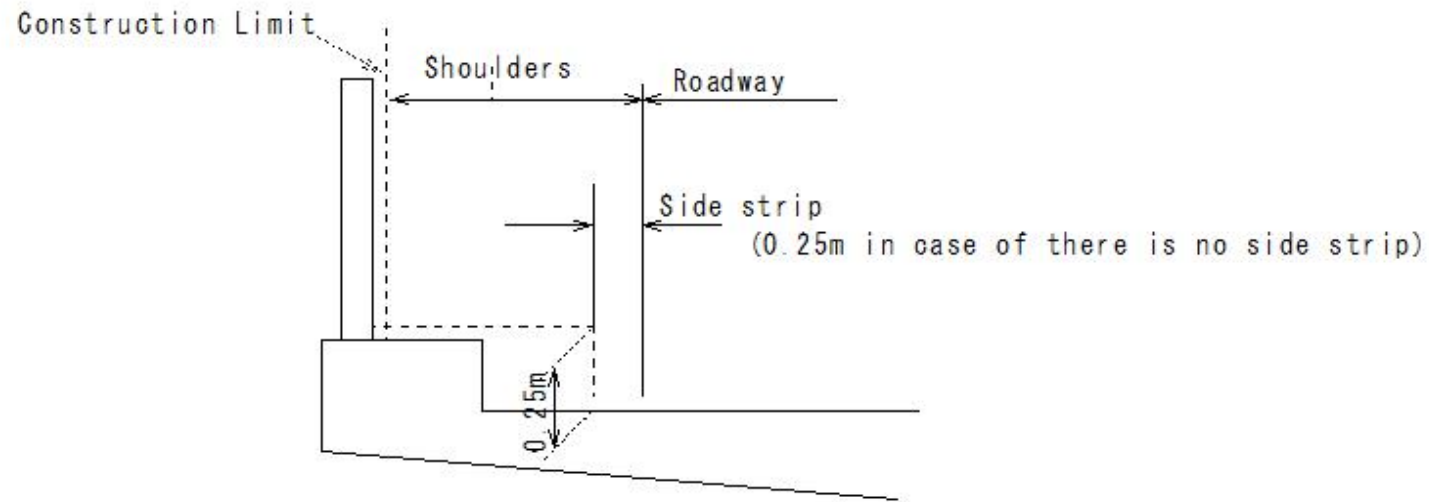
Fig 3-7 Structure of shoulders in tunnels and bridges

(H578)Road Structure Act(Shoulder- Structure of shoulders)

(H578)Road Structure Act(Shoulder- Structure of shoulders)

Road Structure Act

3-4-4 Structure of shoulders



② Structure that also serves as a ground guard

Fig 3-7 Structure of shoulders in tunnels and bridges

(H579)Road Structure Act(Shoulder- Side strip on the shoulder of the road)

(H579)Road Structure Act(Shoulder- Side strip on the shoulder of the road)

Road Structure Act

3-4-6 Side strip on the shoulder of the road

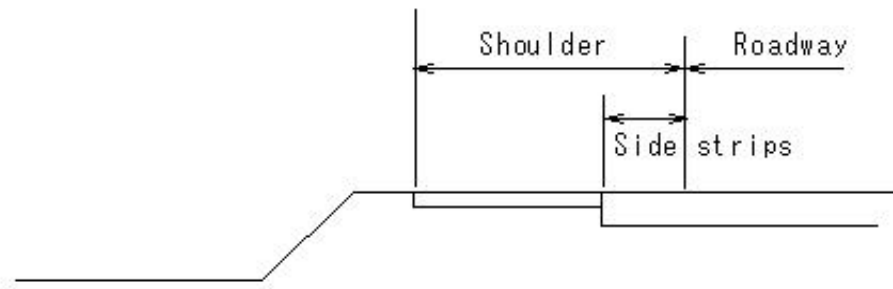


Fig 3-8 Side strip on the shoulder of the road

(H580)Road Structure Act(Shoulder- Side strip on the shoulder of the road)

(H580)Road Structure Act(Shoulder- Side strip on the shoulder of the road)

Road Structure Act

3-4-6 Side strip on the shoulder of the road

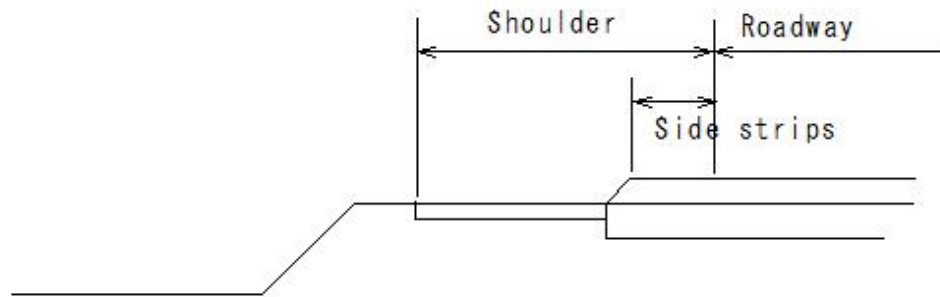


Fig 3-8 Side strip on the shoulder of the road

(H581)Road Structure Act(Shoulder- Protective shoulder)

(H581)Road Structure Act(Shoulder- Protective shoulder)

Road Structure Act
3-4-7 Protected shoulder

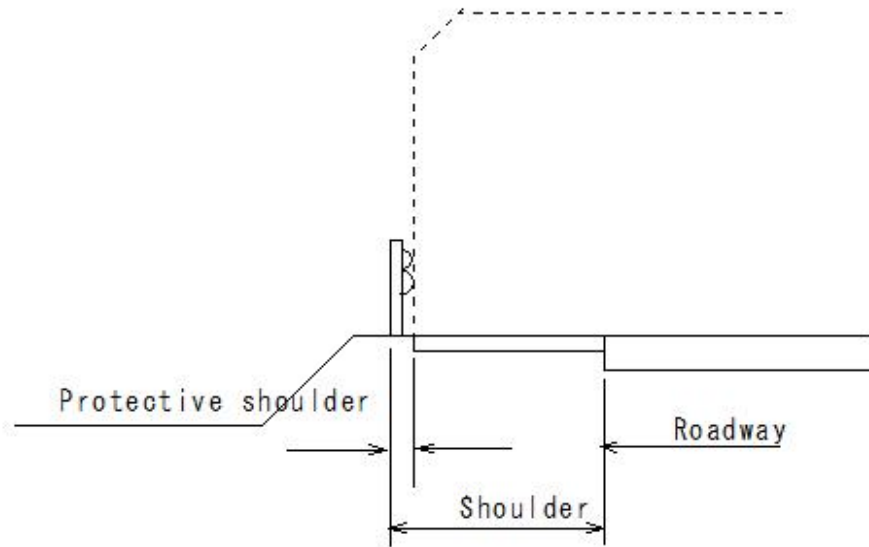


Fig 3-9 Protected shoulder (example for Class 3 or Class 4 roads)

(H582)Road Structure Act(Shoulder- Protective shoulder)

(H582)Road Structure Act(Shoulder- Protective shoulder)

Road Structure Act
3-4-7 Protected shoulder

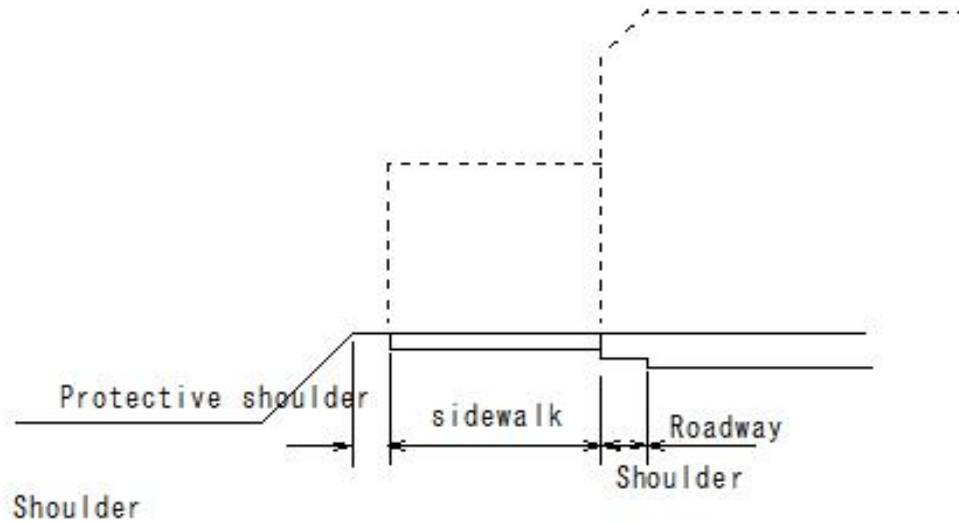
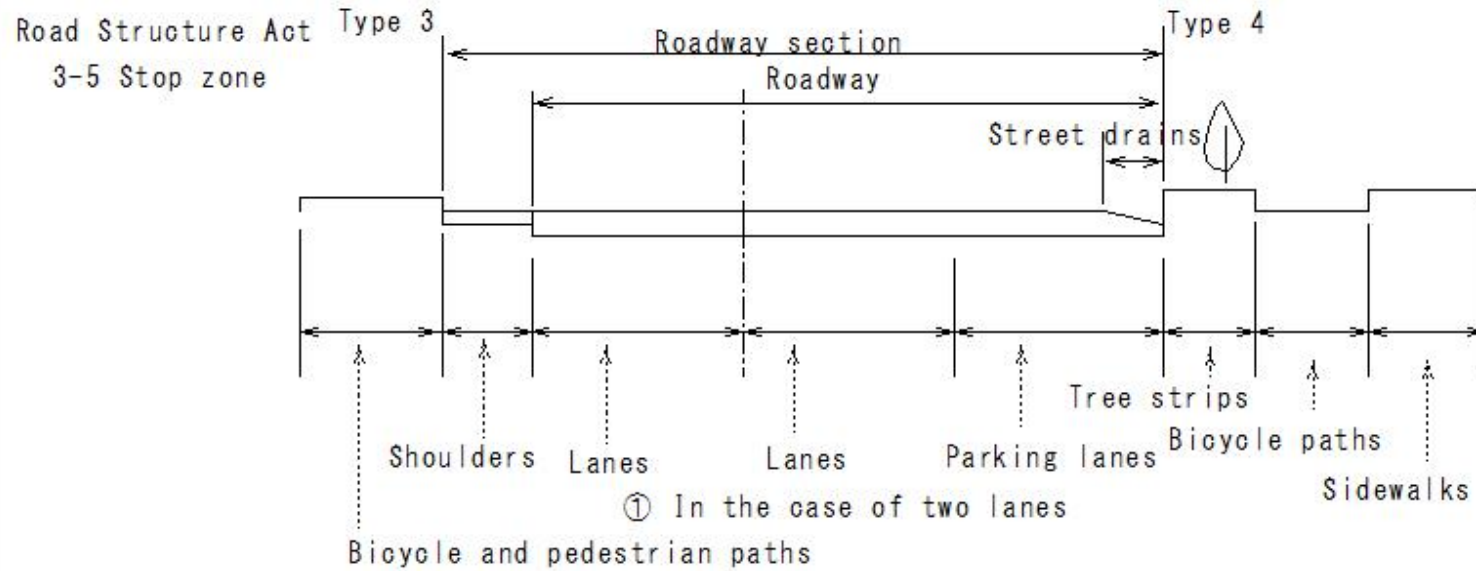


Fig 3-9 Protected shoulder (example for Class 3 or Class 4 roads)

(H583)Road Structure Act(Stop zone)

(H583)Road Structure Act(Stop zone)



H554

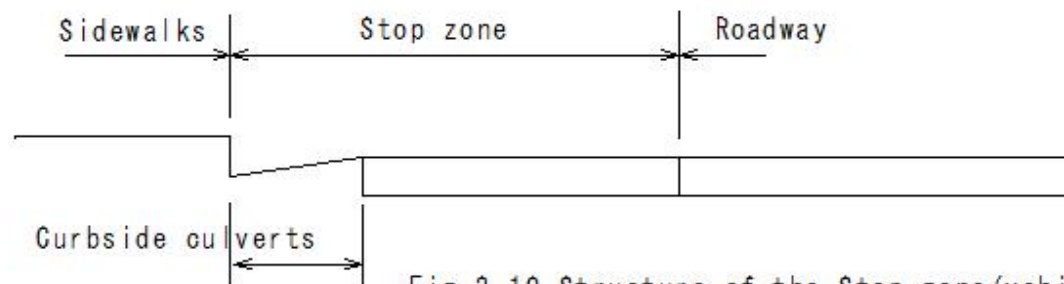


Fig 3-10 Structure of the Stop zone(vehicle belt)

(H584)Road Structure Act(Width of bicycle and pedestrian paths)

(H584)Road Structure Act(Width of bicycle and pedestrian paths)

Road Structure Act

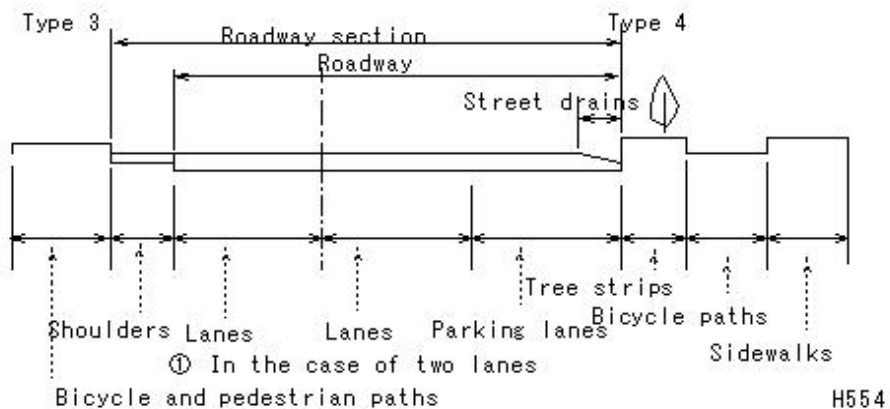
3-6-3 Width of bicycle and pedestrian paths

Width of bicycle and pedestrian paths

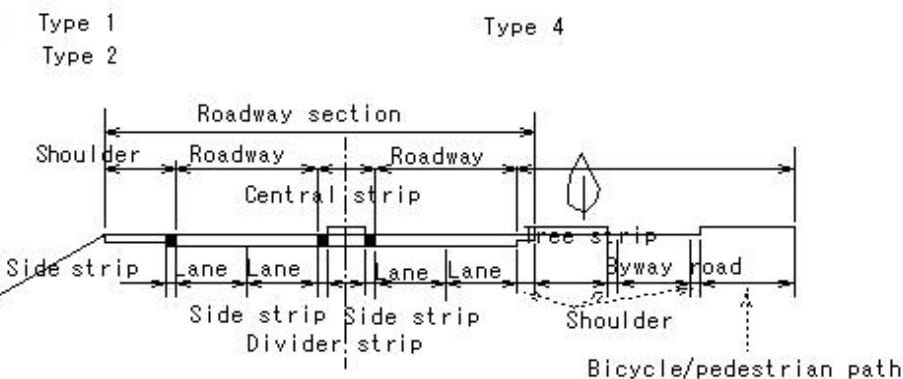
Division		Width of bicycle and pedestrian path		
Type 3		2	1.5	1.5
Type 1	Class 1	3.5	2.75	2
	Class 2		2	
	Class 3	2	1.5	1.5
	Class 4			

(unit: meters)

H491



H554



② In the case of 4 lanes

H555

(H585)Road Structure Act(Sidewalk width)

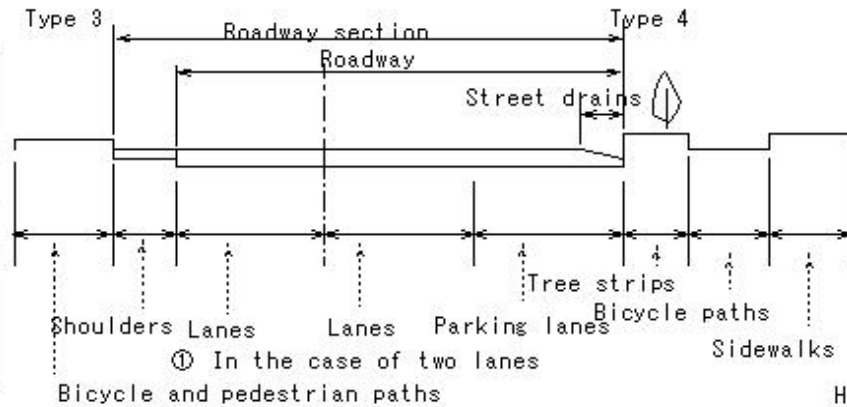
(H585)Road Structure Act(Sidewalk width)

Road Structure Act

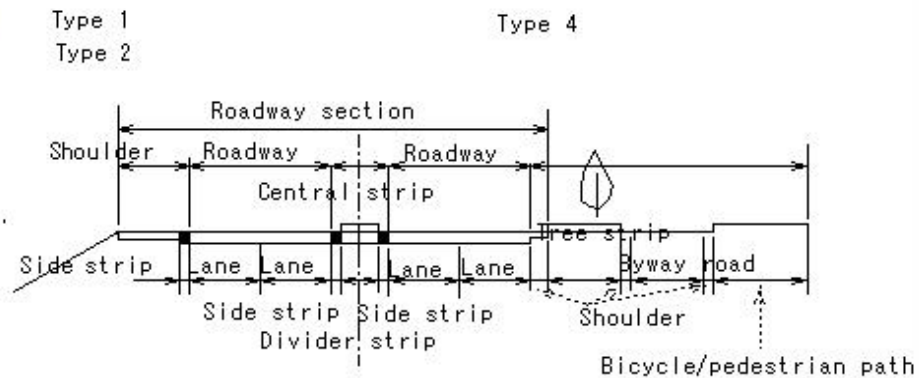
3-6-3 Sidewalk width (unit: meters)

Division		Sidewalk width		
Type 3		1.5	1	1
Type 4	Class 1	3	2.25	1.5
	Class 2		1.5	
	Class 3	1.5	1	1
	Class 4			

(unit: meters)
H492



H554



H555

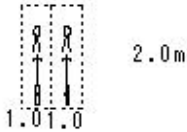
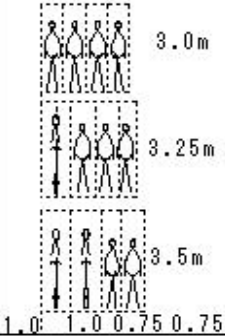
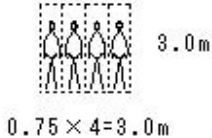
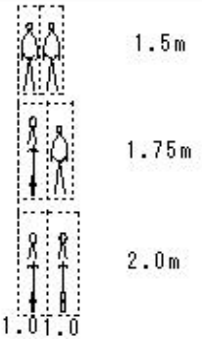
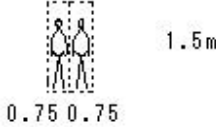
(H587)Road Structure Act(Width of pedestrian lane)

(H587)Road Structure Act(Width of pedestrian lane)

Road Structure Act

3-6-3 Width of pedestrian lane

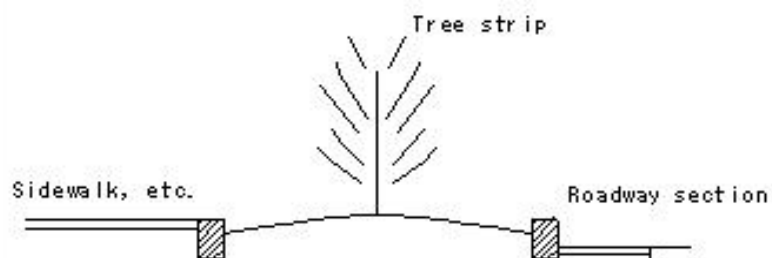
Fig 3-13 Width of pedestrian lane

	Bicycle Paths	Bicycle and pedestrian paths	Sidewalk
Type 4 Class 1 Class 2	2.0m	3.5m	3.0m
			 <p>$0.75 \times 4 = 3.0m$</p>
Type 3 Type 4 Class 3 Class 4		2.0m	1.5m
			 <p>$0.75 \ 0.75$</p>

(H588)Road Structure Act(Sidewalk structure)

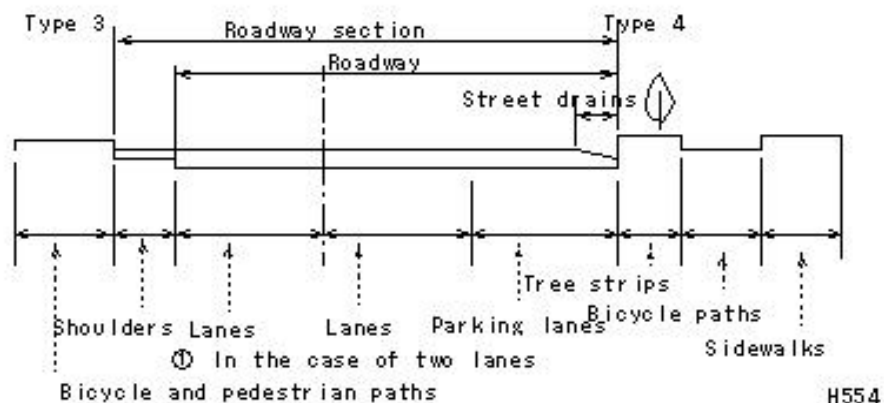
(H588)Road Structure Act(Sidewalk structure)

Road Structure Act
3-6-4 Sidewalk structure



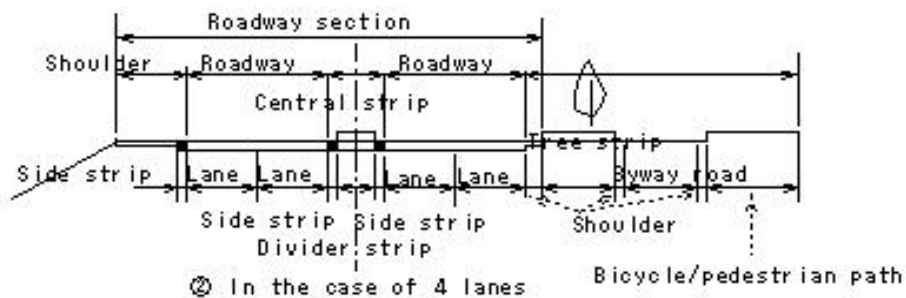
(a)

Figure 3-14 Sidewalk structure, etc.



H554

Type 1
Type 2
Type 4



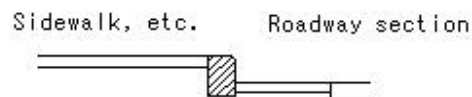
Bicycle/pedestrian path

H555

(H589)Road Structure Act(Sidewalk structure)

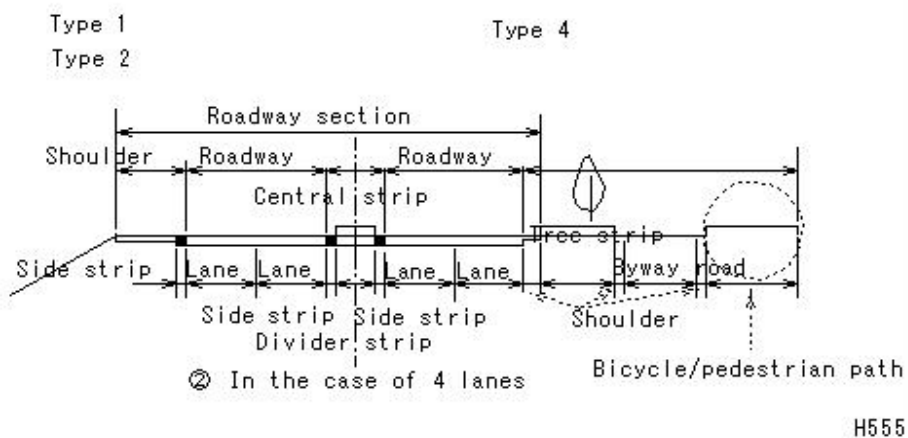
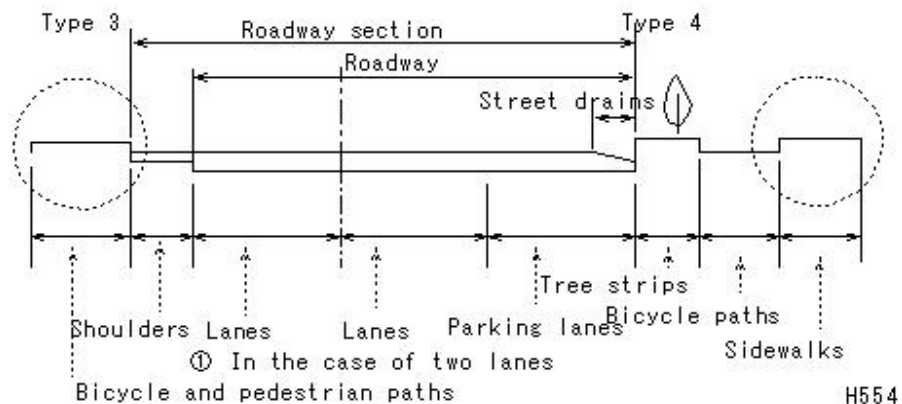
(H589)Road Structure Act(Sidewalk structure)

Road Structure Act
3-6-4 Sidewalk structure



(b)

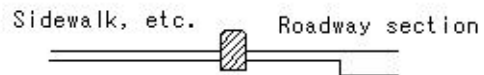
Figure 3-14 Sidewalk structure, etc.



(H590)Road Structure Act(Sidewalk structure)

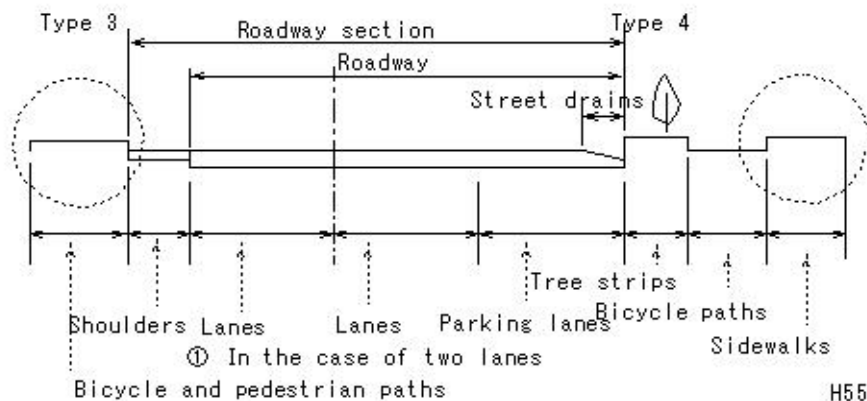
(H590)Road Structure Act(Sidewalk structure)

Road Structure Act
3-6-4 Sidewalk structure



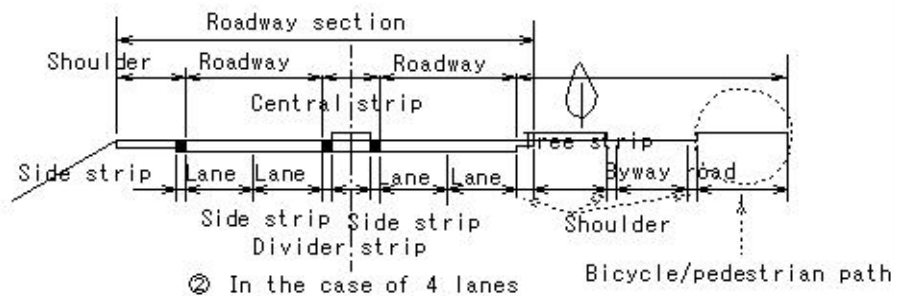
(c)

Figure 3-14 Sidewalk structure, etc.



Type 1
Type 2

Type 4



H555

(H591)Road Structure Act(Width of central strip of roads in snowy regions)

(H591)Road Structure Act(Width of central strip of roads in snowy regions)

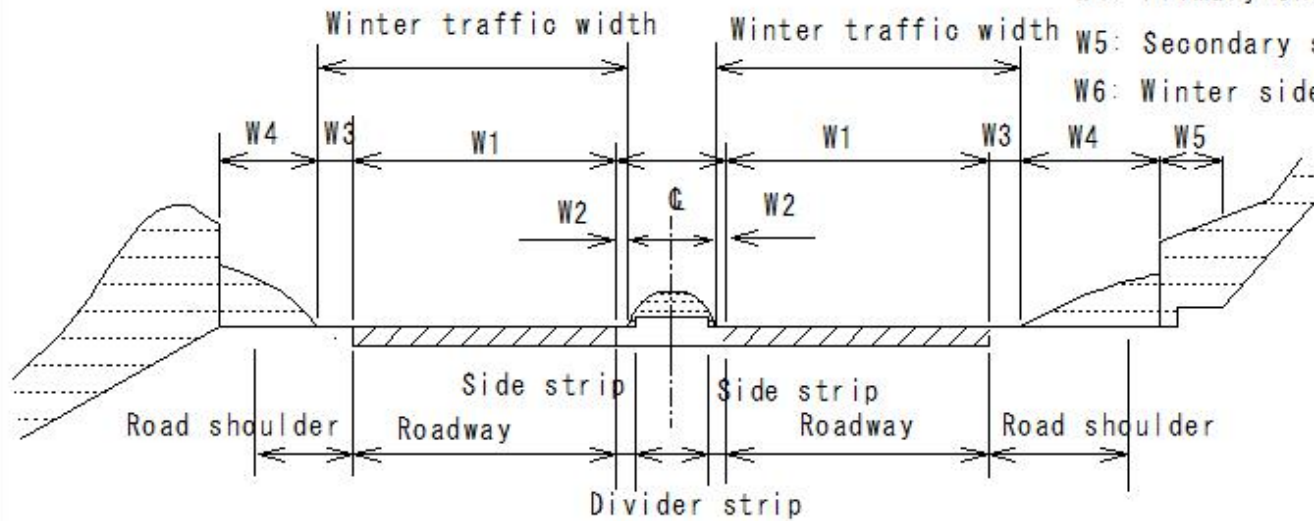
Road Structure Act

3-7 Width of central strip of roads in snowy regions

W1: Winter roadway
 W2: Winter side strip
 W3: Winter shoulder

} Winter traffic width

W4: Primary snow accumulation width
 W5: Secondary snow accumulation width
 W6: Winter sidewalk



(a) Type 1 and Type 2

Figure 3-15 Width composition of roads in snowy regions

(H592)Road Structure Act(Width of central strip of roads in snowy regions)

(H592)Road Structure Act(Width of central strip of roads in snowy regions)

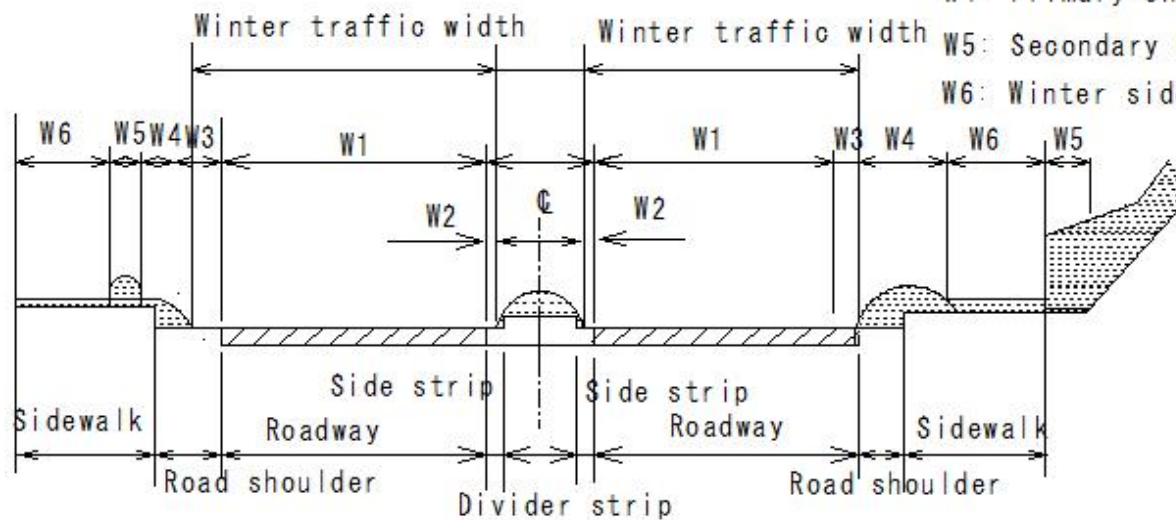
Road Structure Act

3-7 Width of central strip of roads in snowy regions

W1: Winter roadway
 W2: Winter side strip
 W3: Winter shoulder

} Winter traffic width

W4: Primary snow accumulation width
 W5: Secondary snow accumulation width
 W6: Winter sidewalk



(b) Type 3 and Type 4 (multiple lanes)

Figure 3-15 Width composition of roads in snowy regions

(H593)Road Structure Act(Width of central strip of roads in snowy regions)

(H593)Road Structure Act(Width of central strip of roads in snowy regions)

Road Structure Act

3-7 Width of central strip of roads in snowy regions

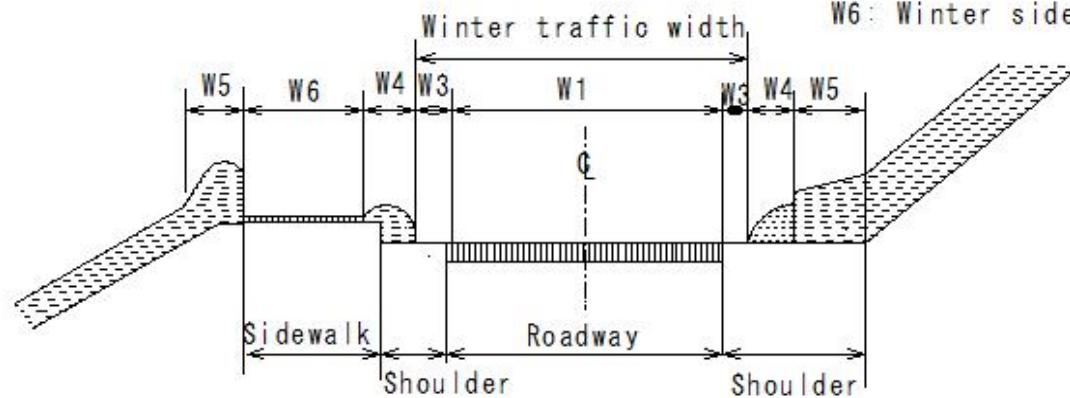
W1: Winter roadway
 W2: Winter side strip
 W3: Winter shoulder

} Winter traffic width

W4: Primary snow accumulation width

W5: Secondary snow accumulation width

W6: Winter sidewalk



(c) Type 3 and Type 4 (2 lanes)

Figure 3-15 Width composition of roads in snowy regions

(H594)Road Structure Act(Width composition in snowy areas)

(H594)Road Structure Act(Width composition in snowy areas)

Road Structure Act

3-7-2 Width composition in snowy areas

Table 3-8 Snow width values (reference)

(a) Primary snow width

(unit: meters)

Road classification		Type 1, Type 2	Type 3 and Type 4		
Road classification	Number of lanes		Class 1	Class 2	Class 3
a	6	3.00	3.00	-	-
	4	2.50	2.50	2.50	-
	2	-	1.75	1.75	1.50
b	6	3.25	3.25	-	-
	4	2.50	2.50	2.50	-
	2	-	1.75	1.75	1.50

Area a: Areas with heavy snowfall

Area b: Areas with light snowfall

(H595)Road Structure Act(Width composition in snowy areas)

(H595) Road Structure Act(Width composition in snowy areas)

Road Structure Act

3-7-2 Width composition in snowy areas

Table 3-8 Snow width values (reference)

(b) Secondary snow depth

(unit: meters)

Road classification		Type 3 and Type 4		
Road classification	Number of lanes	Class 1	Class 2	Class 3
a	6	5.00	-	-
	4	4.00	4.00	-
	2	2.75	2.75	2.25
b	6	4.50	-	-
	4	3.75	3.50	-
	2	2.50	2.50	2.00

Area a: Areas with heavy snowfall

Area b: Areas with light snowfall

(H596)Road Structure Act(Width composition in snowy areas)

(H596)Road Structure Act(Width composition in snowy areas)

Road Structure Act
3-7-2 Width configuration in snowy areas

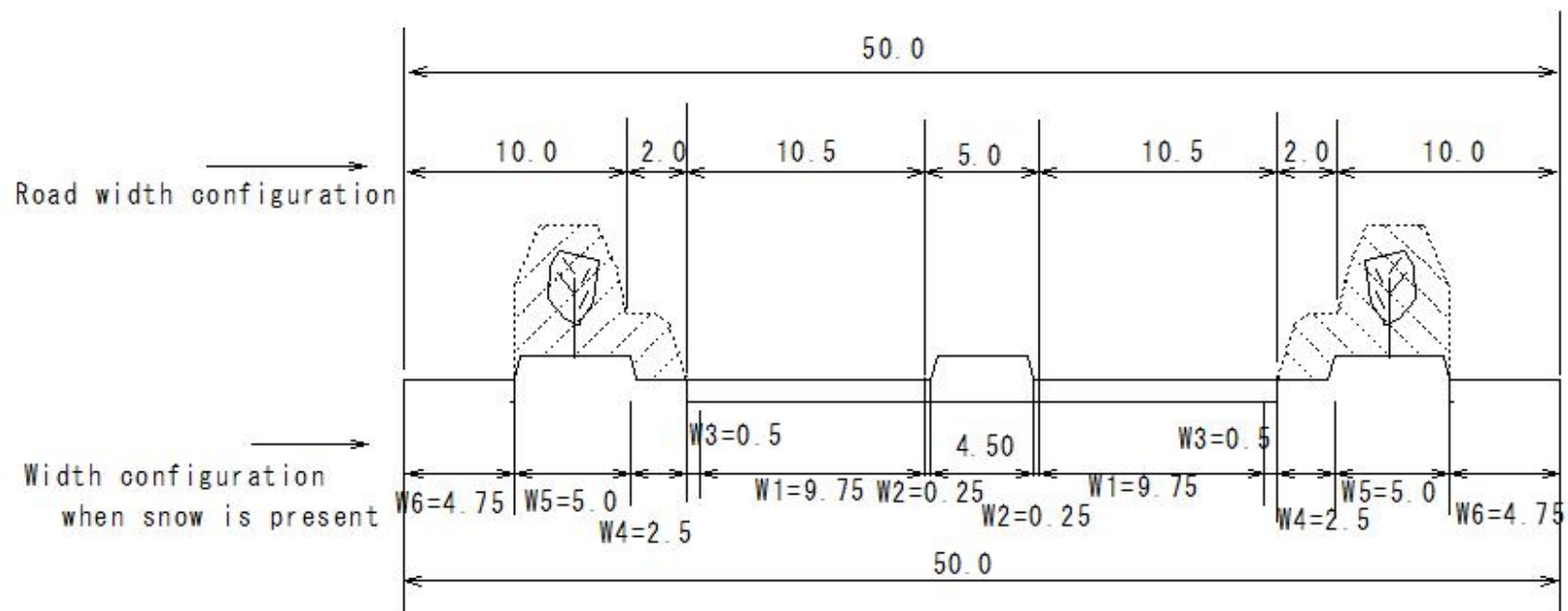


Figure 3-17 Example of width configuration considering snow width

(H597)Road Structure Act(Width composition in snowy areas)

(H597)Road Structure Act(Width composition in snowy areas)

Road Structure Ordinance

3-7-2 Width composition of snowy areas

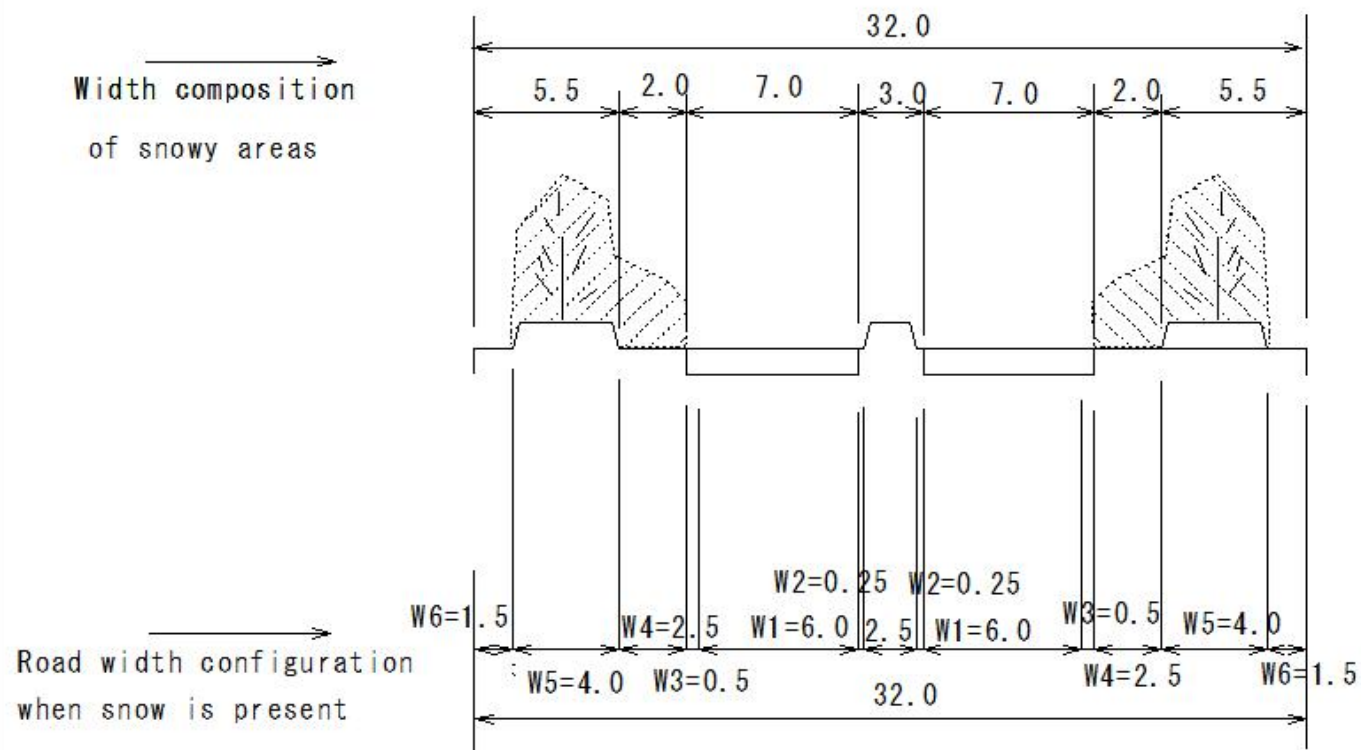


Figure 3-17 Example of width configuration considering snow cover width

(H598)Road Structure Act(Width composition in snowy areas)

(H598)Road Structure Act(Width composition in snowy areas)

Road Structure Act

3-7-2 Width composition of snowy areas

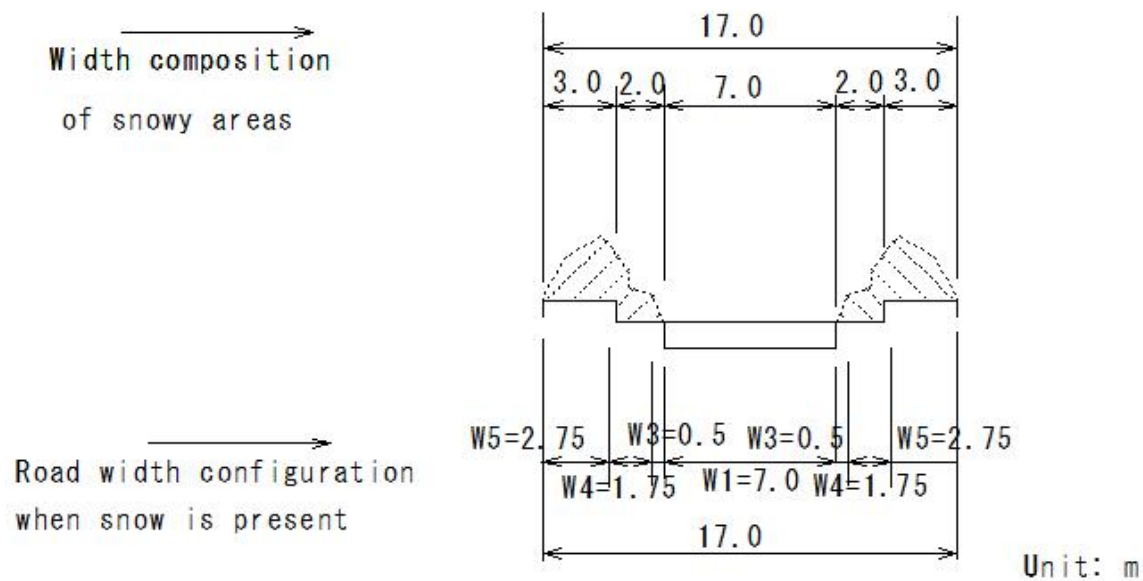


Figure 3-17 Example of width configuration considering snow cover width

(H599)Road Structure Act(Example of road width configuration for bridges and elevated roads)

(H599)Road Structure Act(Example of road width configuration for bridges and elevated roads)

Road Structure Act

3-7-2 Width configuration during snowfall

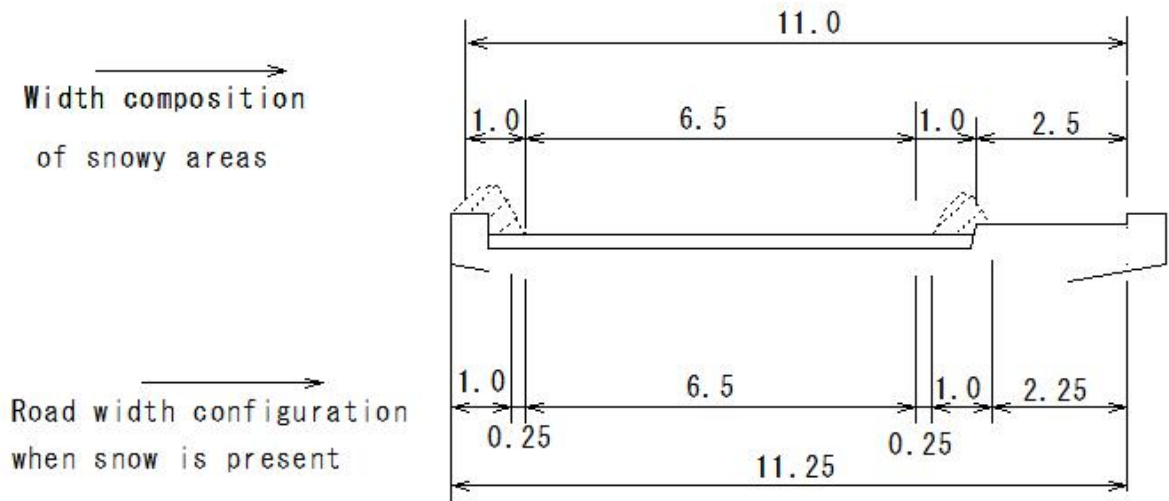


Figure 3-18 Example of road width configuration for bridges and elevated roads

(H600)Road Structure Act(Planting belt)

(H600)Road Structure Act(Planting belt)

Road Structure Act
 3-8 Planting belt
 3-8-3 Planting belt width

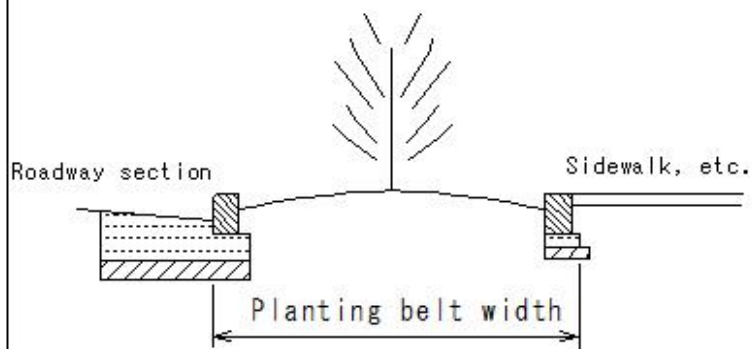
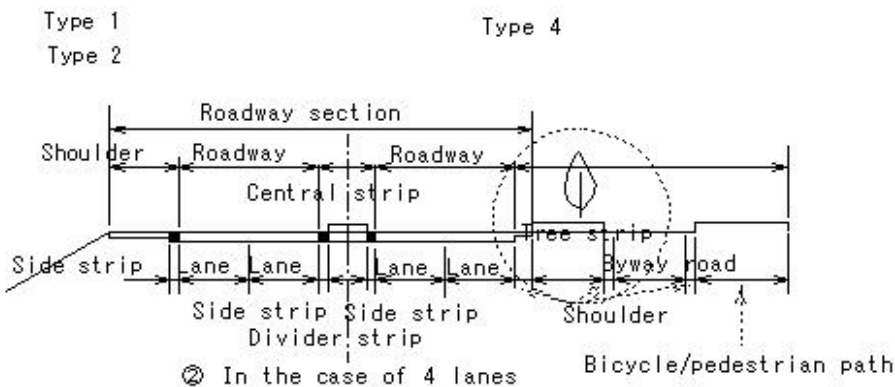
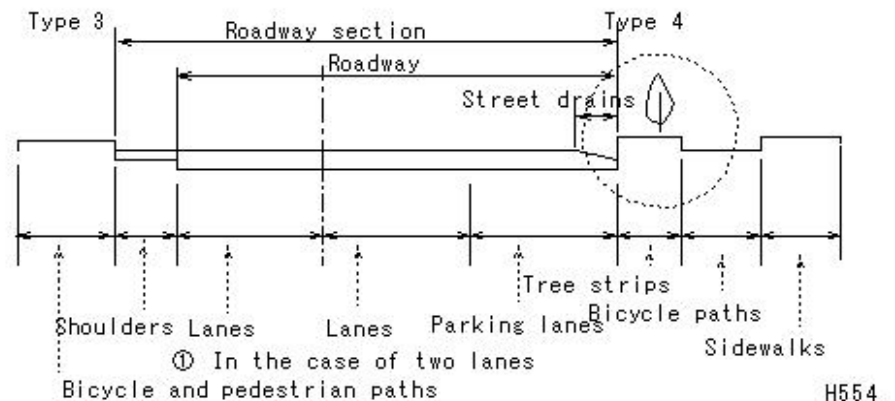


Figure 3-19 Planting cross section (example)



(H601)Road Structure Act(Planting belt)

(H601)Road Structure Act(Planting belt)

Road Structure Act

3-8 Planting belt

3-8-3 Planting belt width

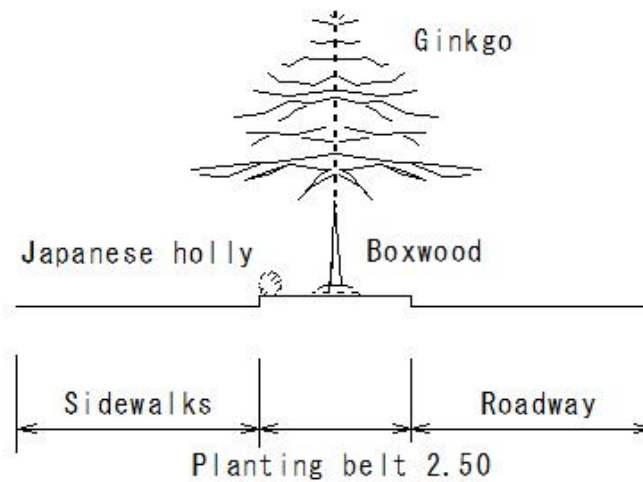


Figure 3-20 Example of planting belt in urban area

(H602)Road Structure Act(Planting belt)

(H602)Road Structure Act(Planting belt)

Road Structure Act

3-8 Planting belt

3-8-3 Planting belt width

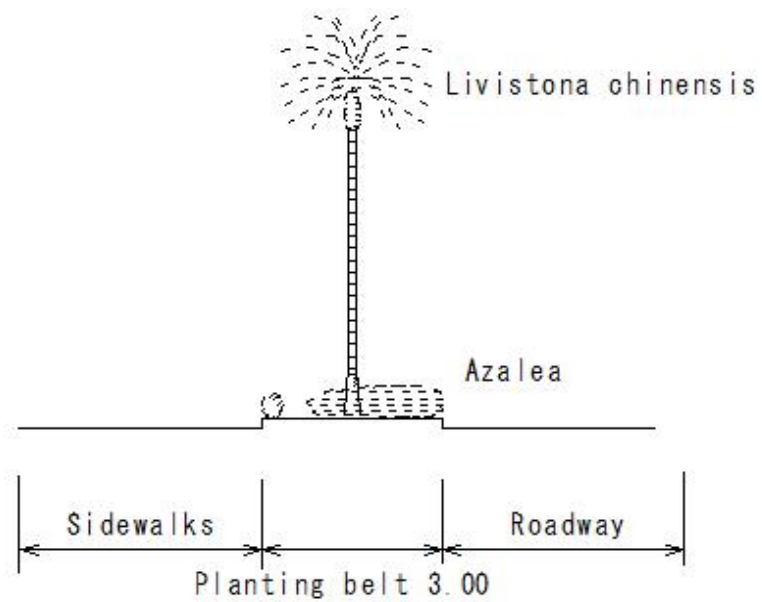


Figure 3-21 Example of tree belt in landscape area

(H603)Road Structure Act(Planting belt)

(H603)Road Structure Act(Planting belt)

Road Structure Act

3-8 Planting belt

3-8-3 Planting belt width

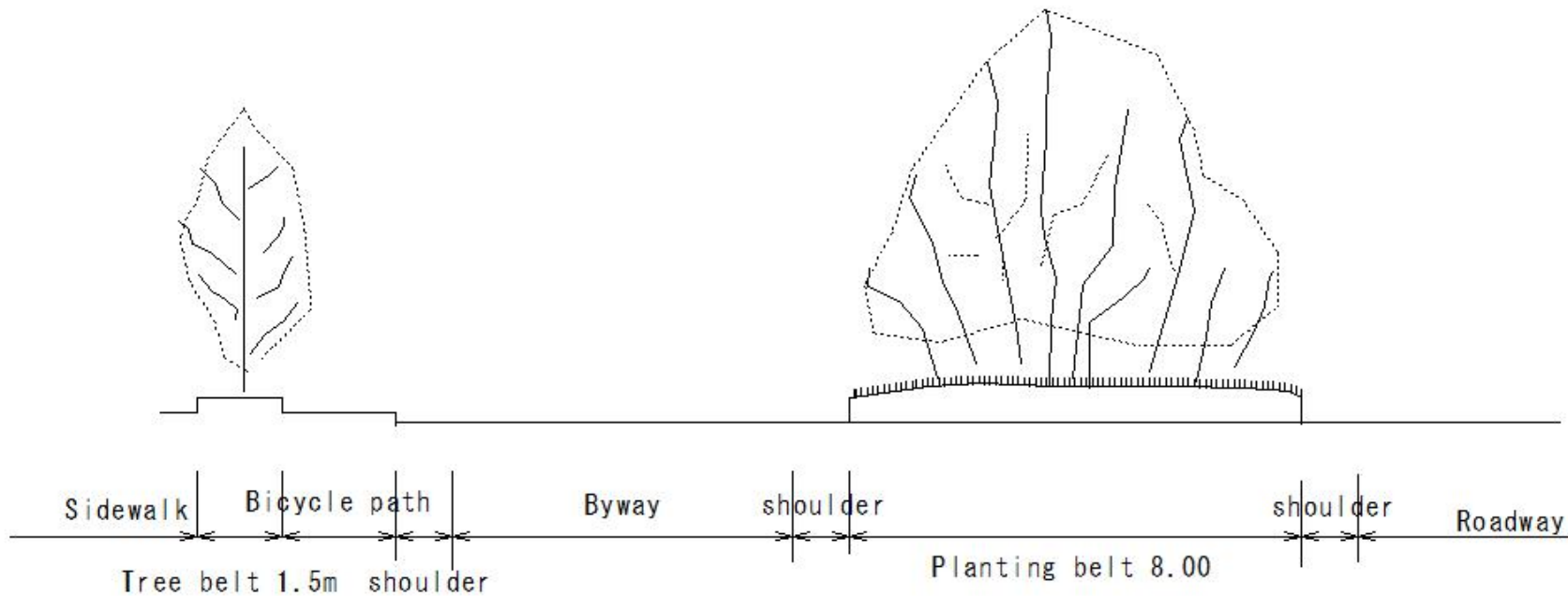


Figure 3-22 Example of a tree belt in a residential area (environmental facility zone)

(H604)Road Structure Act(Side road(Byway))

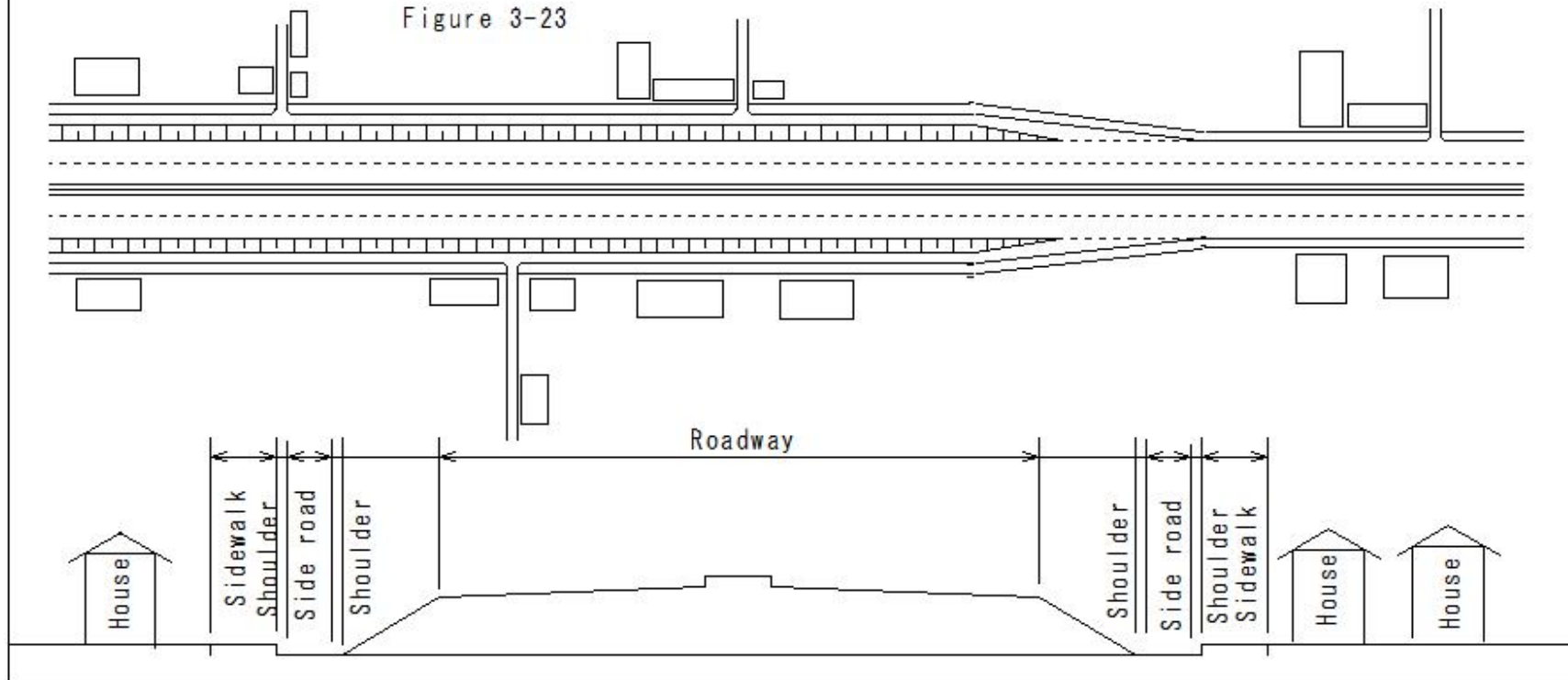
(H604)Road Structure Act(Side road(Byway))

Road Structure Ordinance

3-9 Side road(Byway)

Figure 3-23 Example of Side road(Byway)

Figure 3-23



(H605)Road Structure Act(Environmental facilities zone)

(H605)Road Structure Act(Side road(Byway))

Road Structure Ordinance
3-9 Side road(Byway)

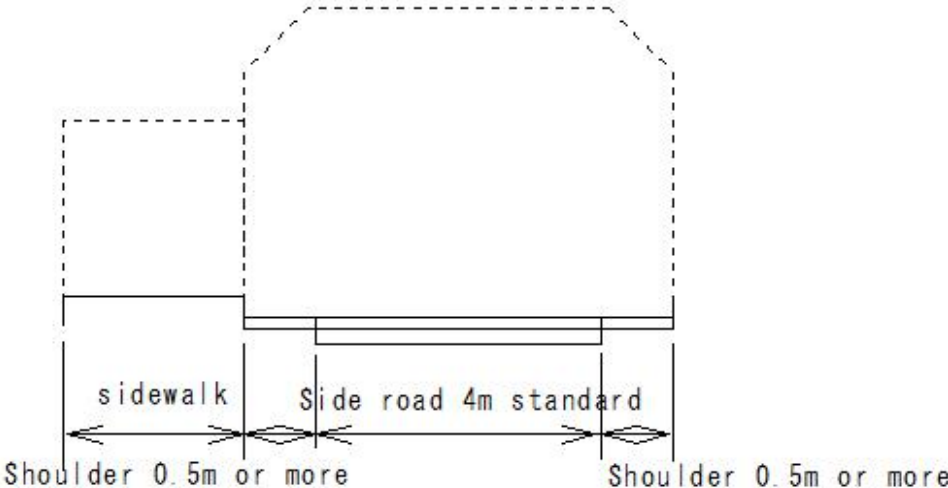
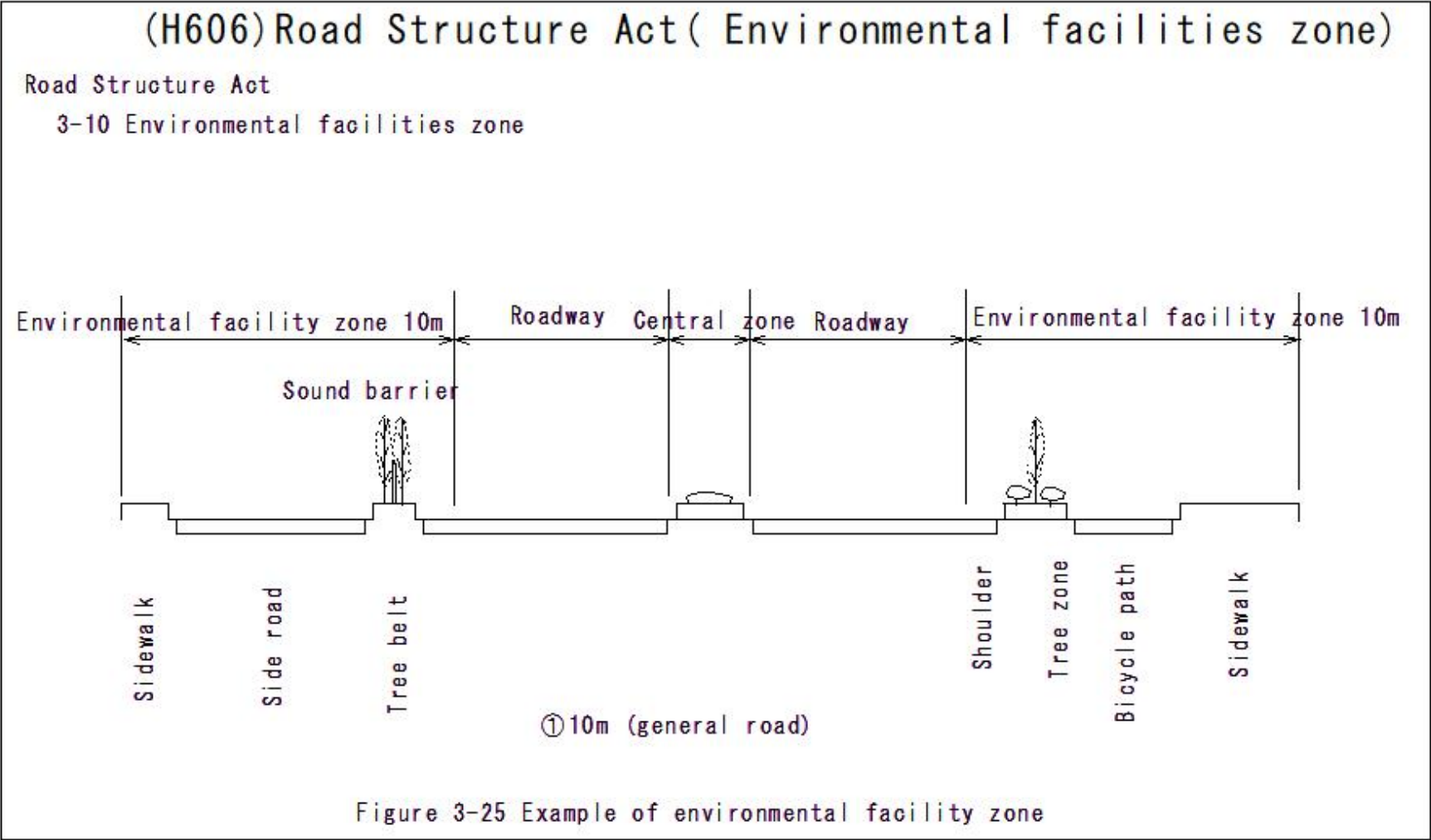
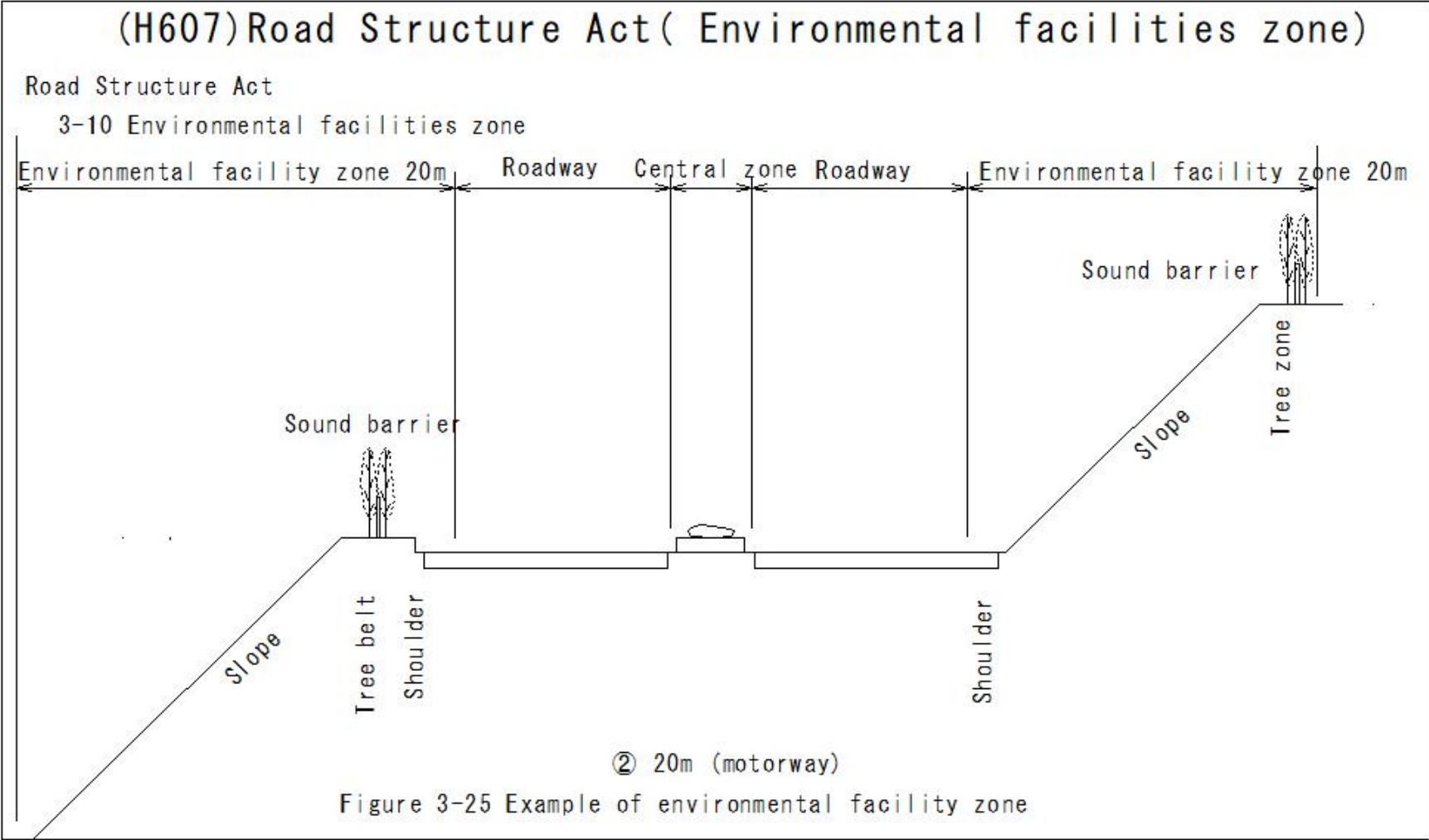


Figure 3-24 Cross-sectional structure of Side road(Byway)

(H606)Road Structure Act(Environmental facilities zone)



(H607)Road Structure Act(Environmental facilities zone)



(H608)Road Structure Act(Standard width)

(H608)Road Structure Act(Standard width)

Road Structure Act

3-11 Standard width

Road classification

- ① Major highways
- ② Highway
- ③ Auxiliary highways

Regional classification

Regional classification/Land use status along roads

Urban areas

Area A: Areas in urban areas where a good residential environment should be preserved

Area B: Urban areas other than Area A

Rural areas

C: Rural areas where there are settlements along roads or
where they are expected to form in the future

D: Rural areas other than C

(H609)Road Structure Act(Road width)

(H609)Road Structure Act(Road width)

Road Structure Act
3-11 Standard width
Road width

Area classification Road classification	Urban area		Rural area	
	Area A	Area B	Area C	Area D
① Major highways	50. 40	40. 30	25. 16	20. 10 (12)
② Highway	40. 30. 25. 20	30. 25. 20	14	9 (11)
③ Auxiliary highways	16	16	12	8 (10)

() in case of installing sidewalks, etc.

(H610)Road Structure Act(Standard Cross-sectional Diagram)

(H610)Road Structure Act(Standard Cross-sectional Diagram)

Road Structure Act
3-11 Standard width
Major highways
Urban area
Area A
6 lanes

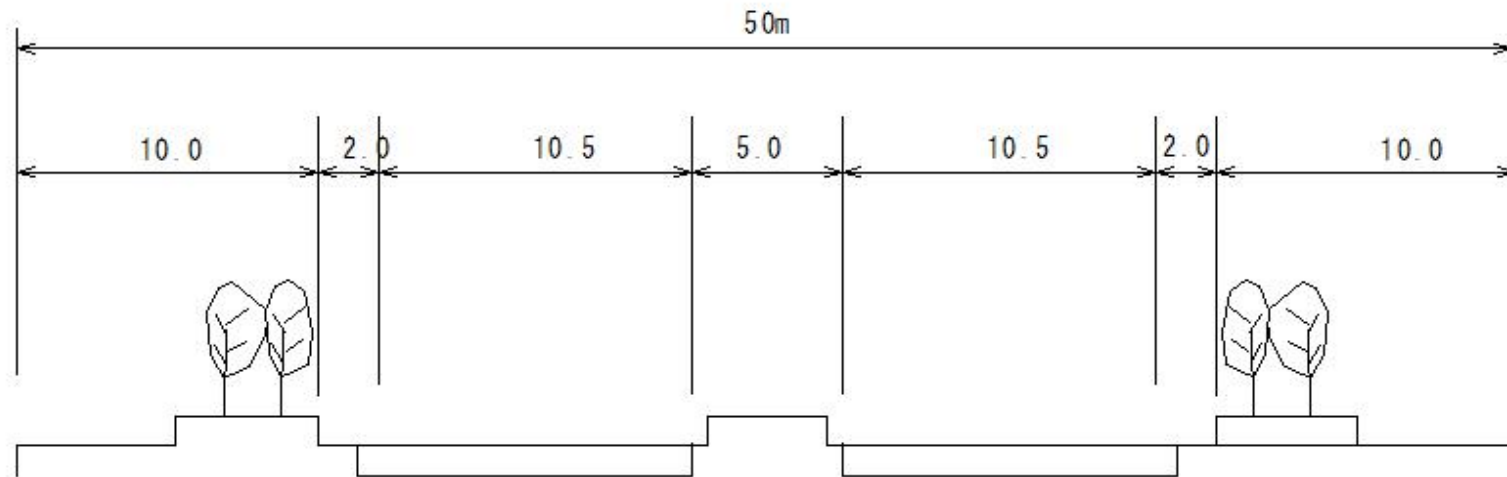


Figure 3-26 Standard cross-sectional configuration diagram

(H611)Road Structure Act(Standard Cross-sectional Diagram)

(H611)Road Structure Act(Standard Cross-sectional Diagram)

Road Structure Act
3-11 Standard width
Major highways
Urban area
Area A
4 lanes

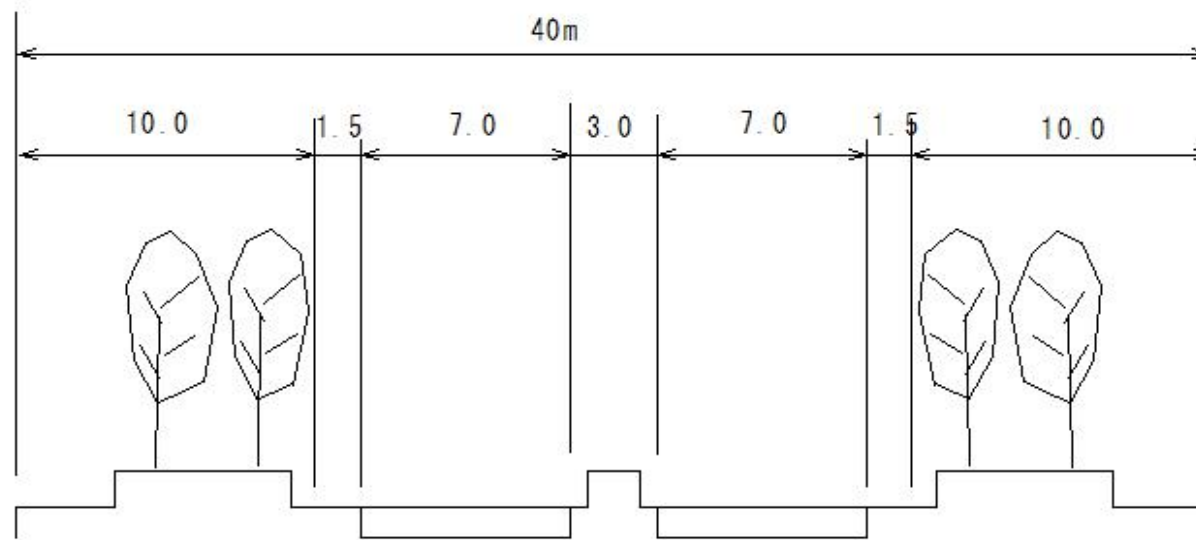


Figure 3-26 Standard cross-sectional configuration diagram

(H612)Road Structure Act(Standard Cross-sectional Diagram)

(H612)Road Structure Act(Standard Cross-sectional Diagram)

Road Structure Act
3-11 Standard width
Major highways
Urban area
Area B
6 lanes

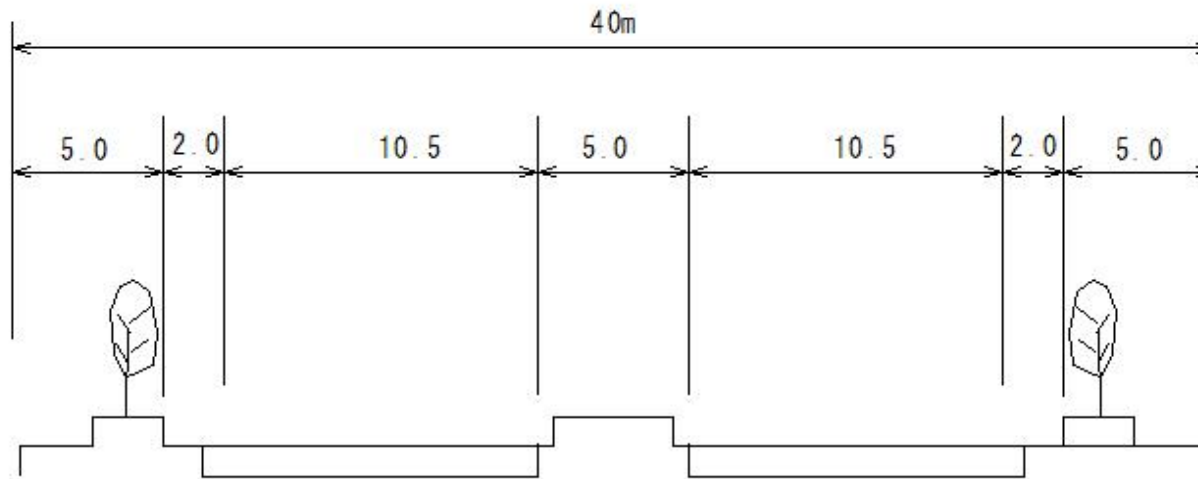


Figure 3-26 Standard cross-sectional configuration diagram

(H613)Road Structure Act(Standard Cross-sectional Diagram)

(H613)Road Structure Act(Standard Cross-sectional Diagram)

Road Structure Act
3-11 Standard width
Major highways
Urban area
Area B
4 lanes

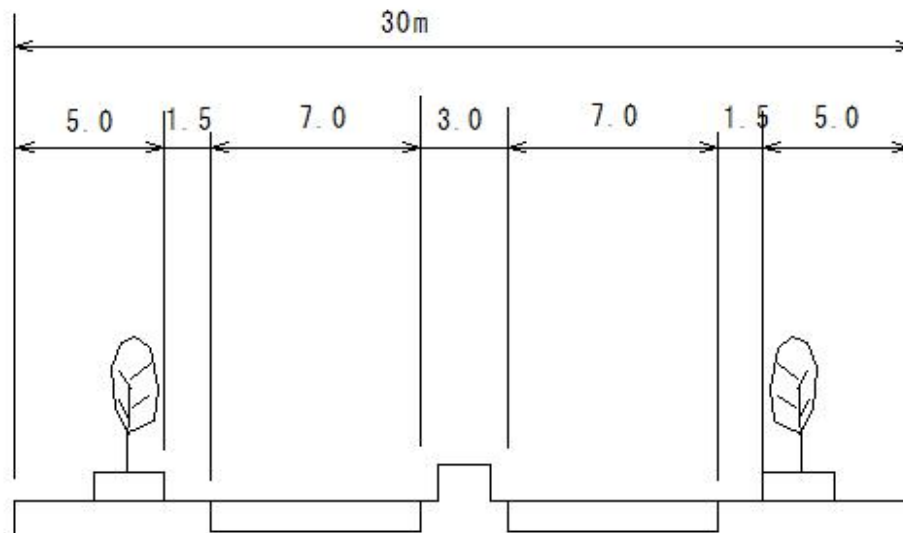


Figure 3-26 Standard cross-sectional configuration diagram

(H614)Road Structure Act(Standard Cross-sectional Diagram)

(H614)Road Structure Act(Standard Cross-sectional Diagram)

Road Structure Act
3-11 Standard width
Highway(Main road)
Urban area
Area A
4 lanes

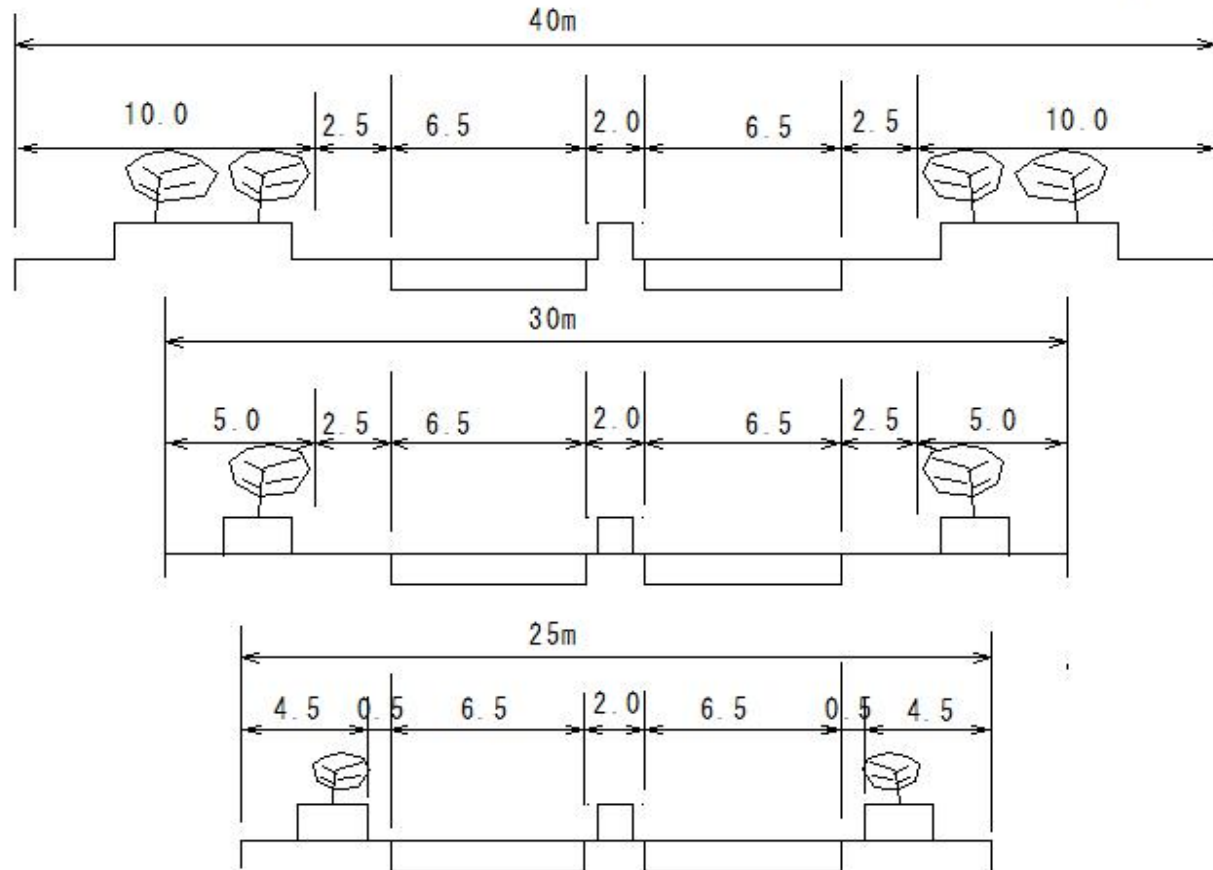


Figure 3-26 Standard cross-sectional configuration diagram

(H615)Road Structure Act(Standard Cross-sectional Diagram)

(H615)Road Structure Act(Standard Cross-sectional Diagram)

Road Structure Act
3-11 Standard width
Highway(Main road)
Urban area
Area A
2 lanes

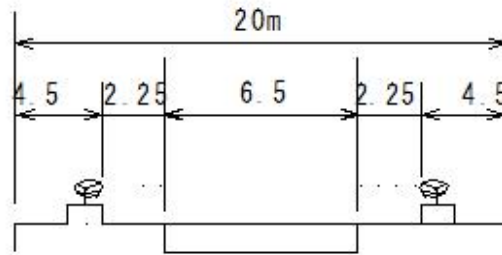


Figure 3-26 Standard cross-sectional configuration diagram

(H616)Road Structure Act(Standard Cross-sectional Diagram)

(H616)Road Structure Act(Standard Cross-sectional Diagram)

Road Structure Act
3-11 Standard width
Highway(Main road)
Urban area
Area B
4 lanes

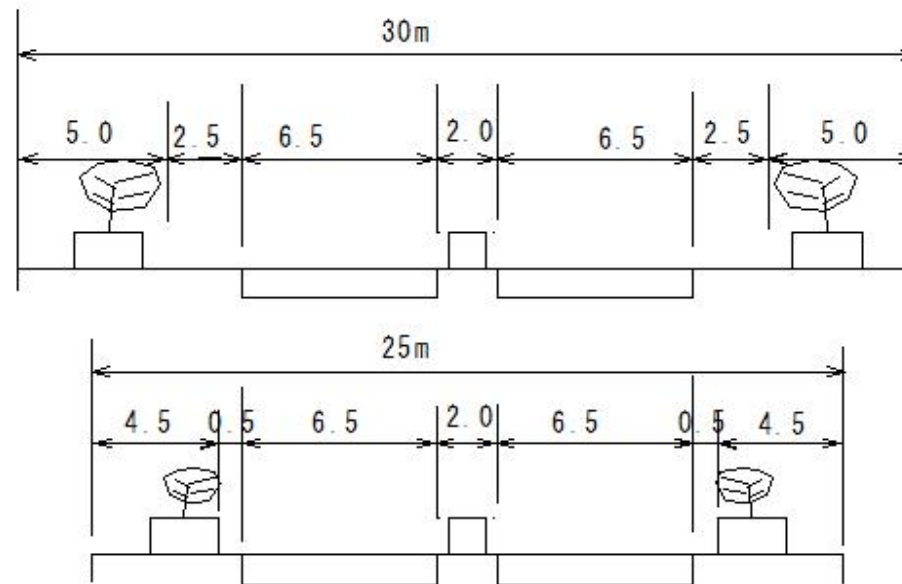


Figure 3-26 Standard cross-sectional configuration diagram

(H617)Road Structure Act(Standard Cross-sectional Diagram)

(H617)Road Structure Act(Standard Cross-sectional Diagram)

Road Structure Act
3-11 Standard width
Highway (Main road)
Urban area
Area B
2 lanes

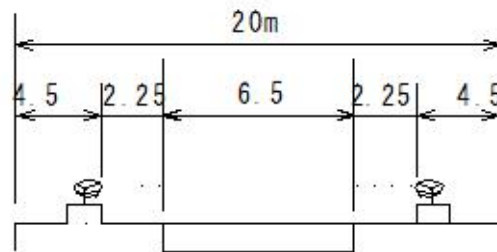


Figure 3-26 Standard cross-sectional configuration diagram

(H618)Road Structure Act(Standard Cross-sectional Diagram)

(H618)Road Structure Act(Standard Cross-sectional Diagram)

Road Structure Act

3-11 Standard width

Auxiliary highways(Secondary trunk road)

Urban area

Area A

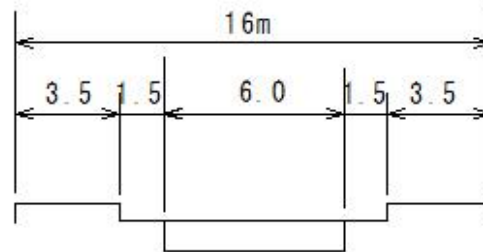


Figure 3-26 Standard cross-sectional configuration diagram

(H619)Road Structure Act(Standard Cross-sectional Diagram)

(H619)Road Structure Act(Standard Cross-sectional Diagram)

Road Structure Act

3-11 Standard width

Auxiliary highways(Secondary trunk road)

Urban area

Area B

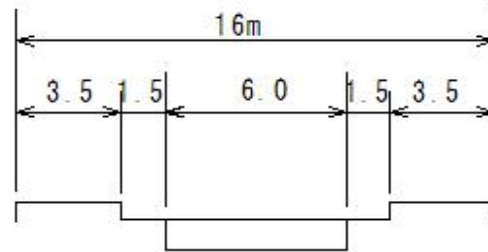


Figure 3-26 Standard cross-sectional configuration diagram

(H620)Road Structure Act(Standard Cross-sectional Diagram)

(H620)Road Structure Act(Standard Cross-sectional Diagram)

Road Structure Act
3-11 Standard width
Major highways
Rural areas
Area C
4 lanes

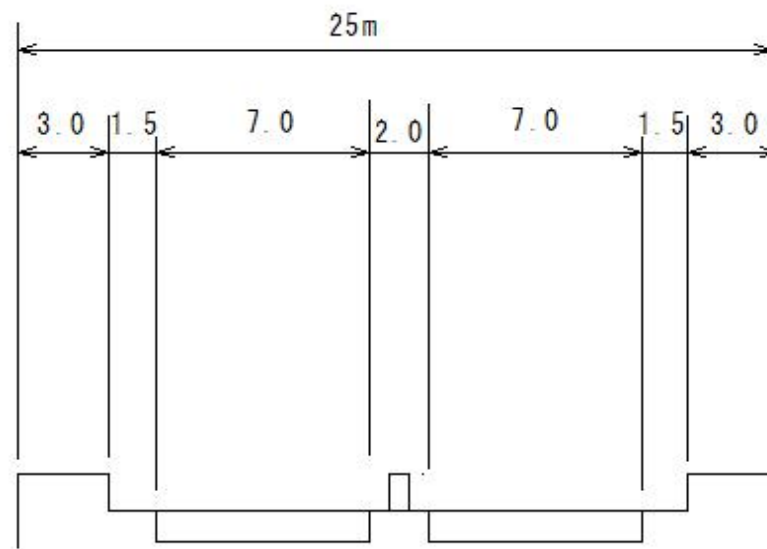


Figure 3-26 Standard cross-sectional configuration diagram

(H621)Road Structure Act(Standard Cross-sectional Diagram)

(H621)Road Structure Act(Standard Cross-sectional Diagram)

Road Structure Act
3-11 Standard width
Major highways
Rural areas
Area C
2 lanes

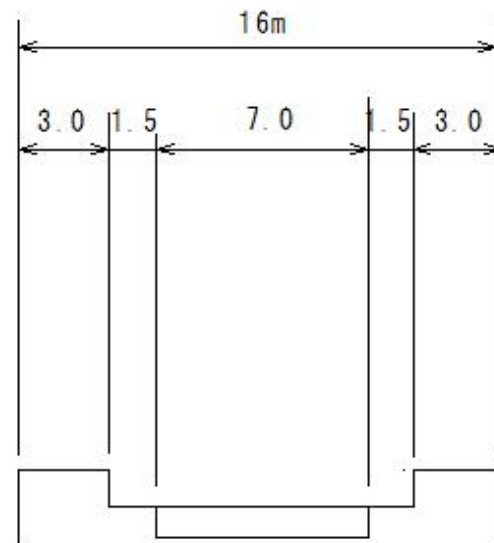


Figure 3-26 Standard cross-sectional configuration diagram

(H622)Road Structure Act(Standard Cross-sectional Diagram)

(H622)Road Structure Act(Standard Cross-sectional Diagram)

Road Structure Act
3-11 Standard width
Major highways
Rural areas
Area D
4 lanes

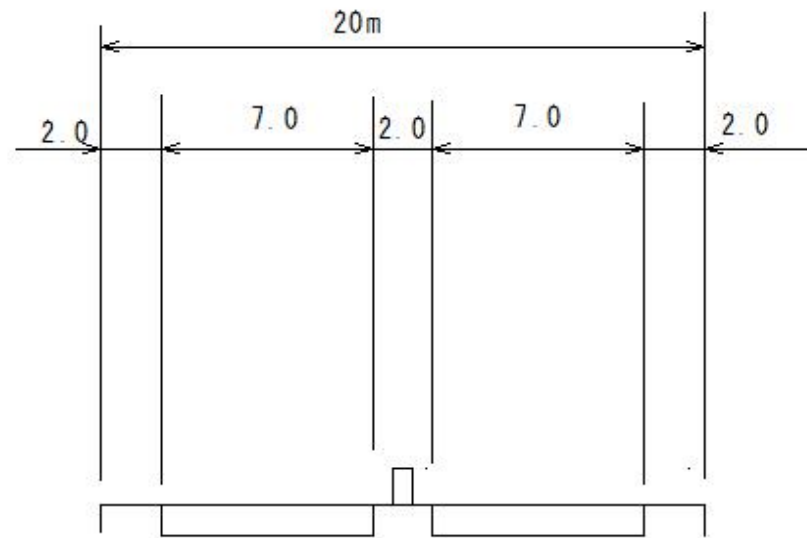


Figure 3-26 Standard cross-sectional configuration diagram

(H623)Road Structure Act(Standard Cross-sectional Diagram)

(H623)Road Structure Act(Standard Cross-sectional Diagram)

Road Structure Act
3-11 Standard width
Major highways
Rural areas
Area D
2 lanes

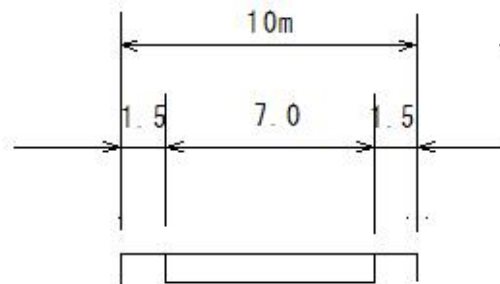


Figure 3-26 Standard cross-sectional configuration diagram

(H624)Road Structure Act(Standard Cross-sectional Diagram)

(H624) Road Structure Act(Standard Cross-sectional Diagram)

Road Structure Act

3-11 Standard width

Major highways

Rural areas

Area D

In case of establishing a pedestrian lane

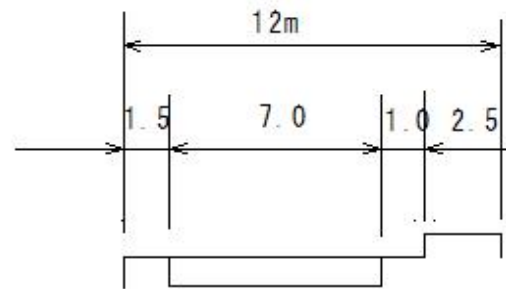
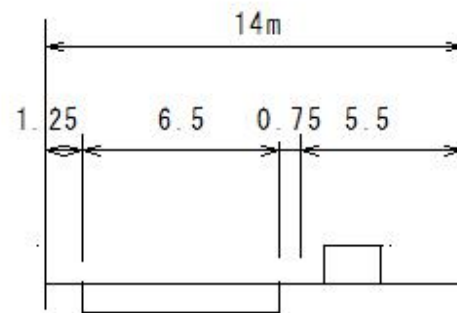
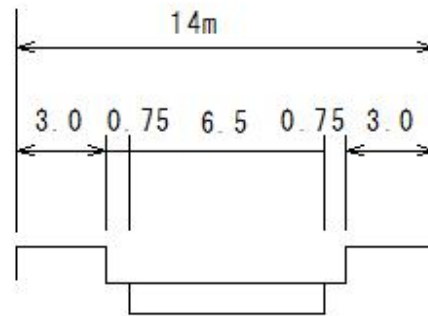


Figure 3-26 Standard cross-sectional configuration diagram

(H625)Road Structure Act(Standard Cross-sectional Diagram)

(H625)Road Structure Act(Standard Cross-sectional Diagram)

Road Structure Act
3-11 Standard width
Highway (Main road)
Rural areas
Area C



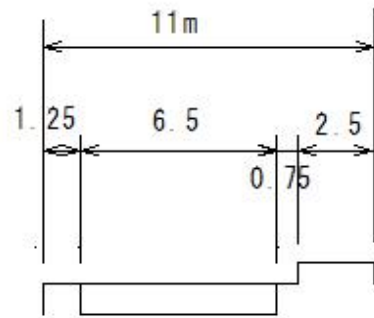
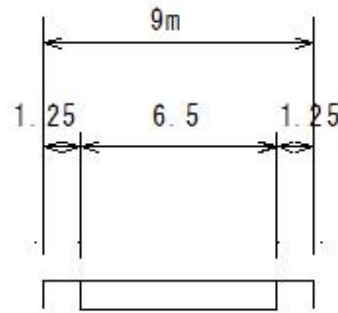
In the case of sidewalks on one side

Figure 3-26 Standard cross-sectional configuration diagram

(H626)Road Structure Act(Standard Cross-sectional Diagram)

(H626)Road Structure Act(Standard Cross-sectional Diagram)

Road Structure Act
3-11 Standard width
Highway (Main road)
Rural areas
Area D



In the case of a one-sided sidewalk

Figure 3-26 Standard cross-sectional configuration diagram

(H627)Road Structure Act(Standard Cross-sectional Diagram)

(H627)Road Structure Act(Standard Cross-sectional Diagram)

Road Structure Act

3-11 Standard width

Auxiliary highways(Secondary trunk road)

Rural areas

Area C

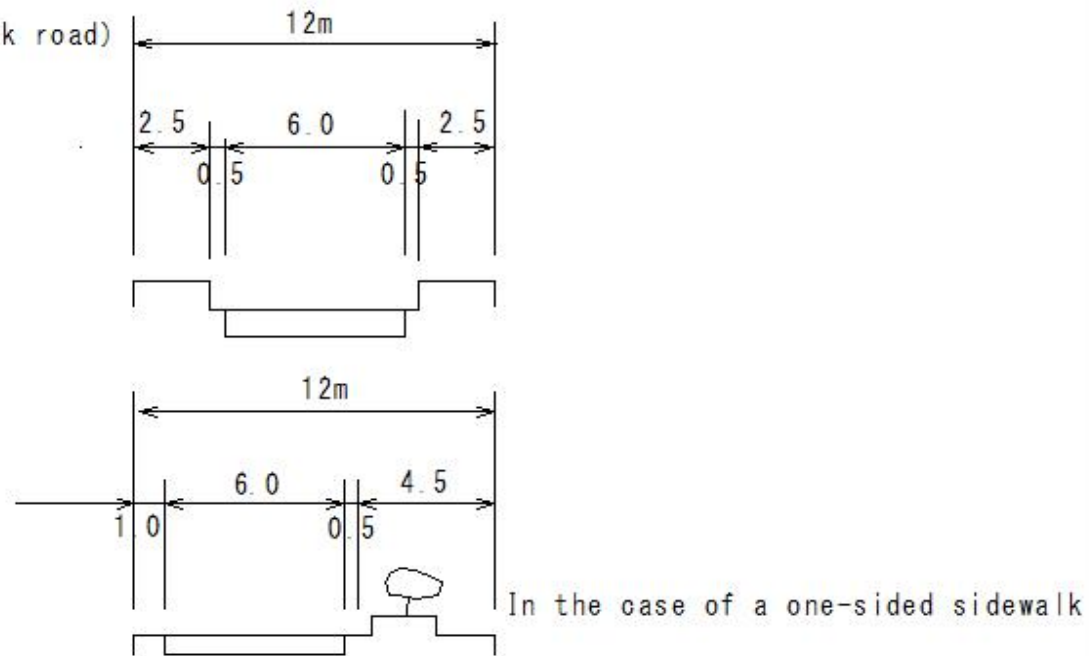


Figure 3-26 Standard cross-sectional configuration diagram

(H628)Road Structure Act(Standard Cross-sectional Diagram)

(H628)Road Structure Act(Standard Cross-sectional Diagram)

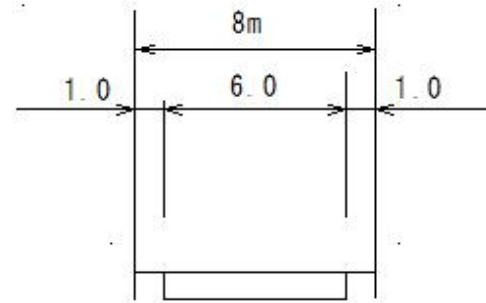
Road Structure Act

3-11 Standard width

Auxiliary highways(Secondary trunk road)

Rural areas

Area D



In the case of installation of sidewalks, etc.

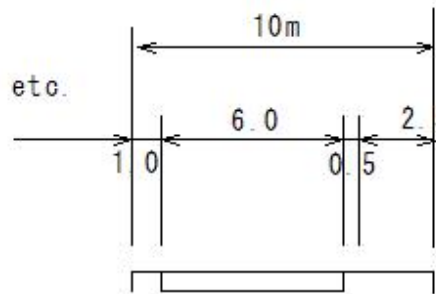


Figure 3-26 Standard cross-sectional configuration diagram

(H629)Road Structure Act(Construction Limit:Construction Gauge)

(H629)Road Structure Act(Construction Limit:Construction Gauge)

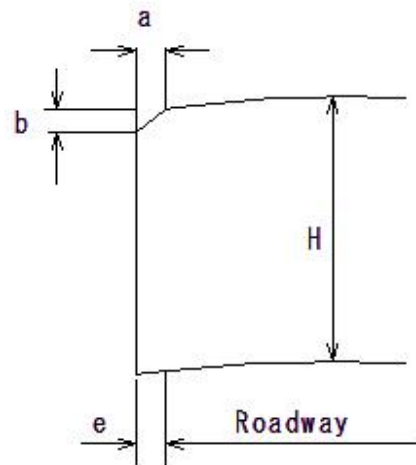
Road Structure Act

3-12 Construction Limit

① Roadway of roads with shoulders adjacent to the roadway

③ Excluding the part shown

Roadway of roads other than tunnels, bridges or elevated roads with a length of 50m or more that do not have sidewalks or bicycle paths



(H630)Road Structure Act(Construction Limit:Construction Gauge)

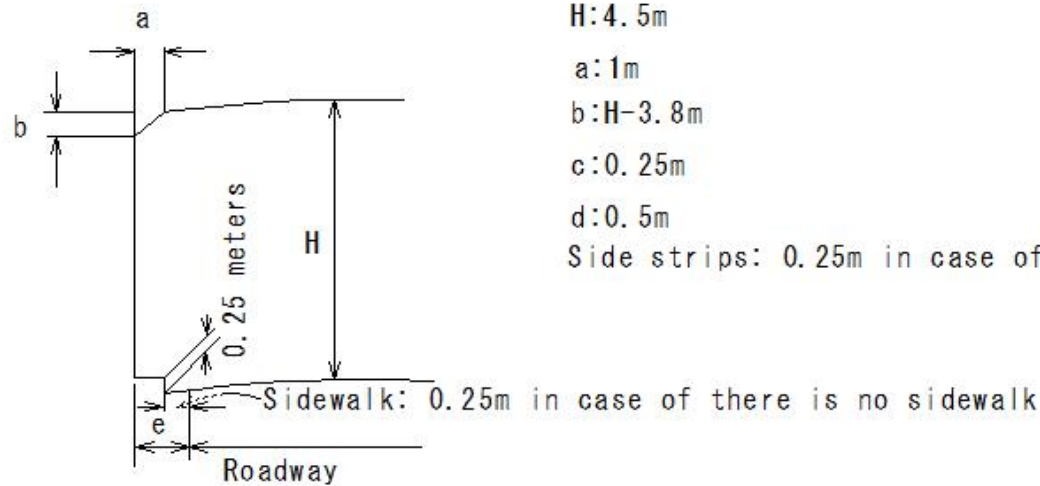
(H630)Road Structure Act(Construction Limit:Construction Gauge)

Road Structure Act

3-12 Construction Limit:Construction Gauge

- ① Roadway of a roadway with a shoulder adjacent to the roadway
- ③ Excluding the part shown (H632)

Roadway of a tunnel or a bridge or elevated road with a length of 50m or more
that does not have a sidewalk or bicycle path, etc.



H: 4.5m

a: 1m

b: $H - 3.8m$

c: 0.25m

d: 0.5m

Side strips: 0.25m in case of there is no side band

Sidewalk: 0.25m in case of there is no sidewalk

Roadway

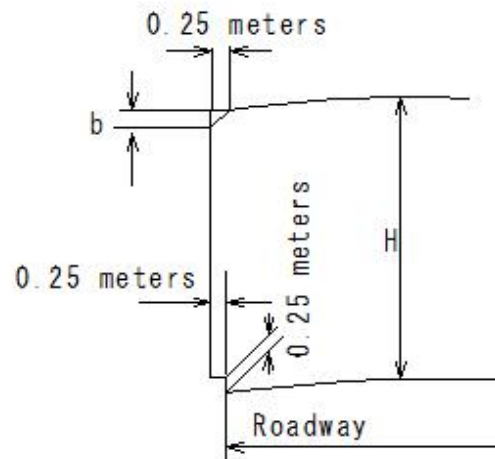
(H631)Road Structure Act(Construction Limit:Construction Gauge)

(H631)Road Structure Act(Construction Limit:Construction Gauge)

Road Structure Act

3-12 Construction Limit:Construction Gauge

- ① Roadway of a road adjacent to the roadway without a shoulder
- ③ Excluding the part shown (H632)



(H632)Road Structure Act(Construction Limit:Construction Gauge)

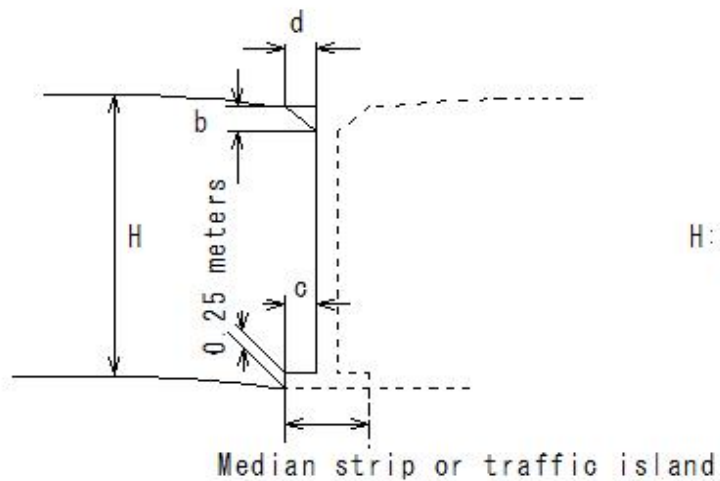
(H632)Road Structure Act(Construction Limit:Construction Gauge)

Road Structure Act

3-12 Construction Limit:Construction Gauge

③Part of the roadway that is related to a median strip or traffic island

Median strip or traffic island



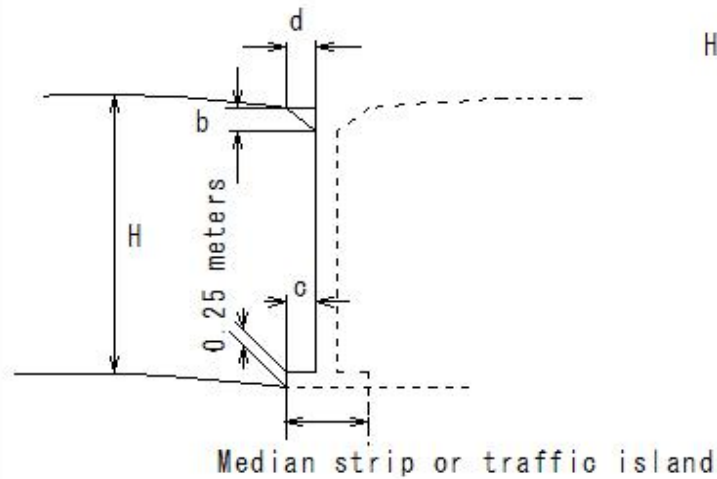
H: 4.8m (ordinary roads that are important logistics roads)
4.5m (other ordinary roads)

(H633)Road Structure Act(Construction Limit:Construction Gauge)

(H633)Road Structure Act(Construction Limit:Construction Gauge)

Road Structure Act

3-12 Construction Limit:Construction Gauge



H: 4.8m (ordinary roads that are important logistics roads)
4.5m (other ordinary roads)

Division		c	d
Type 1	Class 1	0.5	1
	Class 2		
	Class 3	0.25	0.75
	Class 4		
Type 2	Class 1	0.25	0.75
	Class 2		
Type 3		0.25	0.5
Type 4		0.25	0.5

(unit: meters)

Construction limit: Space where objects should not be placed

H497

(H634)Road Structure Act(Construction Limit:Construction Gauge)

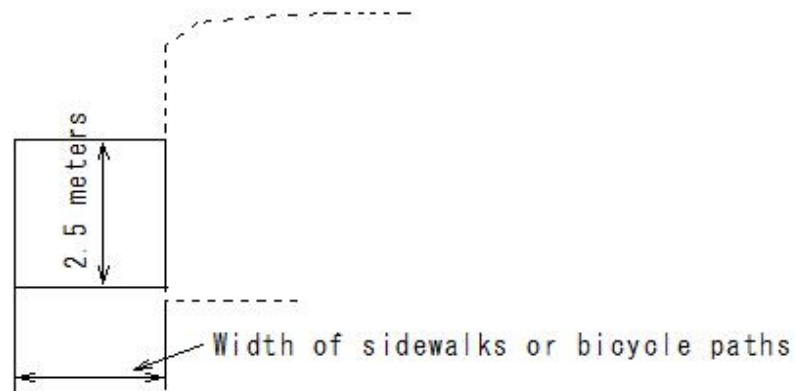
(H634)Road Structure Act(Construction Limit:Construction Gauge)

Road Structure Act

3-12 Construction Limit:Construction Gauge

Sidewalks and bicycles that do not have street facilities

Construction limit: Space where objects should not be placed



○Sidewalks and bicycle paths without roadside facilities

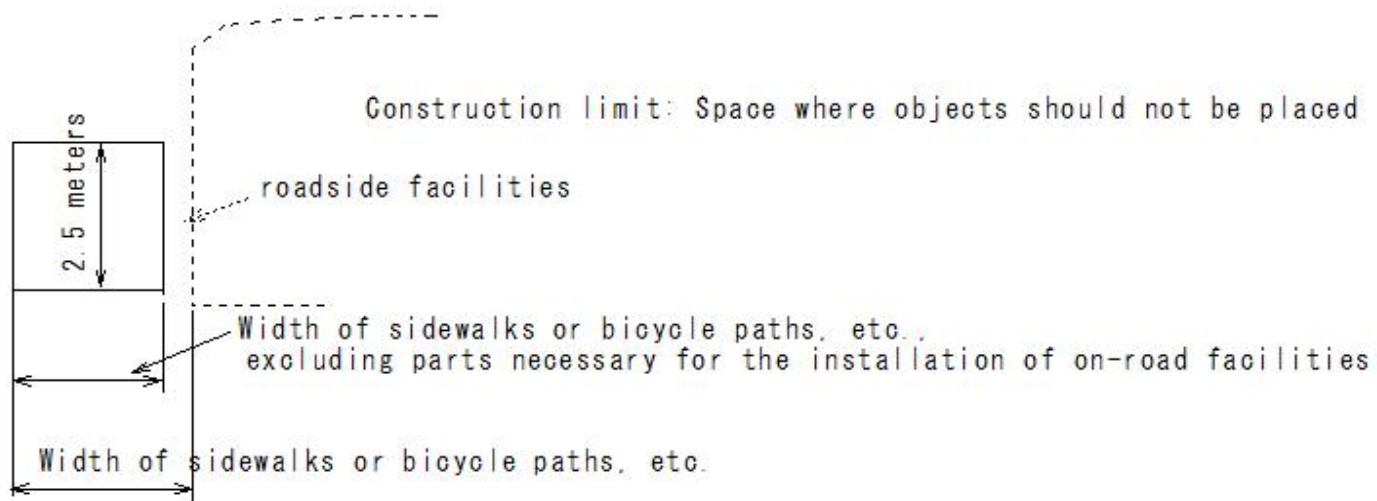
(H635)Road Structure Act(Construction Limit:Construction Gauge)

(H635)Road Structure Act(Construction Limit:Construction Gauge)

Road Structure Act

3-12 Construction Limit:Construction Gauge

Sidewalks and bicycles with roadside facilities



○Sidewalks and bicycle paths with on-road facilities

(H636)Road Structure Act(Construction Limit:Construction Gauge)

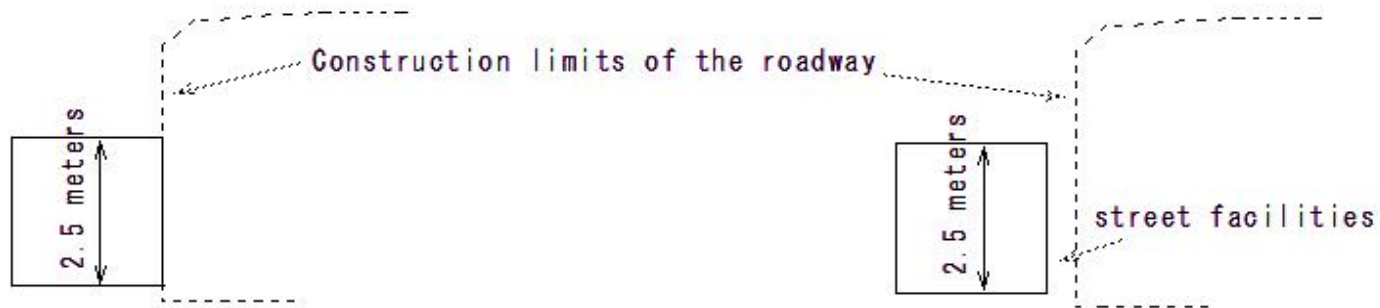
(H636)Road Structure Act(Construction Limit:Construction Gauge)

Road Structure Act

3-12 Construction Limit:Construction Gauge

3-12-2 Building limits for sidewalks or bicycle paths and bicycle and pedestrian paths
Architectural limits of sidewalks, etc.

Construction limit: Space where objects should not be placed



Sidewalks, etc.

In case of setting up a roadside

In case of there is no on-street facility

In case of setting up on-street facilities

(H637)Road Structure Act(Construction Limit:Construction Gauge)

(H637)Road Structure Act(Construction Limit:Construction Gauge)

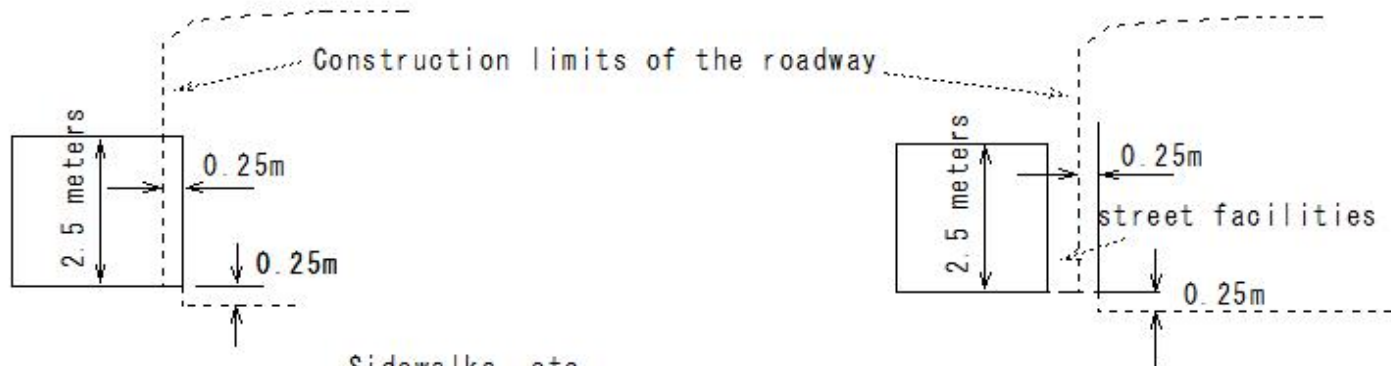
Road Structure Act

3-12 Construction Limit:Construction Gauge

3-12-2 Building limits for sidewalks or bicycle paths and bicycle and pedestrian paths

Architectural limits of sidewalks, etc.

Construction limit: Space where objects should not be placed



Sidewalks, etc.

In case of the shoulder of the road is not provided

In case of there is no on-street facility

In case of setting up on-street facilities

(H638)Road Structure Act(Construction Limit:Construction Gauge)

(H638)Road Structure Act(Construction Limit:Construction Gauge)

Road Structure Act

3-12 Construction Limit:Construction Gauge

3-12-3 How to set the construction limit line

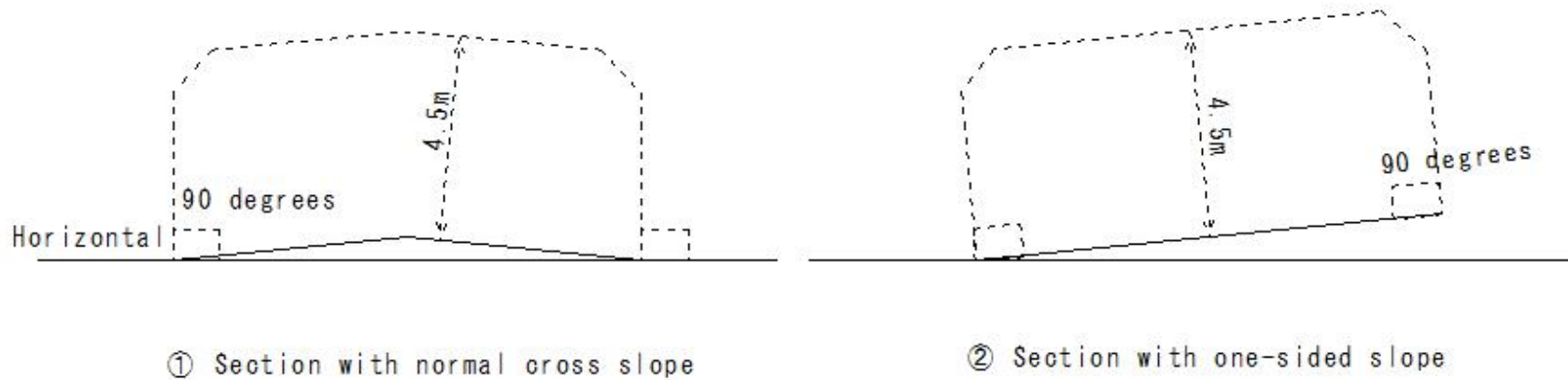


Fig 3-27 Section with normal cross slope

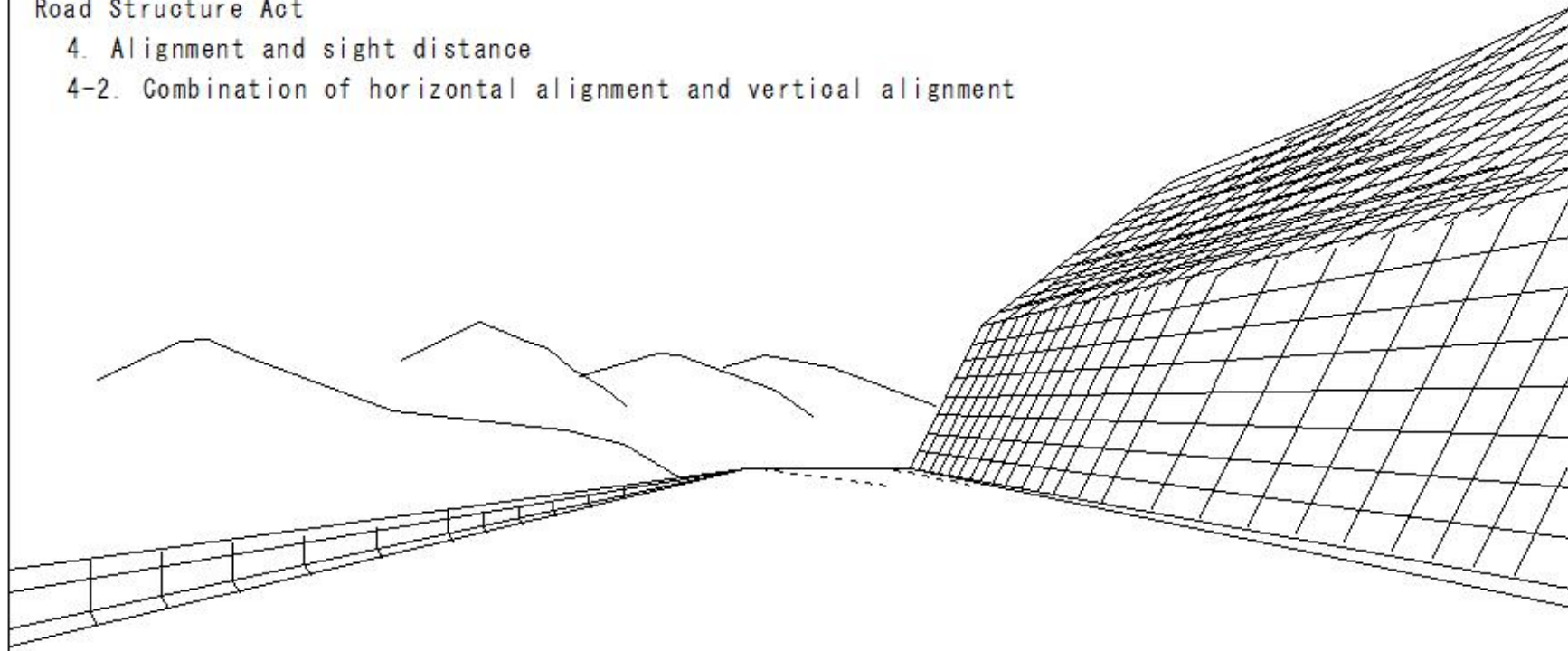
(H639)Road Structure Act(Combination of horizontal alignment and vertical alignment)

(H639)Road Structure Act(Combination of horizontal alignment and vertical alignment)

Road Structure Act

4. Alignment and sight distance

4-2. Combination of horizontal alignment and vertical alignment



① Beyond the crest (dashed line in the figure)

I'm worried because I don't know which way to turn.

Fig 4-1 Visually guiding alignment

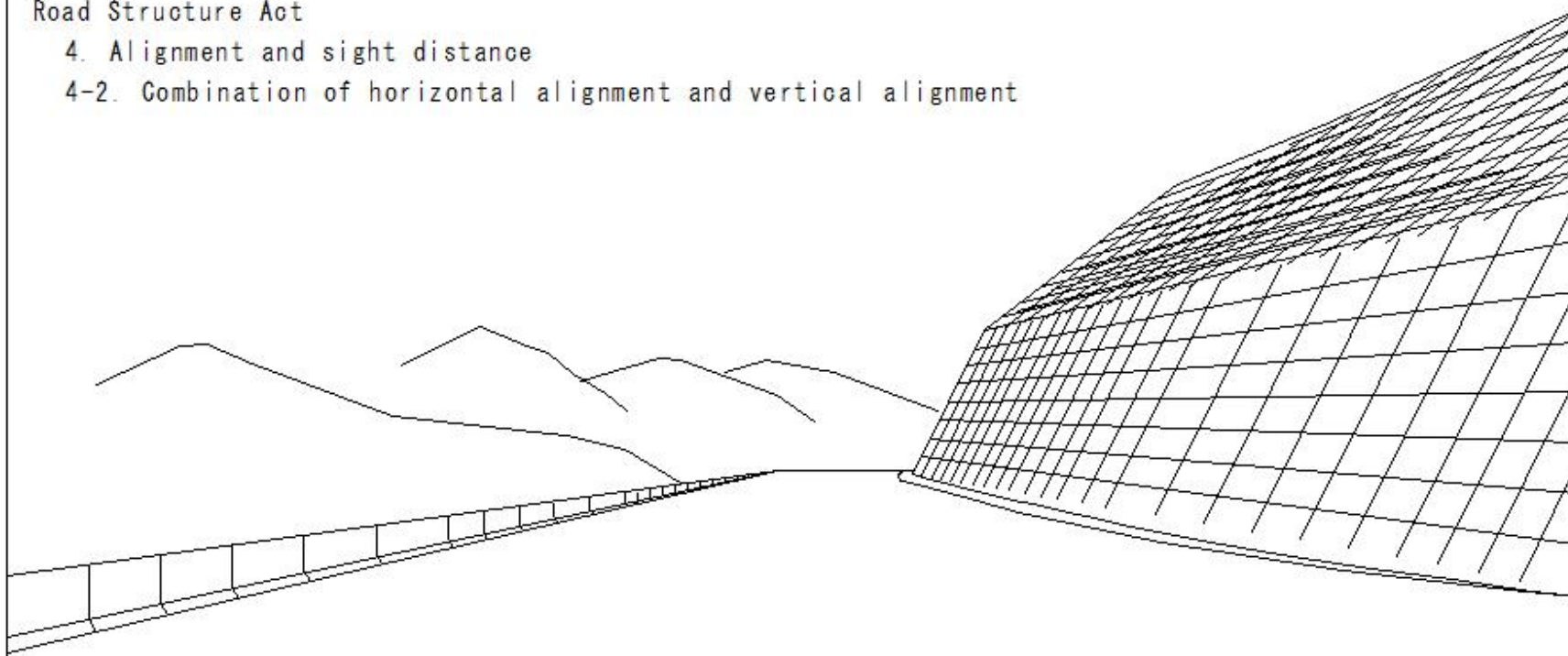
(H640)Road Structure Act(Combination of horizontal alignment and vertical alignment)

(H640)Road Structure Act(Combination of horizontal alignment and vertical alignment)

Road Structure Act

4. Alignment and sight distance

4-2. Combination of horizontal alignment and vertical alignment



②The horizontal alignment is arranged up to the crest,
so you can naturally see which way the road ahead curves.

Fig 4-1 Visually guiding alignment

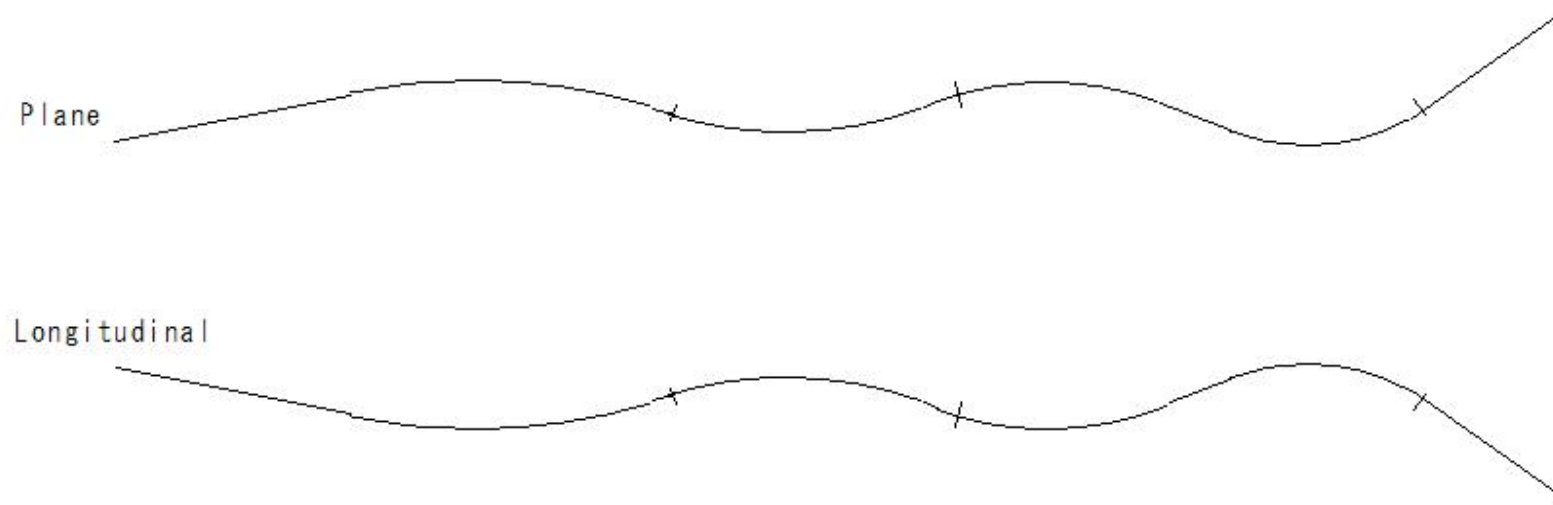
(H641)Road Structure Act(Combination of horizontal alignment and vertical alignment)

(H641)Road Structure Act(Combination of horizontal alignment and vertical alignment)

Road Structure Act

4 Alignment and sight distance

4-2 Combination of horizontal and vertical alignments



(a) In case of there is a 1:1 correspondence

Figure 4-2 Correspondence between horizontal and vertical curves

(H642)Road Structure Act(Combination of horizontal alignment and vertical alignment)

(H642)Road Structure Act(Combination of horizontal alignment and vertical alignment)

Road Structure Act

4 Alignment and sight distance

4-2 Combination of horizontal and vertical alignments

Plane

Longitudinal

(b) In case of phase shift is misaligned
Driver - no visual guidance
Drainage problems
Visual problems where the road appears twisted

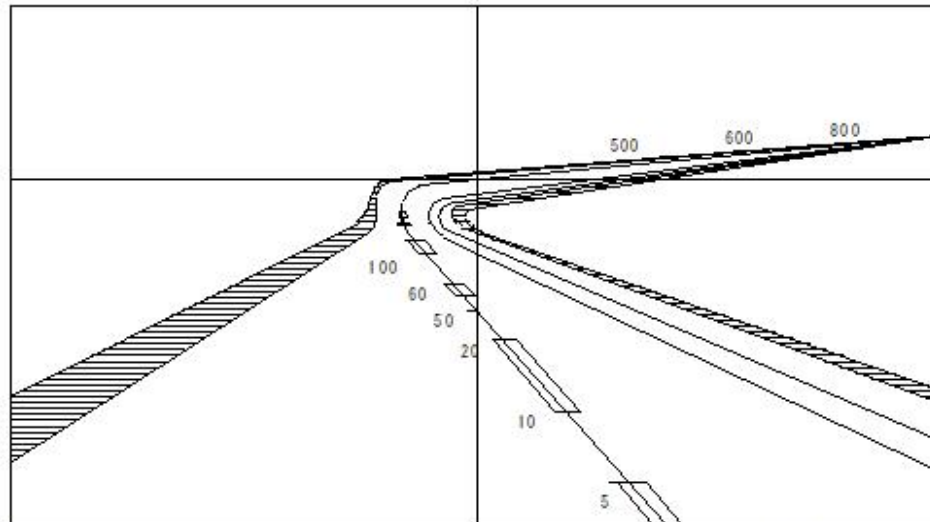
Figure 4-2 Correspondence between horizontal and vertical curves

(H643)Road Structure Act(Combination of horizontal alignment and vertical alignment)

(H643)Road Structure Act(Combination of horizontal alignment and vertical alignment)

Road Structure Act

4-2-3 Combination of horizontal and vertical curves



(a)The point where the horizontal curve begins from the straight line is near the middle of the vertical curve

Difficulties in terms of drainage

Visual difficulties as the road appears twisted

The horizontal curve and the vertical curve are not superimposed

Bad example where the horizontal alignment begins at the bottom of a concave vertical curve

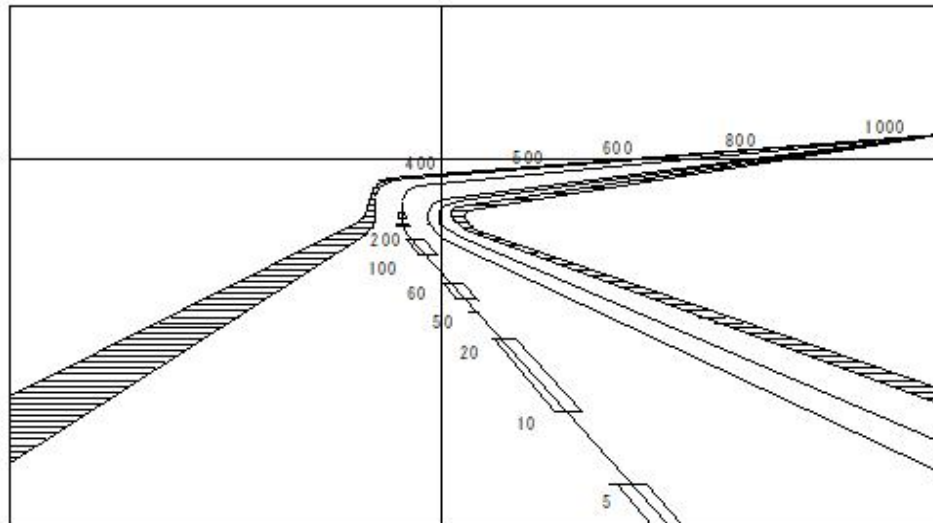
Fig 4-3 Combination of horizontal and vertical curves (explained using perspective drawings)

(H644)Road Structure Act(Combination of horizontal alignment and vertical alignment)

(H644)Road Structure Act(Combination of horizontal alignment and vertical alignment)

Road Structure Act

4-2-3 Combination of horizontal and vertical curves



(b) The point where the plane curve starts from the straight line is about the middle of the longitudinal curve.

The planar curve and the longitudinal curve are not superimposed.

No driving hazard The road looks twisted

You can't get visual smoothness and beauty

in case of the position of the plan/longitudinal curve is misaligned, the alignment appears twisted.

It cannot be avoided even if a relaxation curve is added to the planar curve

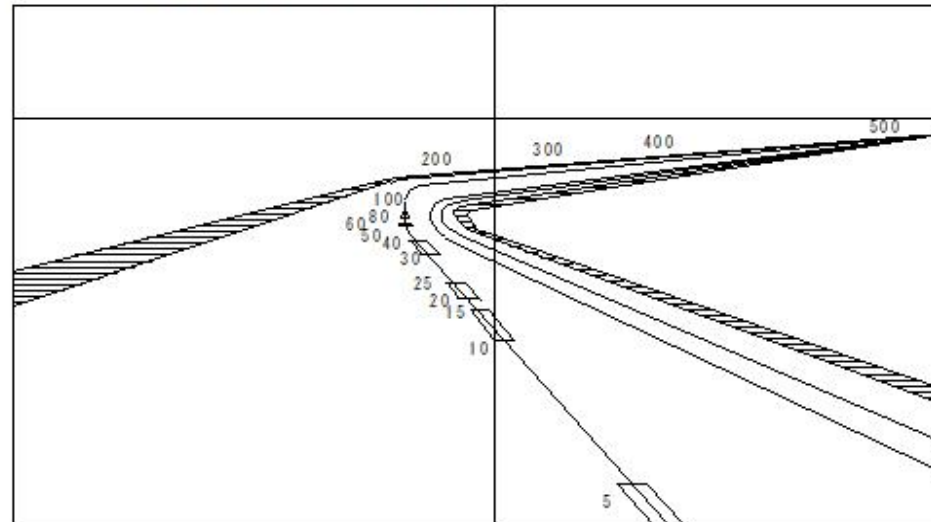
Fig 4-3 Combination of horizontal and vertical curves (explained using perspective drawings)

(H645)Road Structure Act(Combination of horizontal alignment and vertical alignment)

(H645)Road Structure Act(Combination of horizontal alignment and vertical alignment)

Road Structure Act

4-2-3 Combination of horizontal and vertical curves



(c) Superimpose both alignments

Alignment smooths out

Planar curves are significantly shorter than longitudinal curves

It is not desirable if the lengths of both lines are unbalanced.

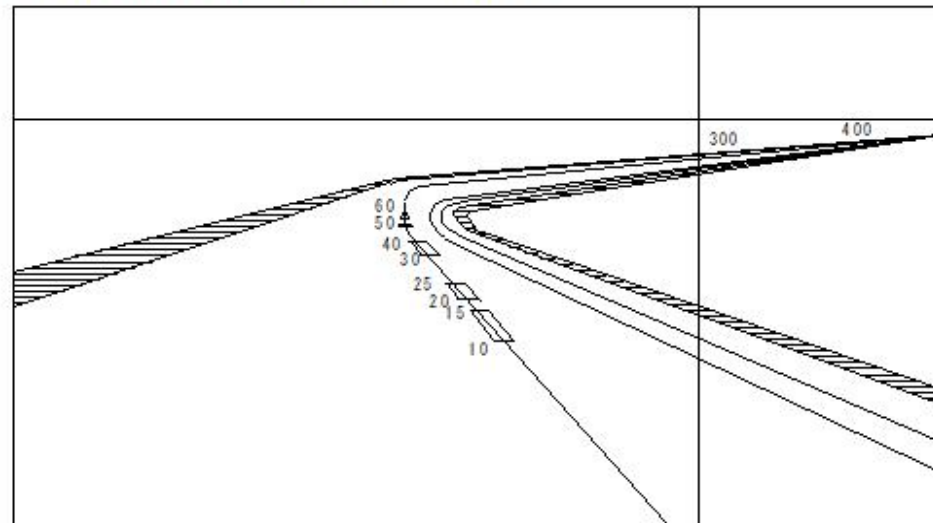
Fig 4-3 Combination of horizontal and vertical curves (explained using perspective drawings)

(H647)Road Structure Act(Combination of horizontal alignment and vertical alignment)

(H647)Road Structure Act(Combination of horizontal alignment and vertical alignment)

Road Structure Act

4-2-3 Combination of horizontal and vertical curves



(e) In case of the plane curve is long

No visual issues

Planar curves should be longer than longitudinal curves

Fig 4-3 Combination of horizontal and vertical curves (explained using perspective drawings)

(H648)Road Structure Act(Alignment design)

(H648)Road Structure Act(Alignment design)

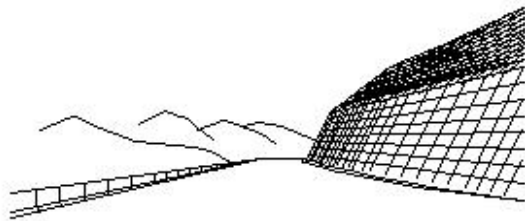
Road Structure Act

4 Alignment and sight distance

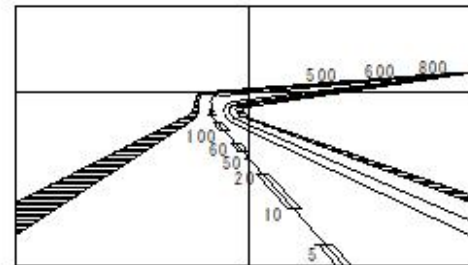
4-1 Alignment design

Points to consider in alignment design

- ① Harmony with topography and local land use
- ② alignment continuity
- ③ Harmony between horizontal alignment, vertical alignment, and cross-sectional configuration
- ④ Visual examination of alignment
- ⑤ Safety and comfort in traffic operation
- ⑥ Constraints on construction
- ⑦ Constraints on geology, topography, features, etc.



H640



H643

(H649)Road Structure Act(Harmony with topography and local land use)

(H649)Road Structure Act(Harmony with topography and local land use)

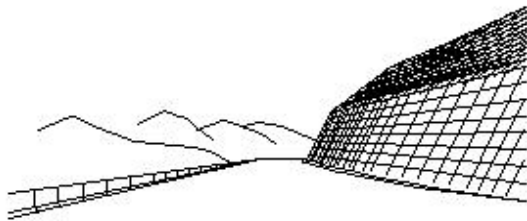
Road Structure Act

4 Alignment and sight distance

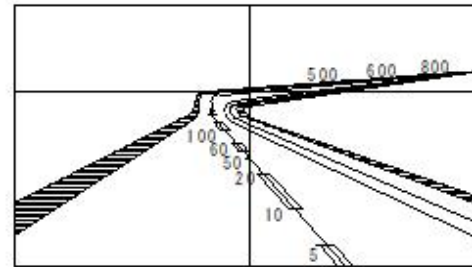
4-1 Alignment design

Points to consider in alignment design

- ① Harmony with topography and local land use
 - Continuous curve
 - Alignment in harmony with the natural terrain
 - Avoidance of disruption of roadside living areas due to road construction
 - Nature conservation
 - Construction, construction, and maintenance costs



H640



H643

(H650)Road Structure Act(Continuity of alignment)

(H650)Road Structure Act(Continuity of alignment)

Road Structure Act

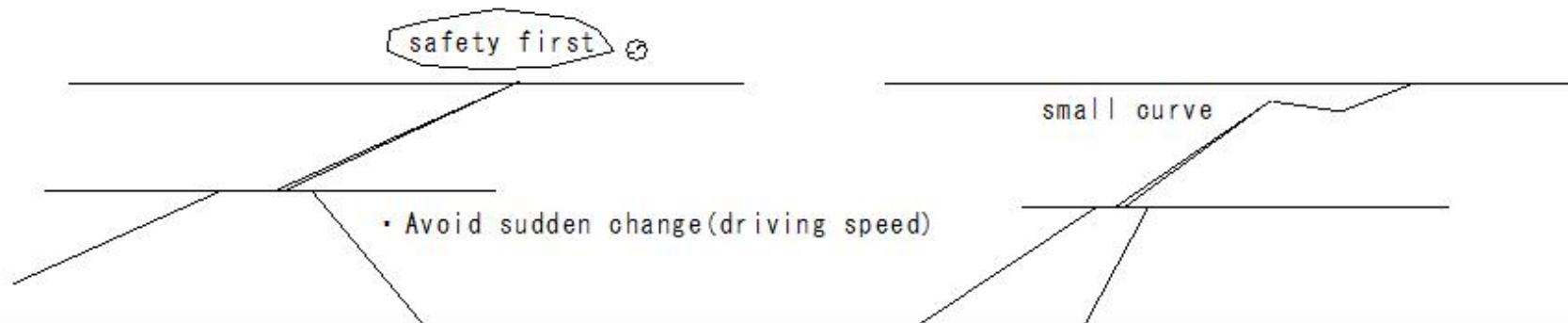
4 Alignment and sight distance

4-1 Alignment design

Points to consider in alignment design

②Continuity of alignment

- Avoid linearity that requires a sudden change in driving speed
- Avoid linearity that requires a sudden change in driving speed
on major trunk roads with many long-distance trips
- Do not have a small curve at the end of a long straight line
- Avoid linearity that suddenly changes from a large curve to a small curve
- In case of creating a curve with a small radius, gradually transition to a curve with a small radius in a continuous manner
Insert a curve with an appropriate radius before



(H651)Road Structure Act(Relationship with road structure and auxiliary facilities)

(H651)Road Structure Act(Relationship with road structure and auxiliary facilities)

Road Structure Act

4 Alignment and sight distance

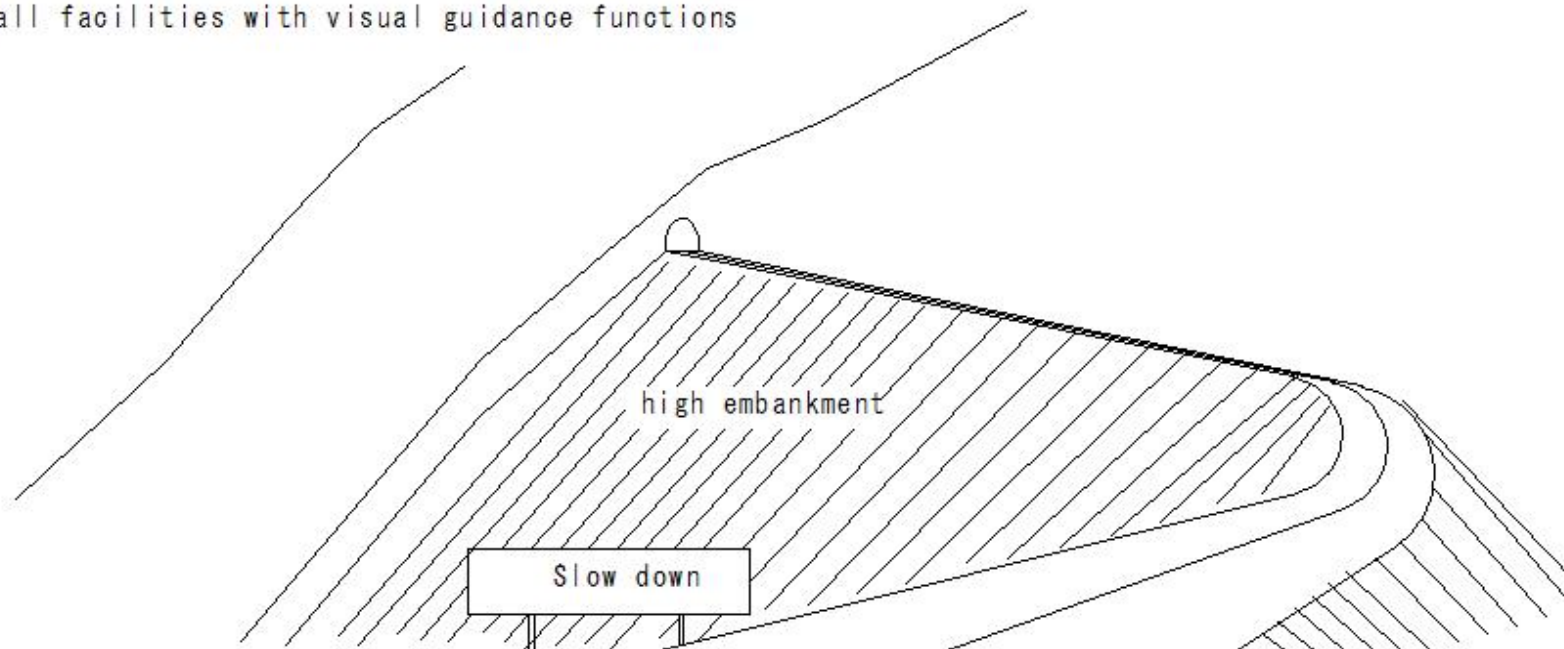
4-1 Alignment design

Points to consider in alignment design

③ Relationship with road structure and auxiliary facilities

In case of inserting curves in high embankment sections, insert curves with large radius

Install facilities with visual guidance functions



(H652)Road Structure Act(Combinations of horizontal alignments)

(H652)Road Structure Act(Combinations of horizontal alignments)

Road Structure Act

4 Alignment and sight distance

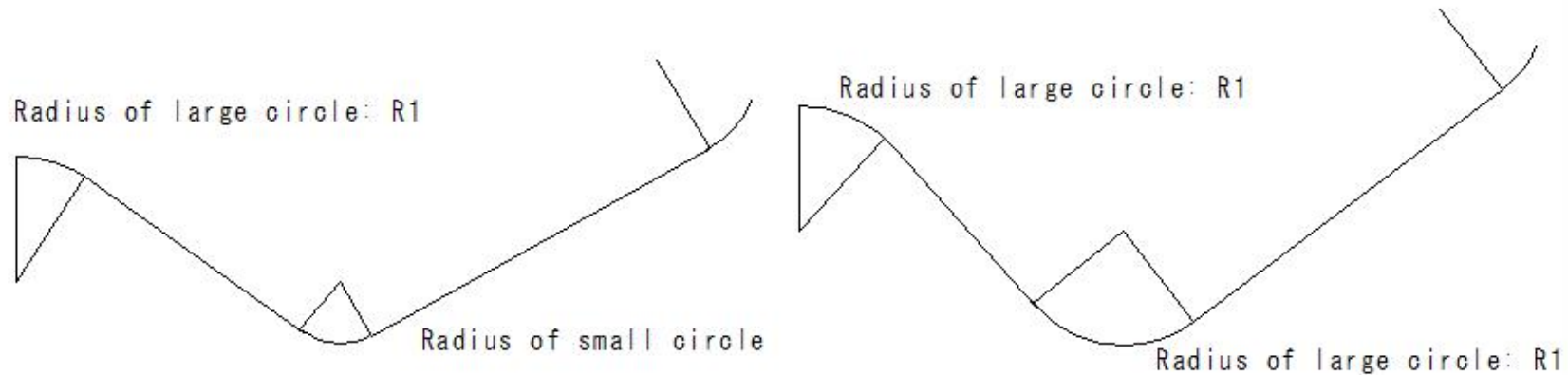
4-1 Alignment design

Points to consider in alignment design

④Combinations of horizontal alignments to be aware of

Composite curves - avoid

Make sure that the radii of two adjacent curves are not too different



(H653)Road Structure Act(Combinations of vertical curves)

(H653)Road Structure Act(Combinations of vertical curves)

Road Structure Act

4 Alignment and sight distance

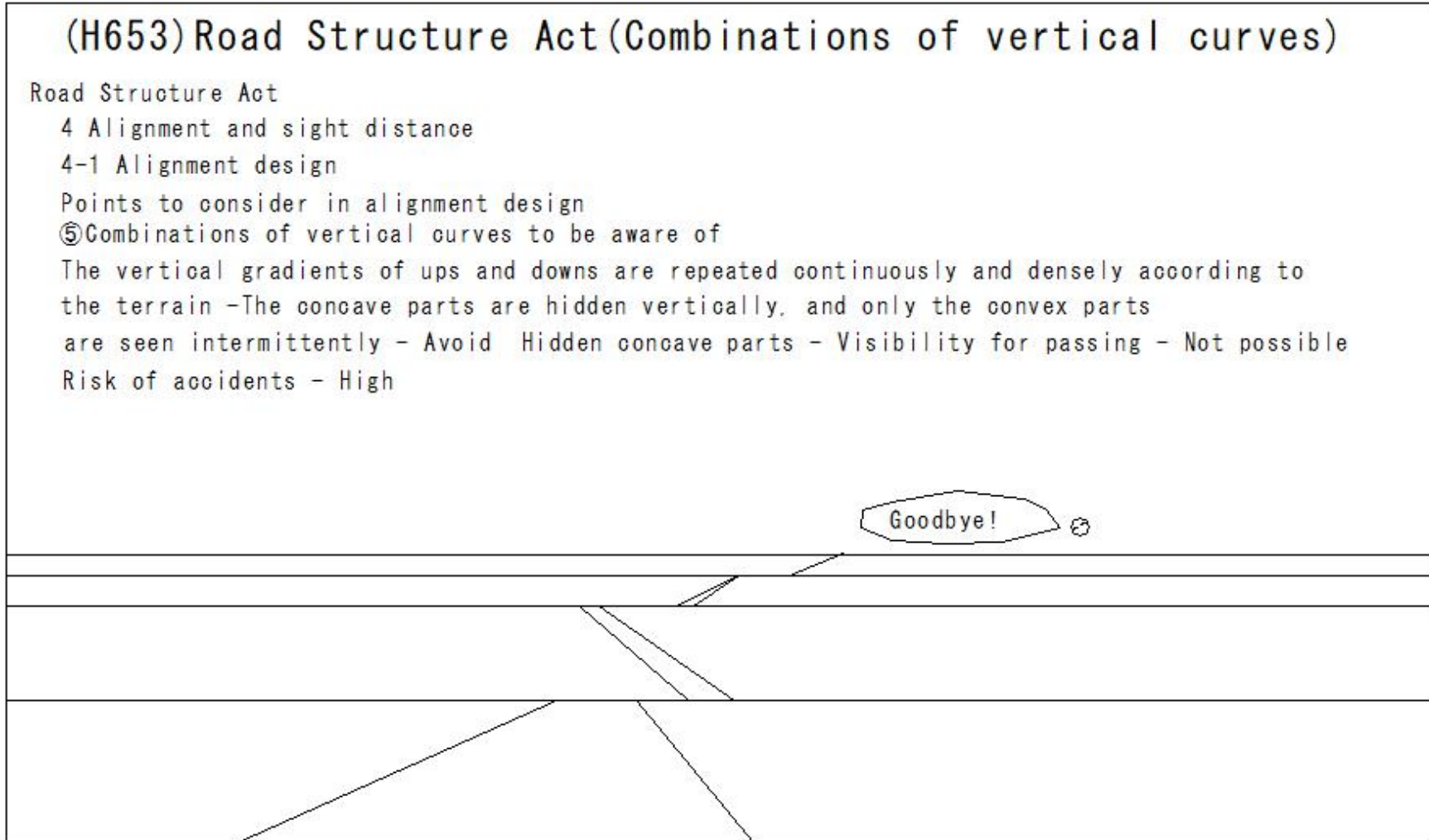
4-1 Alignment design

Points to consider in alignment design

⑤Combinations of vertical curves to be aware of

The vertical gradients of ups and downs are repeated continuously and densely according to the terrain -The concave parts are hidden vertically, and only the convex parts are seen intermittently - Avoid Hidden concave parts - Visibility for passing - Not possible
Risk of accidents - High

Goodbye!



(H654)Road Structure Act(Road alignment)

(H654)Road Structure Act(Road alignment)

Road Structure Act

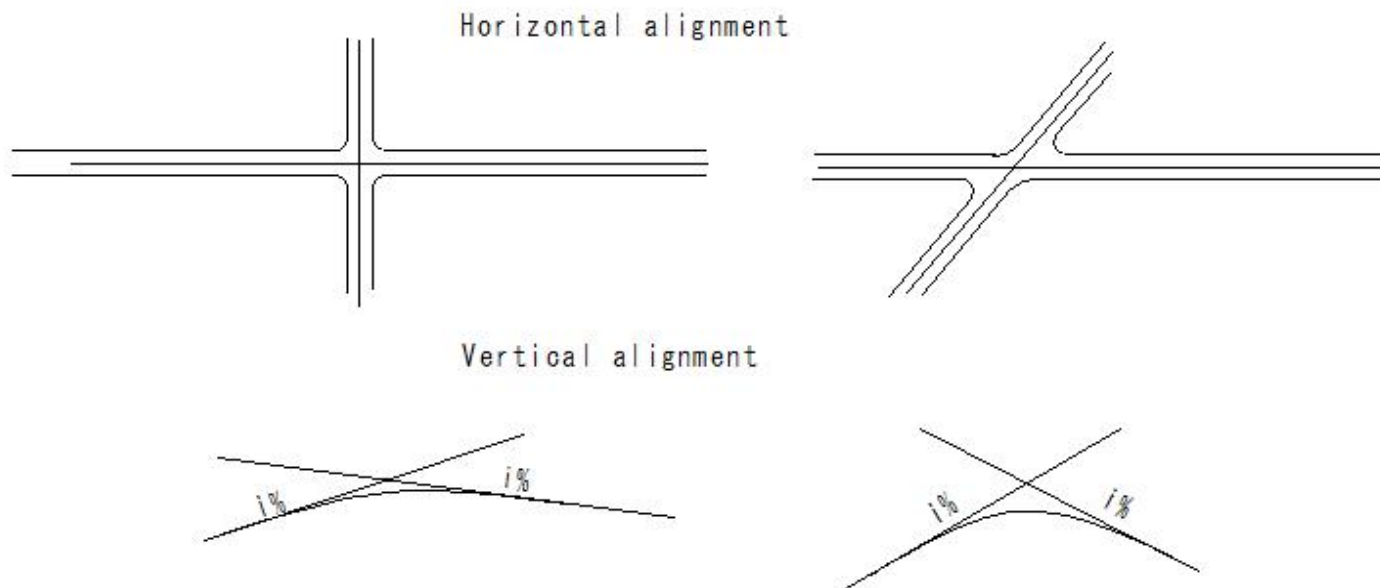
4 Alignment and sight distance

4-1 Alignment design

Points to consider in alignment design

⑥ Road alignment before and after level intersections

Horizontal and vertical alignment - gentle alignment



(H655)Road Structure Act(Alignment design of urban roads)

(H655)Road Structure Act(Alignment design of urban roads)

Road Structure Act

4 Alignment and sight distance

4-1-2 Alignment design of urban roads

Points to consider in alignment design

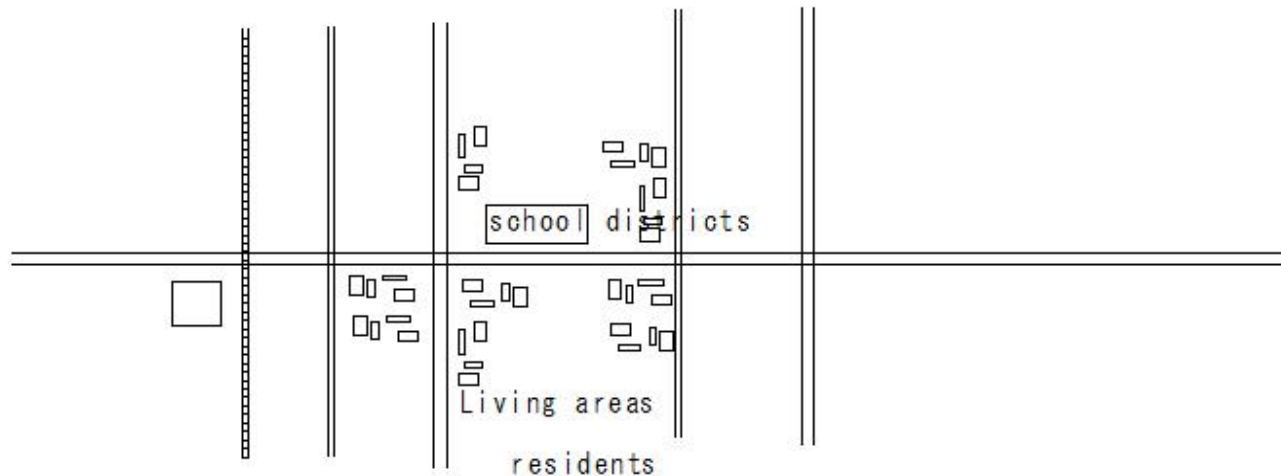
① Consider the relevance to land use in the area along the road

Urban areas - Main roads - Linear design

Local school districts

Living areas

Consider the convenience and habits of residents



(H656)Road Structure Act(Alignment design of urban road)

(H656)Road Structure Act(Alignment design of urban road)

Road Structure Act

4 Alignment and sight distance

4-1-2 Alignment design of urban roads

Points to consider in alignment design

② Consider the relationship with the existing road network.

Select a line that does not result in multiple branch intersections or irregular intersections.



(H657)Road Structure Act(Alignment design of urban road)

(H657)Road Structure Act(Alignment design of urban road)

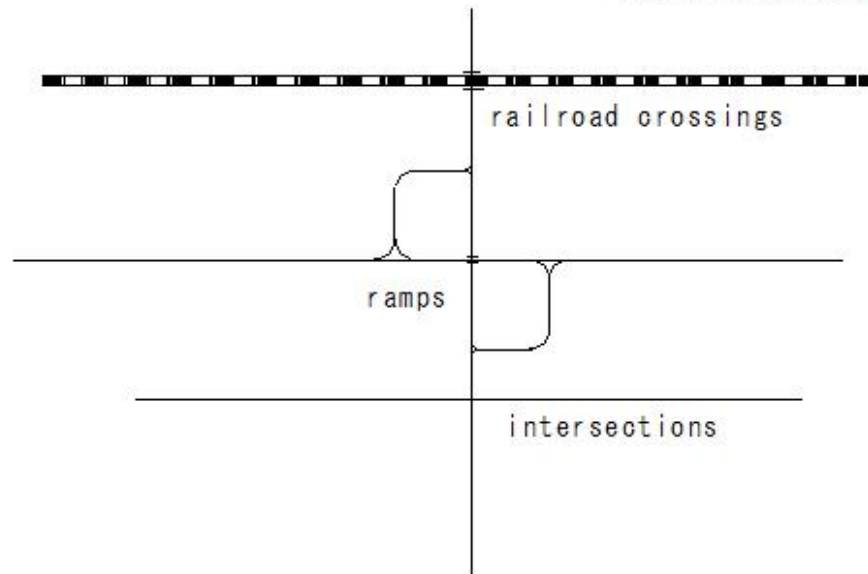
Road Structure Act

4 Alignment and sight distance

4-1-2 Alignment design of urban roads

Points to consider in alignment design

- ③ Avoid alignments that have at-grade intersections close to intersection access points, railroad crossings, or ramps on urban expressways.



(H658)Road Structure Act(Combination of horizontal and vertical alignments)

(H658)Road Structure Act(Combination of horizontal and vertical alignments)

Road Structure Act

4 Alignment and sight distance

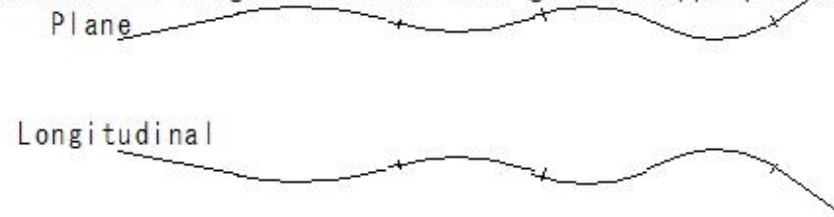
4-2 Combination of horizontal and vertical alignments

① Visual examination

① Superimposing horizontal alignments and vertical curves

② Balancing the size of horizontal alignments and vertical curves

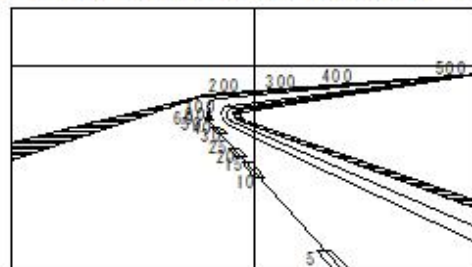
③ Select a combination of alignments that will give an appropriate composite gradient



(a) In case of there is a 1:1 correspondence

Figure 4-2 Correspondence between horizontal and vertical curves

H641



(c) Superimpose both alignments

H645

Fig 4-3 Combination of horizontal and vertical curves (explained using perspective drawings)

(H659)Road Structure Act(Combination of horizontal and vertical alignments)

(H659)Road Structure Act(Combination of horizontal and vertical alignments)

Road Structure Act

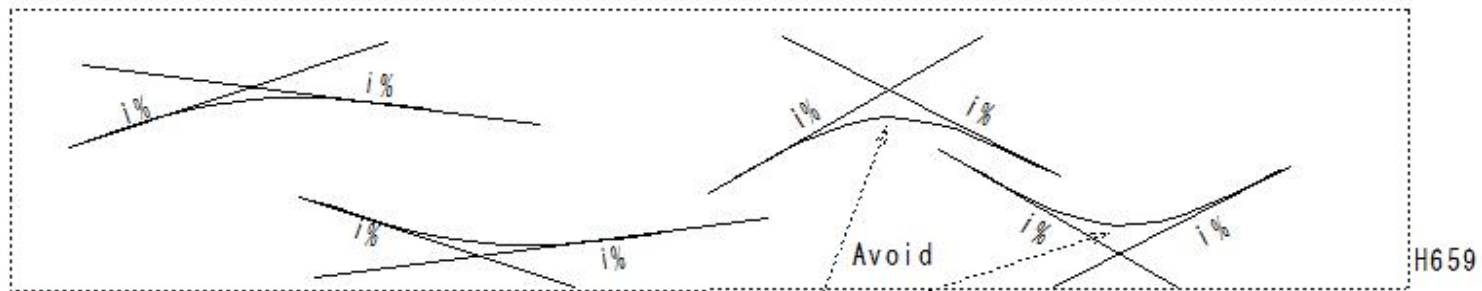
4 Alignment and sight distance

4-2 Combination of horizontal and vertical alignments

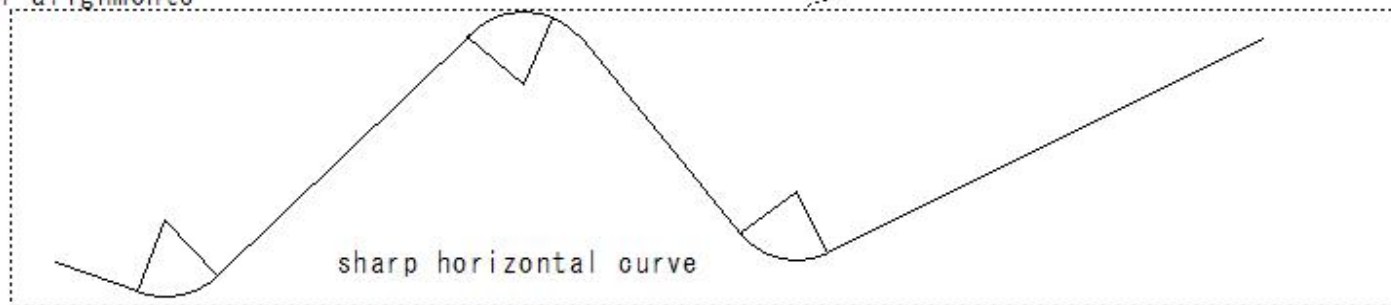
Avoid the following combinations of horizontal and vertical alignments

① Insert a sharp horizontal curve at the top or bottom of a convex or concave vertical curve

Vertical alignment



Horizontal alignments



(H660)Road Structure Act(Combination of horizontal and vertical alignments)

(H660)Road Structure Act(Combination of horizontal and vertical alignments)

Road Structure Act

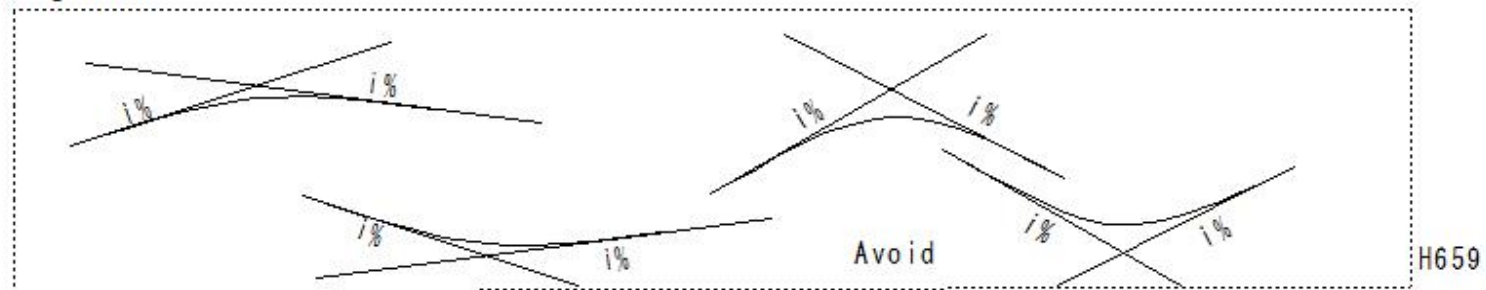
4 Alignment and sight distance

4-2 Combination of horizontal and vertical alignments

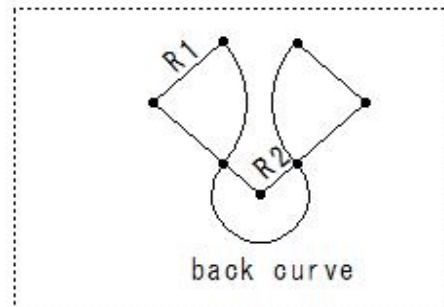
Avoid the following combinations of horizontal and vertical alignments

- ② Place an inflection point of a back curve of a convex or concave vertical curve

Vertical alignment



Horizontal alignments



(H661)Road Structure Act(Combination of horizontal and vertical alignments)

(H661)Road Structure Act(Combination of horizontal and vertical alignments)

Road Structure Act

4 Alignment and sight distance

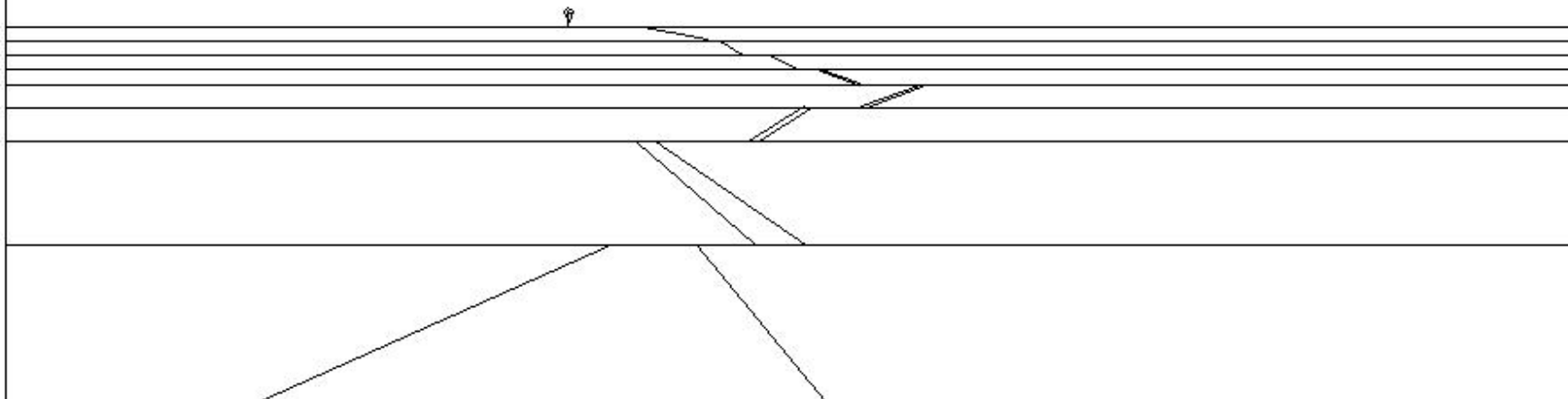
4-2 Combination of horizontal and vertical alignments

Avoid the following combinations of horizontal and vertical alignments

③ The vertical alignment has repeated concaves and convexes

within a horizontal curve or a straight line

repeated concaves and convexes



(H662)Road Structure Act(Combination of horizontal and vertical alignments)

(H662)Road Structure Act(Combination of horizontal and vertical alignments)

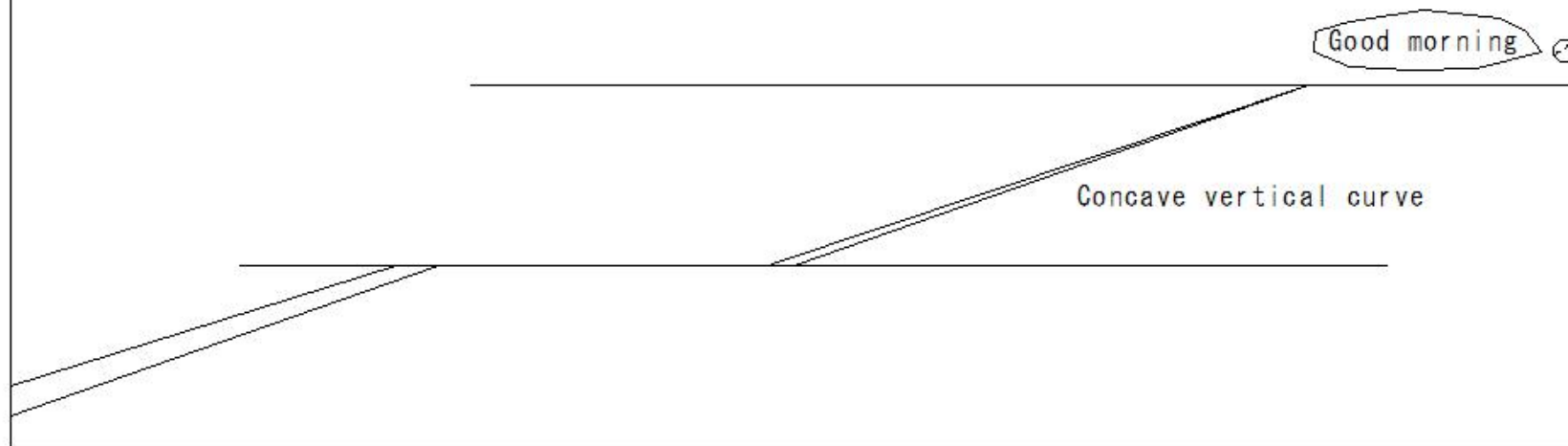
Road Structure Act

4 Alignment and sight distance

4-2 Combination of horizontal and vertical alignments

Avoid the following combinations of horizontal and vertical alignments

④ Insert a concave vertical curve in a long straight section



(H663)Road Structure Act(Combination of horizontal and vertical alignments)

(H663)Road Structure Act(Combination of horizontal and vertical alignments)

Road Structure Act

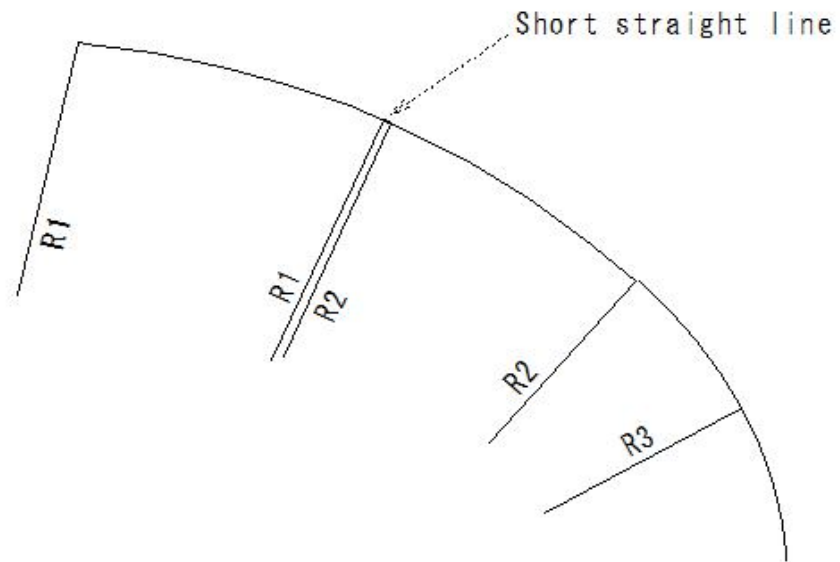
4 Alignment and sight distance

4-2 Combination of horizontal and vertical alignments

Avoid the following combinations of horizontal and vertical alignments

⑤ Insert a short straight line between curves that bend in the same direction

Horizontal alignments



(H664)Road Structure Act(Combination of horizontal and vertical alignments)

(H664)Road Structure Act(Combination of horizontal and vertical alignments)

Road Structure Act

4 Alignment and sight distance

4-2 Combination of horizontal and vertical alignments

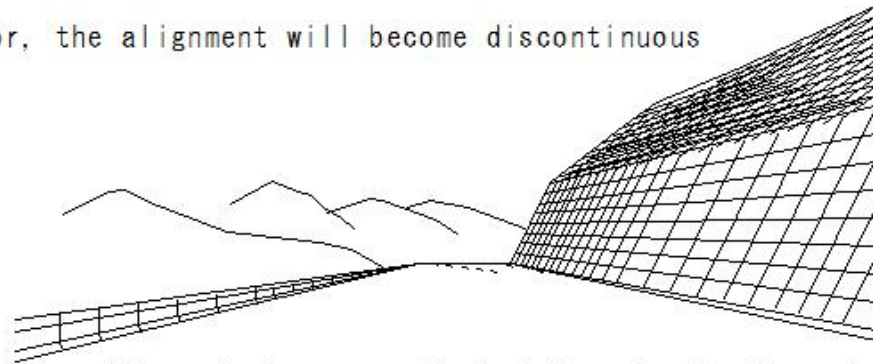
① Creating an alignment that naturally guides the driver visually is a fundamental principle of road design, especially in the combination of horizontal and vertical alignments

- in case of a sharp curve starts from the top of a convex vertical curve

The driver is not informed of the existence of a horizontal curve

until he or she is near the top of the vertical curve

- Visually undesirable alignment
- Visual guidance by planting trees, etc.
- Install warning signs
- in case of the combination is poor, the alignment will become discontinuous



① Beyond the crest (dashed line in the figure)
I'm worried because I don't know which way to turn.

Fig 4-1 Visually guiding alignment

(H665)Road Structure Act(Combination of horizontal and vertical alignments)

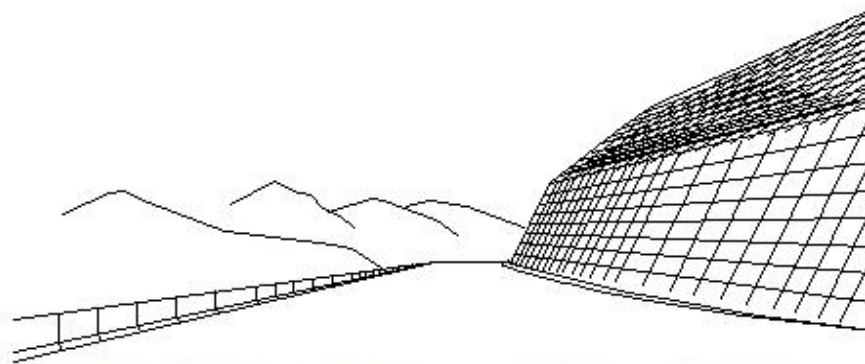
(H665)Road Structure Act(Combination of horizontal and vertical alignments)

Road Structure Act

4 Alignment and sight distance

4-2 Combination of horizontal and vertical alignments

- ② It is always necessary to consider the balance of the size of both horizontal and vertical alignments
- In mountainous areas with severe unevenness,
there is no need to force the horizontal alignment to be good
 - Same goes the other way around • Maintain balance between both alignments
 - Construction cost - Low • Visually smooth
 - Horizontal curves leading up to the crest are arranged so that you can tell
which way the road is bending ahead



② The horizontal alignment is arranged up to the crest,
so you can naturally see which way the road ahead curves.
Fig 4-1 Visually guiding alignment

(H666)Road Structure Act(Combination of horizontal and vertical alignments)

(H666)Road Structure Act(Combination of horizontal and vertical alignments)

Road Structure Act

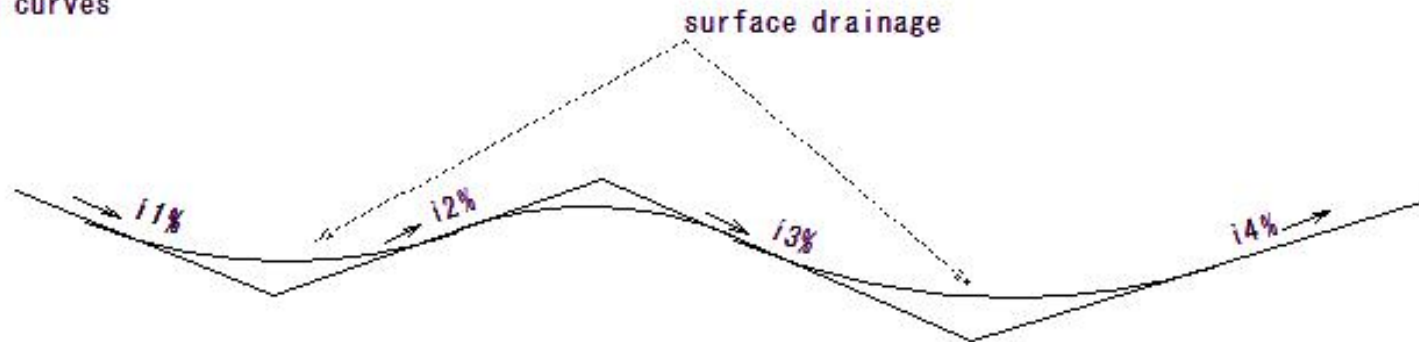
4 Alignment and sight distance

4-2 Combination of horizontal and vertical alignments

③ Avoid delays in road surface drainage

- in case of the longitudinal gradient is close to horizontal (0.3%) or less
- in case of the inflection point of the horizontal reverse curve is near the bottom of the concave longitudinal curve

vertical curves



(H667)Road Structure Act(Combination of horizontal and vertical alignments)

(H667)Road Structure Act(Combination of horizontal and vertical alignments)

Road Structure Act

4 Alignment and sight distance

4-2 Combination of horizontal and vertical alignments

4-2-3 General design policy

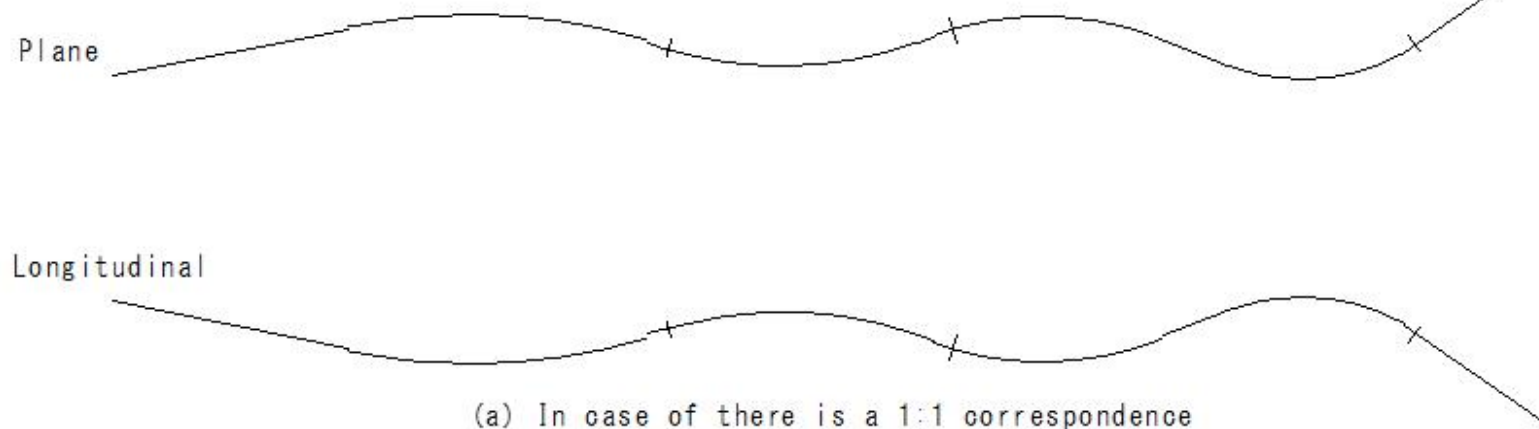
Overlapping horizontal alignment and vertical curves

Effect of visually guiding the driver

Smooth and beautiful alignment

One-to-one correspondence between horizontal and vertical curves

The horizontal curve is longer than the vertical curve



(a) In case of there is a 1:1 correspondence

Figure 4-2 Correspondence between horizontal and vertical curves

(H668)Road Structure Act(Combination of horizontal and vertical alignments)

(H668)Road Structure Act(Combination of horizontal and vertical alignments)

Road Structure Act

4 Alignment and sight distance

4-2 Combination of horizontal and vertical alignments

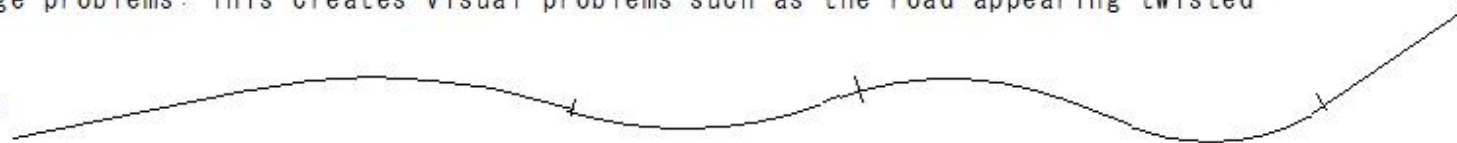
4-2-3 General design policy

① Superimposing horizontal alignment and vertical curves

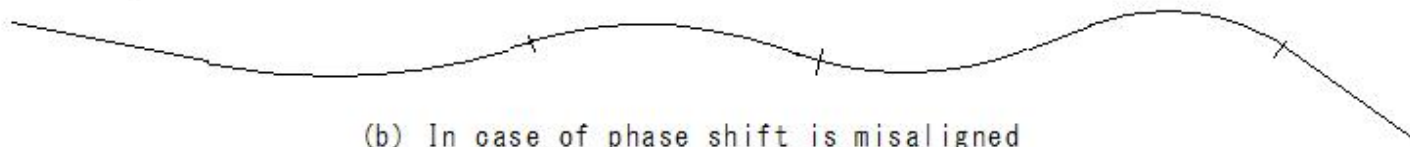
Example of a horizontal curve and a vertical curve with a 1/2 phase shift

- in case of a horizontal curve begins at the apex of a vertical curve,
the driver cannot be visually guided
- Drainage problems: This creates visual problems such as the road appearing twisted

Plane



Longitudinal



(b) In case of phase shift is misaligned

(H670)Road Structure Act(Combination of horizontal and vertical alignments)

(H670)Road Structure Act(Combination of horizontal and vertical alignments)

Road Structure Act

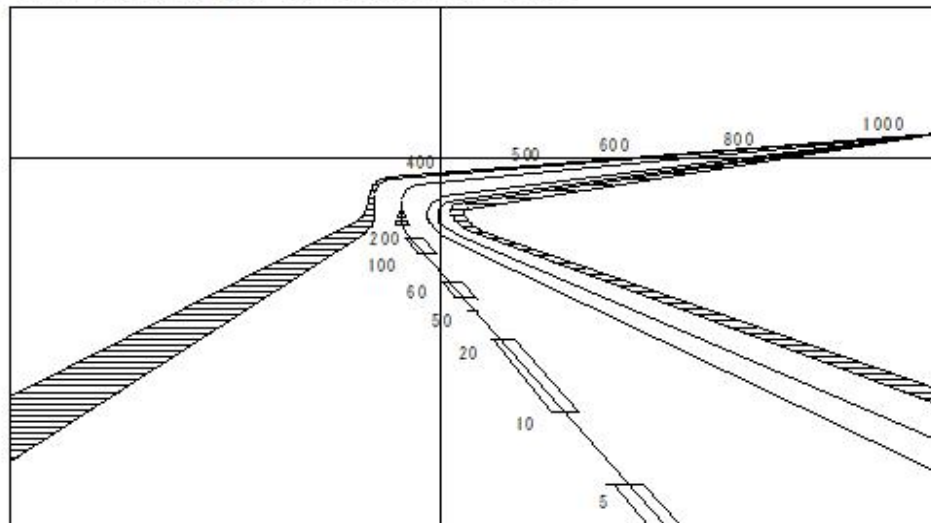
4 Alignment and sight distance

4-2 Combination of horizontal and vertical alignments

4-2-3 General design policy

② Maintain balance in the size of horizontal and vertical curves

- Be careful not to make horizontal and vertical curves large and gentle on one side and small and full of changes on the other side.



(b) The point where the plane curve starts from the straight line is about the middle of the longitudinal curve.

(H671)Road Structure Act(Combination of horizontal and vertical alignments)

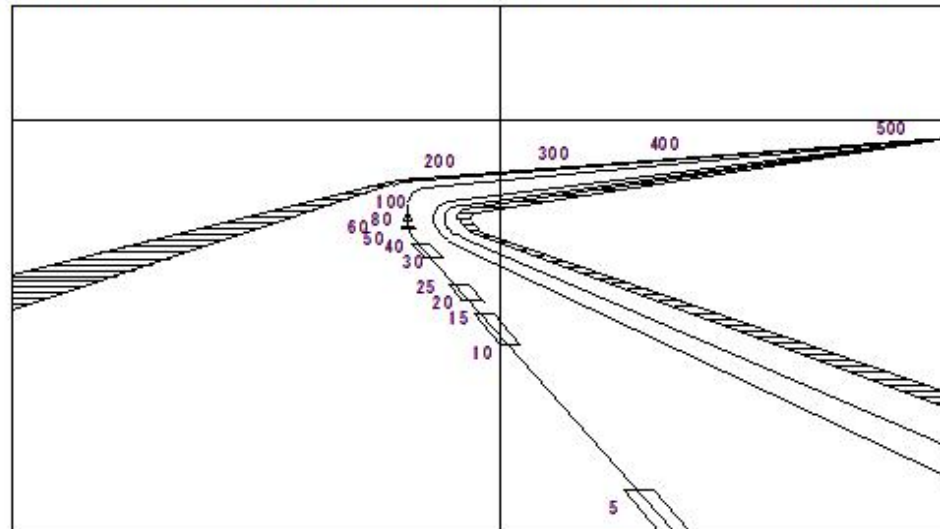
(H671) Road Structure Act(Combination of horizontal and vertical alignments)
Road Structure Act

4 Alignment and sight distance

4-2 Combination of horizontal and vertical alignments

4-2-3 General design policy

② Maintain balance in size between horizontal and vertical curves



(c) Superimpose both alignments

Alignment smooths out

Planar curves are significantly shorter than longitudinal curves

It is not desirable if the lengths of both lines are unbalanced.

Fig 4-3 Combination of horizontal and vertical curves (explained using perspective drawings) H645

(H672)Road Structure Act(Combination of horizontal and vertical alignments)

(H672)Road Structure Act(Combination of horizontal and vertical alignments)

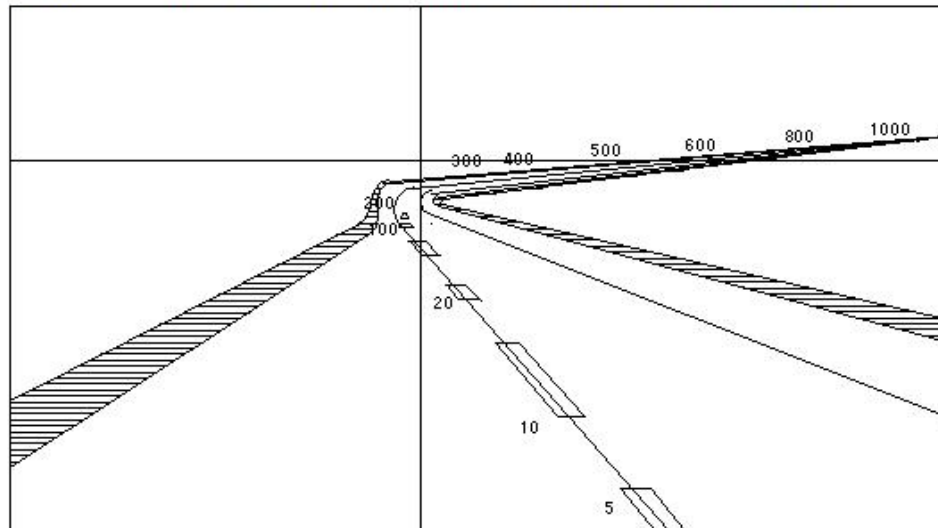
Road Structure Act

4 Alignment and sight distance

4-2 Combination of horizontal and vertical alignments

4-2-3 General design policy

② Maintain balance in the size of horizontal and vertical curves



(d) The planar curve is significantly shorter than the longitudinal curve

It is not desirable in case of the lengths of both lines are unbalanced.

Fig 4-3 Combination of horizontal and vertical curves (explained using perspective drawings)

(H673)Road Structure Act(Combination of horizontal and vertical alignments)

(H673)Road Structure Act(Combination of horizontal and vertical alignments)

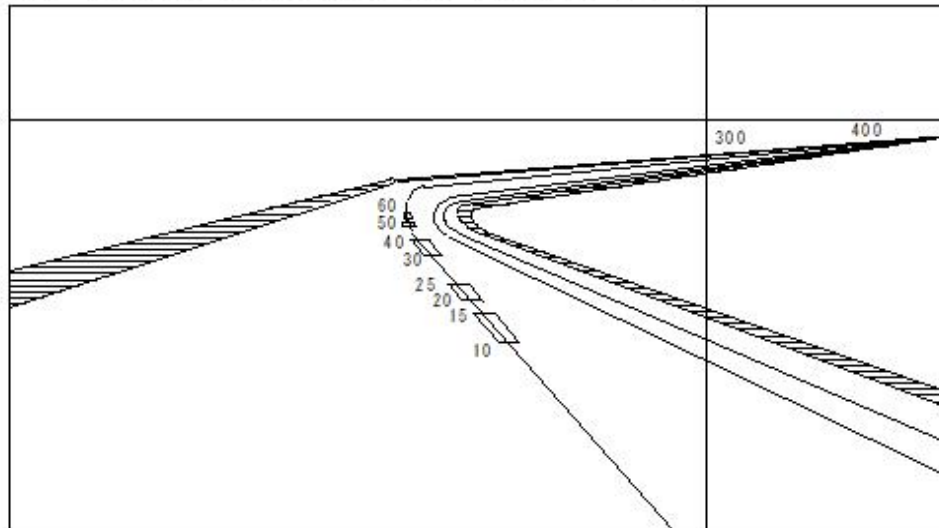
Road Structure Act

4 Alignment and sight distance

4-2 Combination of horizontal and vertical alignments

4-2-3 General design policy

② Maintain balance between horizontal and vertical curves



(e) In case of the plane curve is long

No visual issues

Planar curves should be longer than longitudinal curves

Fig 4-3 Combination of horizontal and vertical curves (explained using perspective drawings) H647

(H674)Road Structure Act(Combination of horizontal and vertical alignments)

(H674)Road Structure Act(Combination of horizontal and vertical alignments)

Road Structure Act

4 Alignment and sight distance

4-2 Combination of horizontal and vertical alignments

4-2-3 General design policy

② Maintain balance between horizontal and vertical curve sizes

③ Select a alignment combination that will give you an appropriate composite gradient.

Table 4-1 Balance between horizontal and vertical curve radius

Radius of horizontal curve (m)	Radius of vertical curve (m)
500	10000
700	12000
800	16000
900	20000
1000	25000
1100	30000
1200	40000
1500	60000
2000	100000

(H675)Road Structure Act(Combination of horizontal and vertical alignments)

(H675)Road Structure Act(Combination of horizontal and vertical alignments)

Road Structure Act

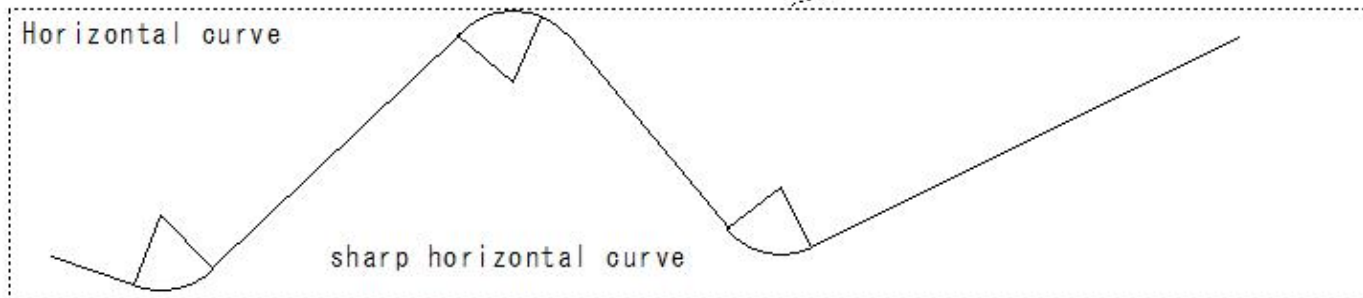
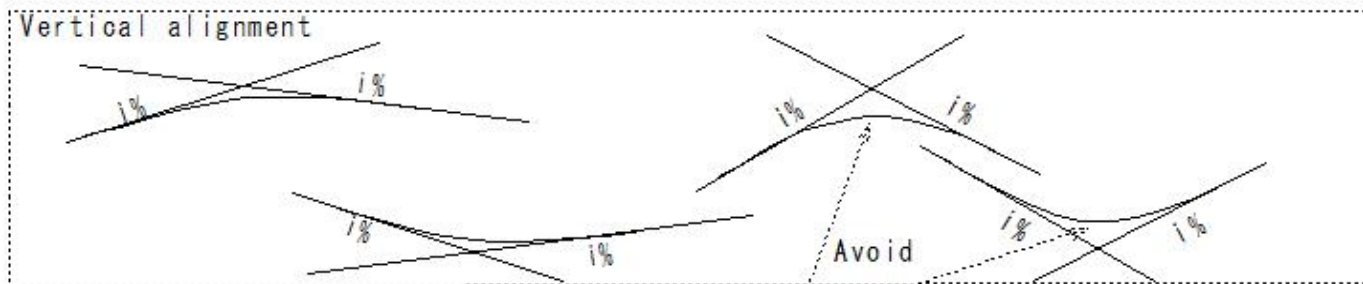
4 Alignment and sight distance

4-2 Combination of horizontal and vertical alignments

4-2-4 Other precautions (combinations that should be avoided)

- ① Avoid putting steep horizontal alignments at the top

or bottom of convex or concave vertical curves.



(H676)Road Structure Act(Combination of horizontal and vertical alignments)

(H676)Road Structure Act(Combination of horizontal and vertical alignments)

Road Structure Act

4 Alignment and sight distance

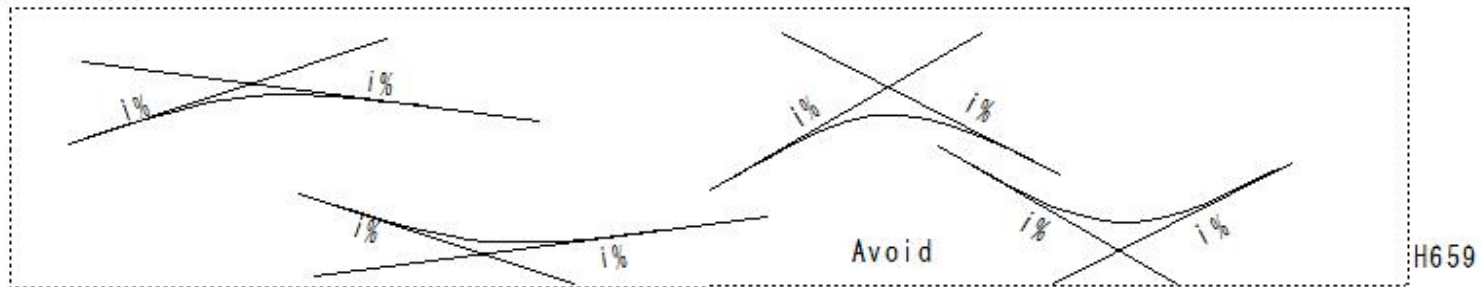
4-2 Combination of horizontal and vertical alignments

4-2-4 Other precautions (combinations that should be avoided)

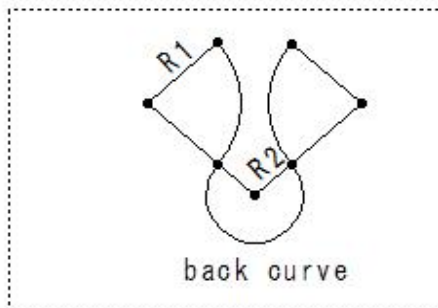
② Avoid placing the inflection point of a back curve

at the top or bottom of a convex or concave vertical curve.

Vertical alignment



Horizontal alignments



H660

(H677)Road Structure Act(Combination of horizontal and vertical alignments)

(H677)Road Structure Act(Combination of horizontal and vertical alignments)

Road Structure Act

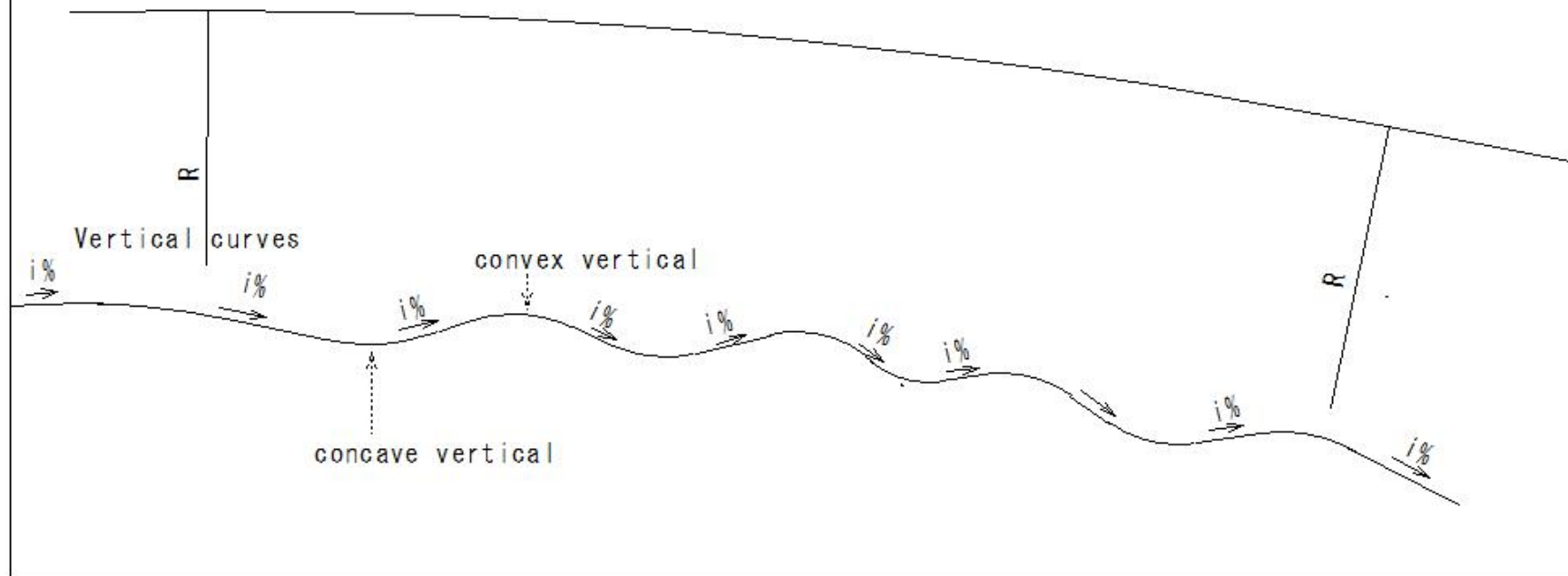
4 Alignment and sight distance

4-2 Combination of horizontal and vertical alignments

4-2-4 Other precautions (combinations that should be avoided)

③ Avoid repeated concave and convex vertical curves within a single horizontal curve.

horizontal curve.



(H678)Road Structure Act(Combination of horizontal and vertical alignments)

(H678)Road Structure Act(Combination of horizontal and vertical alignments)

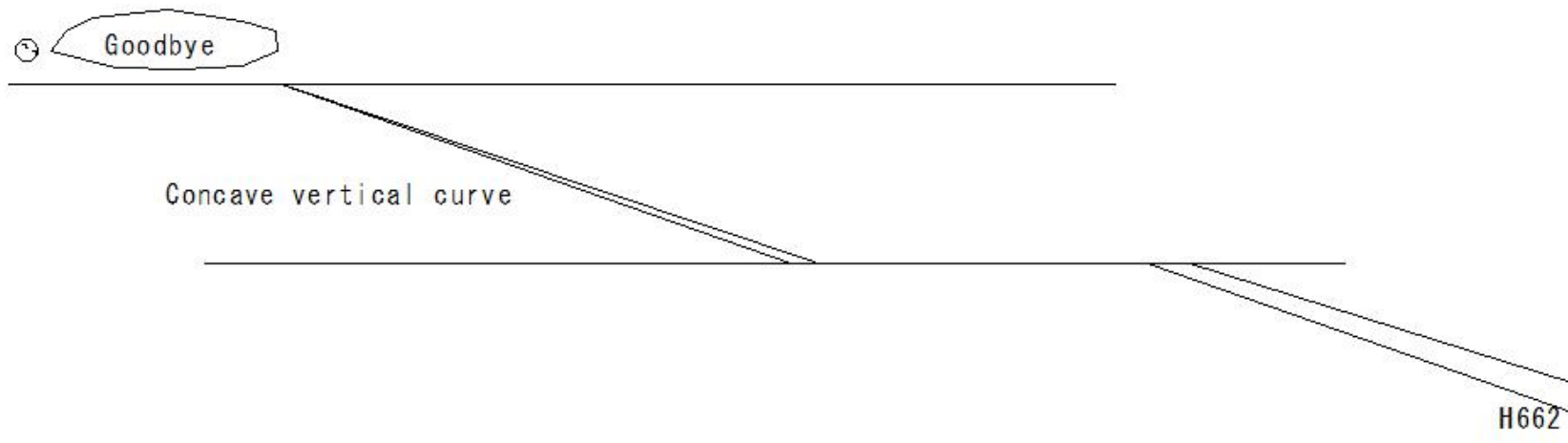
Road Structure Act

4 Alignment and sight distance

4-2 Combination of horizontal and vertical alignments

4-2-4 Other precautions (combinations that should be avoided)

④ Insert a concave vertical curve into a long straight section



(H679)Road Structure Act(Combination of horizontal and vertical alignments)

(H679)Road Structure Act(Combination of horizontal and vertical alignments)

Road Structure Act

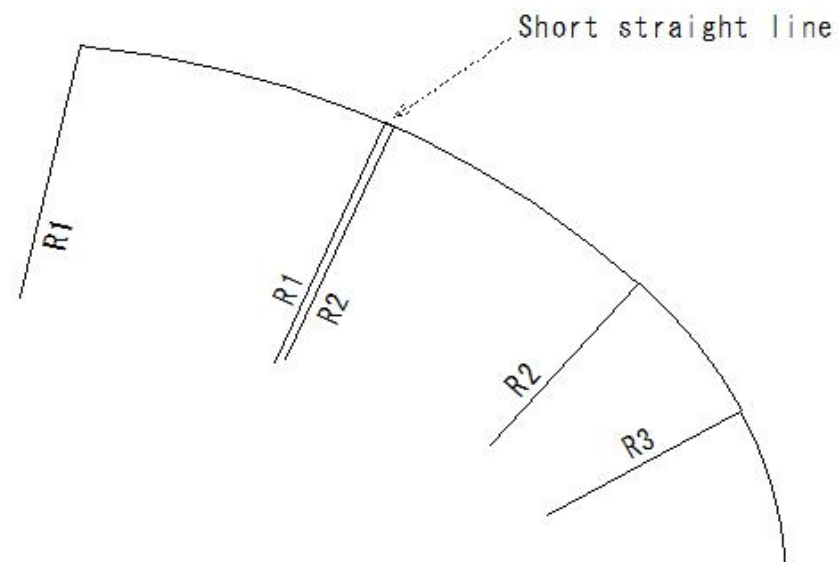
4 Alignment and sight distance

4-2 Combination of horizontal and vertical alignments

4-2-4 Other precautions (combinations that should be avoided)

⑤ Avoid putting short straight lines between curves that bend in the same direction.

Horizontal alignments



H663

(H680)Road Structure Act(Horizontal and Vertical alignments)

(H680)Road Structure Act(Horizontal and Vertical alignments)

Road Structure Act

4 Alignment and sight distance

4-2 Combination of horizontal and vertical alignments

4-2-4 Other precautions (combinations that should be avoided)

⑥ Considerations for low-standard roads, etc.

Low-standard roads with a design speed of 40km/h or less

Table 4-2 Limits at which horizontal and vertical alignments should be avoided

Design speed (km/h)	Radius of horizontal curve (m)	Radius of vertical curve (m)
80	400	5000 (50△)
60	200	2500 (25△)
40	100	2000 (20△)
30	50	1500 (15△)
20	50	1000 (10△)

(H681)Road Structure Act(Curve radius)

(H681)Road Structure Act(Curve radius)

Road Structure Act

- 4 Alignment and sight distance
- 4-4 Curve radius (unit: meters)
- 4-4-1 Minimum curve radius

Design speed (unit: kilometers per hour)	Curve radius (unit: meters)	
	120	710
100	460	380
80	280	230
60	150	120
50	100	80
40	60	50
30	30	
20	15	

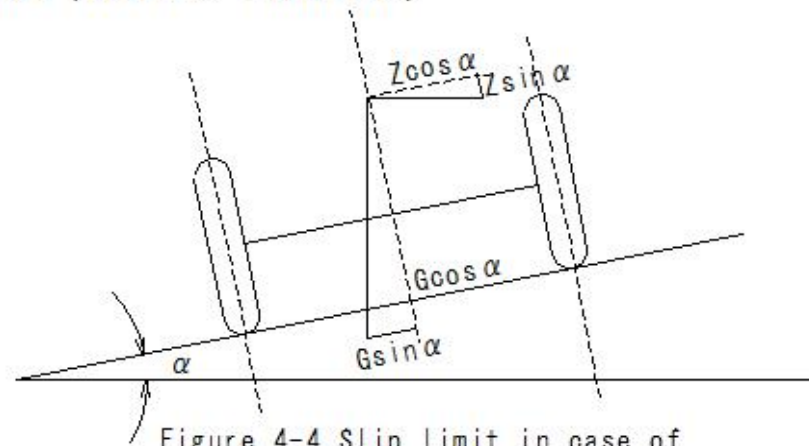
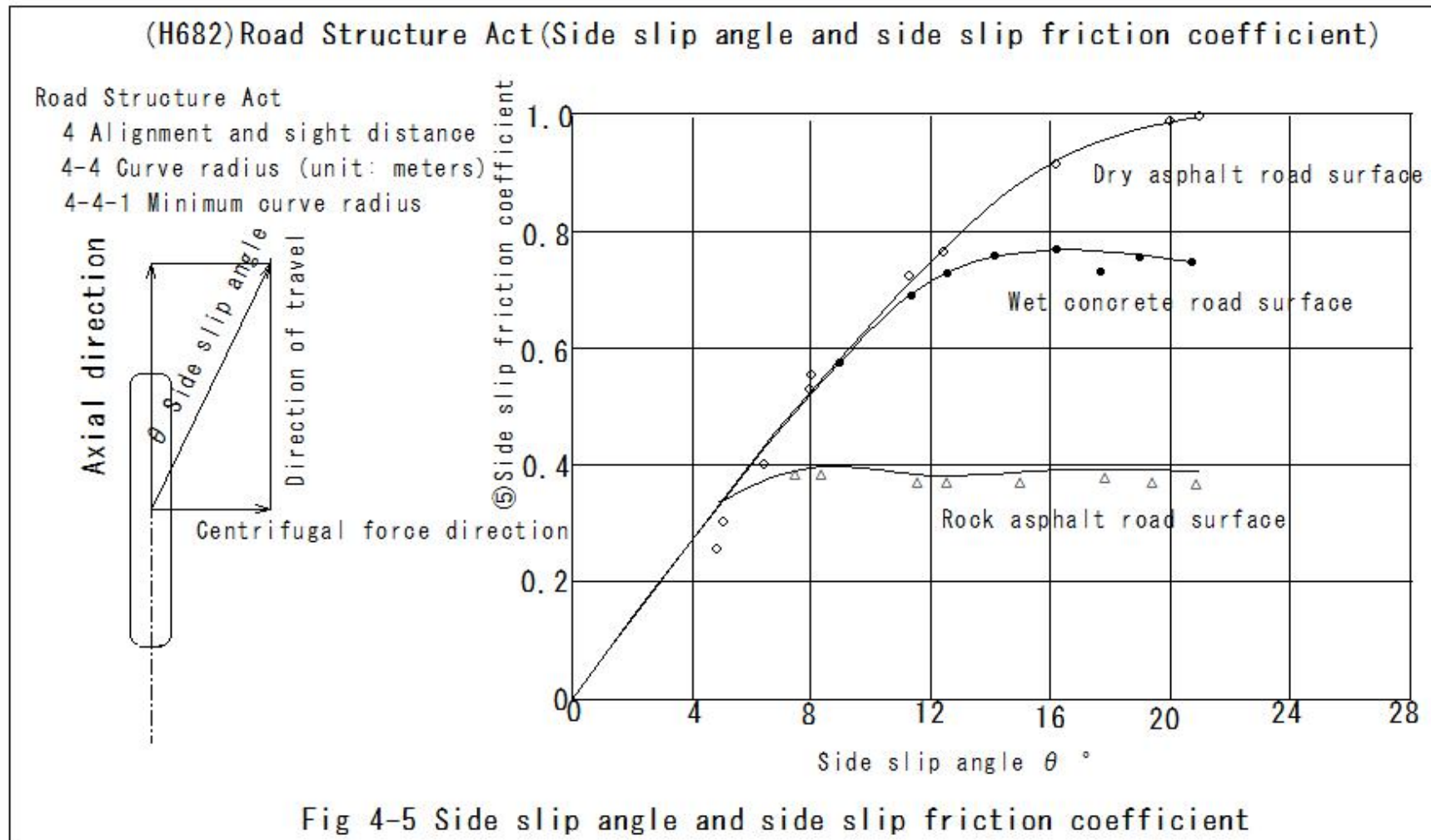


Figure 4-4 Slip limit in case of traveling on a curved section

- Z: Centrifugal force (kg)
 - v: Vehicle speed (m/s)
 - g: Acceleration of gravity ($\approx 9.81\text{m/s}^2$)
 - G: Total weight of the vehicle (kg)
 - f: Friction coefficient between the road surface and the tires against lateral slippage
 - i: Single slope of the road surface ($=\tan \alpha$)
 - R: Curve radius (m)
- $R = V^2 / 127(i + f) \dots \dots \dots (4-5)$

(H682)Road Structure Act(Side slip angle and side slip friction coefficient)



(H683)Road Structure Act(Lateral slip friction coefficient used in design)

(H683)Road Structure Act(Lateral slip friction coefficient used in design)

Road Structure Act

4 Alignment and sight distance

4-4 Curve radius (unit: meters)

4-4-1 Minimum curve radius

Table 4-3 Lateral slip friction coefficient used in design

Design speed(km/h)	120	100	80	60	50	Under 40
f	0.10	0.11	0.12	0.13	0.14	0.15

(H684)Road Structure Act(Side-slip friction coefficient)

(H684) Road Structure Act(Side-slip friction coefficient)

Road Structure Act

4 Alignment and sight distance

4-4 Curve radius (unit: meters)

4-4-1 Minimum curve radius

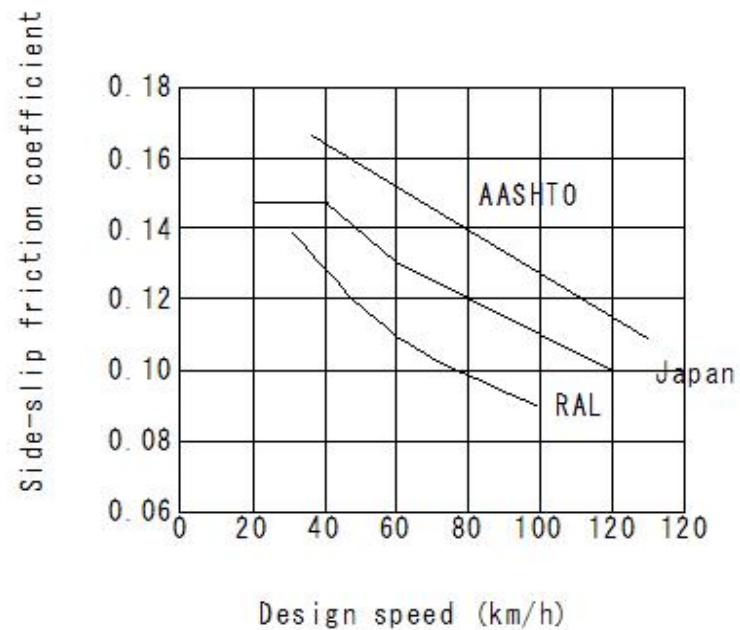


Figure 4-7 Side-slip friction coefficient used in design

(H685)Road Structure Act(Curve radius)

(H685)Road Structure Act(Curve radius)

Road Construction Act

4 Alignment and sight distance

4-4 Curve radius (unit: meters)

4-4-1 Minimum curve radius

Table 4-4 Calculated minimum curve radius

Design speed (km/h)	f	Curve radius (m)		
		i=6%	i=8%	i=10%
120	0.1	709	630	567
100	0.11	463	414	375
80	0.12	280	252	229
60	0.13	149	135	123
50	0.14	98	89	82
40	0.15	60	55	50
30	0.15	34	31	28
20	0.15	15	14	13

f:Side-slip friction coefficient

(H686)Road Structure Act(Curve radius)

(H686) Road Structure Act (Curve radius)

Road Structure Act

4 Alignment and sight distance

4-4 Curve radius (unit: meters)

4-4-1 Minimum curve radius

Table 4-5 Calculated minimum curve radius when no one-way slope is applied

V (km/h)	f	R(m)
60	0.15	218
50	0.15	151
40	0.15	97
30	0.15	55
20	0.15	24

f: Side-slip friction coefficient

(H687)Road Structure Act(Minimum Curve Radius)

(H687)Road Structure Act(Minimum Curve Radius)

Road Construction Act

4 Alignment and sight distance

4-4 Curve radius (unit: meters)

4-4-1 Minimum curve radius

Table 4-6: Minimum curve radius

Design speed (km/h)	Curve radius(m)				
	Standard case	In case of terrain or other special reasons, Maximum super-gradient that can be applied			
		6%	8%	10%	⑤In case of no super-gradient
120	710	710	630	570	-
100	460	460	410	380	-
80	280	280	250	230	-
60	150	150	140	120	220
50	100	100	90	80	150
40	60	60	55	50	100
30	30		-	-	55
20	15		-	-	25

(H688)Road Structure Act(Minimum Curve Radius)

(H688)Road Structure Act(Minimum Curve Radius)

Road Structure Act

4 Alignment and sight distance

4-4 Curve radius (unit: meters)

4-4-2 Value of (f) at the desired minimum curve radius

Curve radius

Design speed (unit: kilometers per hour)	Curve radius (unit: meters)
120	1000
100	700
80	400
60	200
50	150
40	100
30	65
20	30

(H689)Road Structure Act(Minimum curve radius)

(H689)Road Structure Act(Minimum curve radius)

Road Construction Act

4 Alignment and sight distance

4-4 Curve radius (unit: meters)

4-4-2 Value of (f) at the desired minimum curve radius

Table 4-7 Value of (f) at the desired minimum curve radius

Design speed (km/h)	Curve radius (m)	$v^2/127R$	Side gradient (i)	Side slip friction coefficient (f)
120	1000	0.11	0.06	0.05
100	700	0.11	0.06	0.05
80	400	0.13	0.07	0.06
60	200	0.14	0.08	0.06
50	150	0.13	0.08	0.05
40	100	0.13	0.07	0.06
30	65	0.11	0.06	0.05
20	30	0.11	0.06	0.05

f:Side-slip friction coefficient

(H690)Road Structure Act(Lateral slip friction coefficient (f))

(H690)Road Structure Act(Lateral slip friction coefficient (f))

Road Construction Act

4 Alignment and sight distance

4-4 Curve radius (unit: meters)

4-4-2 Value of (f) at the desired minimum curve radius

Table 4-8 Consideration of lateral slip friction coefficient for snow and ice

Design speed V (km/h)	Winter driving speed Vw (km/h)	Lateral slip friction coefficient (f)					
		i=8%			i=6%		
		Rmin	$Vw^2/127R_{min}$	f	Rmin	$Vw^2/127R_{min}$	f
120	60	630	0.045	-0.035	710	0.040	-0.020
100	60	410	0.069	-0.011	460	0.062	0.002
80	60	250	0.113	0.033	280	0.101	0.040
60	50	140	0.140	0.060	150	0.131	0.071
50	40	90	0.140	0.060	100	0.126	0.066
40	30	55	0.129	0.049	60	0.118	0.058
30	20	30	0.105	0.025	30	0.105	0.045

f:Side-slip friction coefficient

$$f = Vw^2/127R_{min} - i_{max} \dots (4-6)$$

(H691)Road Structure Act(Curve length)

(H691)Road Structure Act(Curve length)

Road Structure Act

4-5 Curve length

4-5-1 Minimum curve length

Design speed V (km/h)	Curve length (m)	
120	$1400/\theta$	200
100	$1200/\theta$	170
80	$1000/\theta$	140
60	$700/\theta$	100
50	$600/\theta$	80
40	$500/\theta$	70
30	$350/\theta$	50
20	$280/\theta$	40

θ : Road intersection angle (deg)

(H692)Road Structure Act(Curve length)

(H692)Road Structure Act(Curve length)

Road Structure Act

4-5 Curve length

4-5-1 Minimum curve length

Table 4-9 Curve length required from steering operation

Design speed V (km/h)	120	100	80	60	50	40	30	20
Curve length required from steering operation (m)	200	167	133	100	83	67	50	33

(H693)Road Structure Act(Curve length)

Road Structure Act

4-5 Curve length

4-5-1 Minimum curve length

Road Structure Act

Curve length

Table 4-10 Rate of change of centrifugal acceleration

Design speed V (km/h)	120	100	80	60	50	40	30	20
Desired value of minimum curve radius (m)	1000	700	400	200	150	100	65	30
P1 (m/s ³)	0.37	0.36	0.39	0.46	0.43	0.41	0.36	0.31
Minimum curve radius (m)	710	460	280	150	100	60	30	15
P2 (m/s ³)	0.52	0.57	0.59	0.62	0.65	0.68	0.77	0.60
Reduction value of minimum curve radius	570	380	230	120	80	50		
P3 (m/s ³)	0.65	0.69	0.72	0.77	0.81	0.82		

(H694)Road Structure Act(Curve length)

(H694)Road Structure Act(Curve length)

Road Structure Act

4-5 Curve length

4-5-1 Minimum curve length

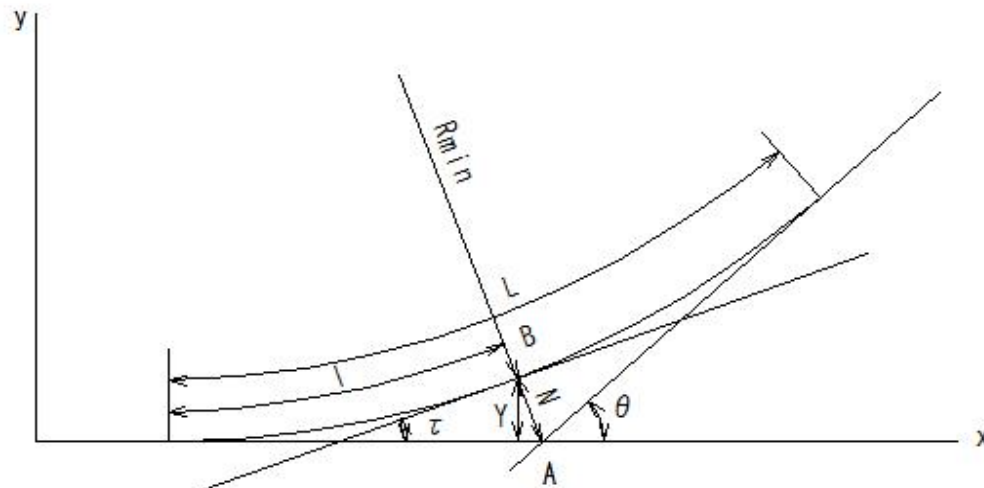


Figure 4-8 N value when road intersection angle is less than 7°

(H695)Road Structure Act(Curve length)

Road Structure Act

4-5 Curve length

4-5-1 Minimum curve length

Road Structure Act

Curve length

Table 4-11 Relationship between road intersection angle θ (less than 7°) and curve length

Design speed V (km/h)	Minimum transition curve length l_m (m)	Secant length N_m (m)	Curve length L_m (m)
120	100	2.04	$1400/\theta$
100	85	1.73	$1200/\theta$
80	70	1.42	$1000/\theta$
60	50	1.02	$700/\theta$
50	40	0.81	$600/\theta$
40	35	0.71	$500/\theta$
30	25	0.51	$350/\theta$
20	20	0.41	$280/\theta$

(H696)Road Structure Act(Curve length)

(H696)Road Structure Act(Curve length)

Road Structure Act

4-5 Curve length

4-5-1 Minimum curve length

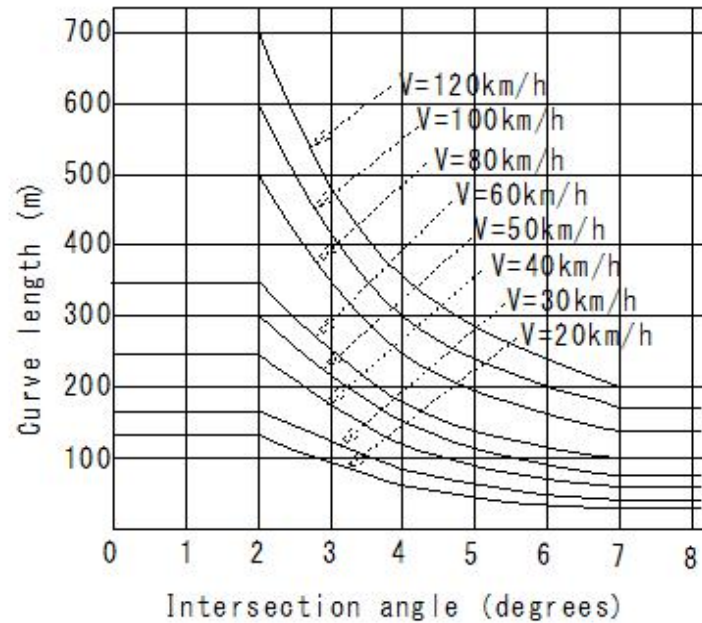


Figure 4-9 Relationship between intersection angle and minimum curve length

(H697)Road Structure Act(Super gradient of curved sections)

(H697)Road Structure Act(Super gradient of curved sections)

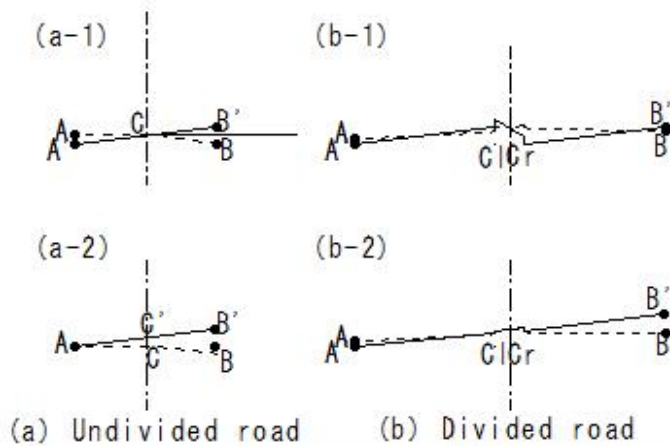
Road Structure Act

4-6 Super gradient of curved sections

Article 16

Classification	Areas where roads exist	Maximum side slope (%)
Type 1, 2, 3	Snowy and cold regions	6
	Areas with high snowfall and cold	8
	Other regions	10
Type 4	Other regions	6

Figure 4-29



H502

H732

(H698)Road Structure Act(Maximum super-gradient)

(H698)Road Structure Act(Maximum super-gradient)

Road Structure Act

4-6 Super gradient of curved sections

4-6-1 Maximum super-gradient

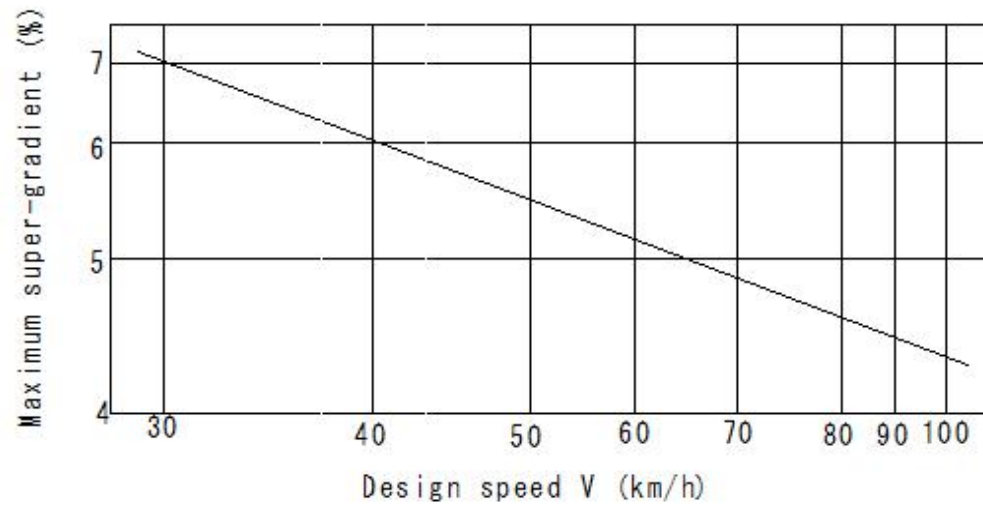


Figure 4-10 Maximum super-gradient (RAL)

(H699)Road Structure Act(Maximum super-gradient)

(H699) Road Structure Act (Maximum super-gradient)

Road Structure Act

4-6 Super gradient of curved sections

4-6-1 Maximum super-gradient

Table 4-12 Maximum superelevation (AASHTO)

Maximum superelevation	Summary
12%	Actual maximum value in areas without snow and ice
10%	Maximum value not taking snow and ice into account (general value in Japan)
8%	Maximum value in areas with snow cover
6%	Maximum value in urban areas

(H700)Road Structure Act(Super gradient of curved sections)

(H700) Road Structure Act (Super gradient of curved sections)

Road Structure Act

4-6 Super gradient of curved sections

4-6-2 Minimum curve radius for cutting off the one-way slope

Unit: m

Cross-slope of straight section (%)	Design speed V (km/h)							
	120	100	80	60	50	40	30	20
2.0	7500	5000	3500	2000	1300	800	500	200
1.5	5500	4000	2500	1500	1000	600	350	150

(H701)Road Structure Act(Super gradient of curved sections)

(H701)Road Structure Act(Super gradient of curved sections)

Road Construction Act

4-6 Super gradient of curved sections

4-6-2 Minimum curve radius for cutting off the one-way slope

Table 4-13 Minimum curve radius for cutting off the one-way slope

Cross-slope of straight section (%)	Design speed V (km/h)							
	120	100	80	60	50	40	30	20
2	7,559	5,249	3,360	1,889	1,312	839	472	210
1.5	5,669	3,937	2,520	1,417	984	630	354	154

$$R_e = \frac{V^2}{127(i+f)} \dots \dots \dots (4-5)$$

Re:Minimum curve radius for cutting off the one-way slope(m)

V:Design speed V (km/h)

i:-0.02 or -0.015

f:0.035

in case of RAL:f=0.04

ASSHTO f=0.026~0.028

(H702)Road Structure Act(Super gradient of curved sections)

(H702)Road Structure Act(Super gradient of curved sections)

Road Construction Act

4-6 Super gradient of curved sections

4-6-3 Curve radius and super-gradient value

Curve radius (m)								Super-gradient (%)
120km/h	100	80	60	50	40	30	20	
570-610	380-430	230-280	120-150	80-100	50-65	-		10
610-670	430-480	280-330	150-190	100-130	65-80	-		9
670-760	480-550	330-380	190-230	130-160	80-100	30-40	15-20	8
760-880	550-640	380-450	230-270	160-200	100-130	40-60	20-30	7
880-1030	640-760	450-540	270-330	200-240	130-160	60-80	30-40	6
1030-1280	760-930	540-670	330-420	240-310	160-210	80-110	40-50	5
1280-1660	930-1210	670-870	420-560	310-410	210-280	110-150	50-70	4
1660-2300	1210-1700	870-1240	560-800	410-590	280-400	150-220	70-100	3
2300-7500	1700-5000	1240-3500	800-2000	590-1300	400-800	220-500	100-200	2

Standard cross slope: 1.5%

120	100	80	60	50	40	30	20	Super-gradient (%)
2300-2860	1700-2130	1240-2100	800-1370	590-1000	400-600	220-350	100-150	2
2860-5500	2130-4000	2100-2500	1370-1500	-	-	-	-	1.5

(H703)Road Structure Act(Relationship between (i+f) and curve radius)

(H703)Road Structure Act(Relationship between (i+f) and curve radius)

Road Structure Act

4-6 Super gradient of curved sections

4-6-3 Curve radius and super-gradient value

$$i+f=V^2/127R$$

i: Single slope

f: Side slip friction coefficient

V: Travel speed (km/h)

R: Curve radius (m)

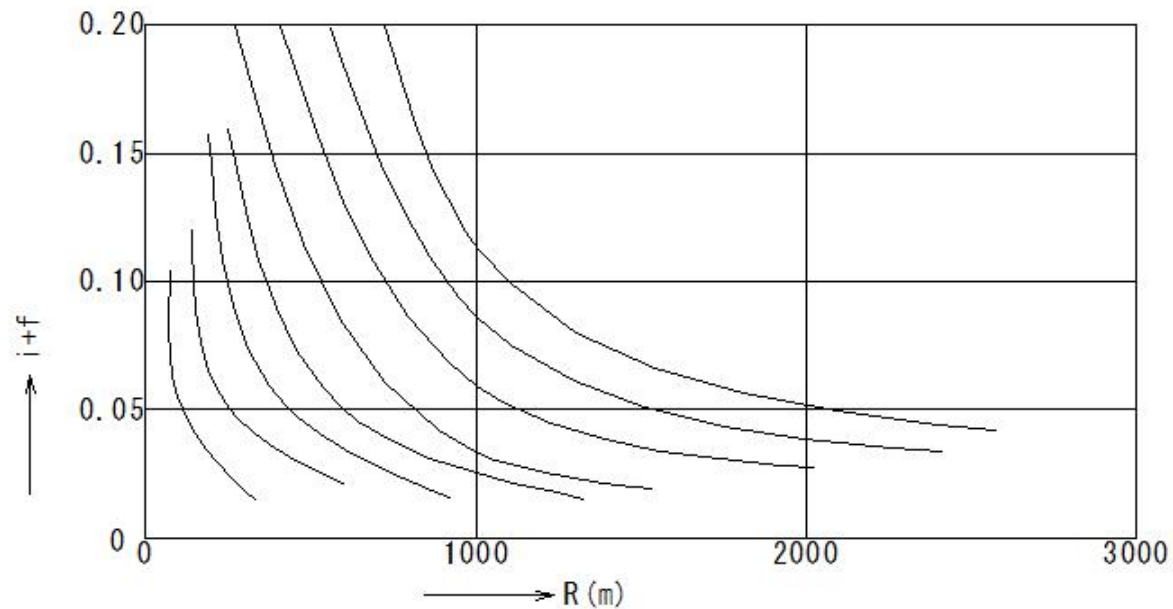


Figure 4-11 Relationship between (i+f) and curve radius

(H704)Road Structure Act(Relationship between design speed and driving speed)

(H704)Road Structure Act(Relationship between design speed and driving speed)

Road Construction Act

4-6 Super gradient of curved sections

4-6-3 Curve radius and super-gradient value

Table 4-14 Relationship between design speed and driving speed

Design speed (km/h)	120	100	80	60	50	40	30	20
Driving speed (km/h)	81	74	64	52	45	37	28	19

(H705)Road Structure Act(Relationship between design speed and driving speed)

(H705)Road Structure Act(Relationship between design speed and driving speed)

Road Structure Act

4-6 Super gradient of curved sections

4-6-3 Curve radius and super-gradient value

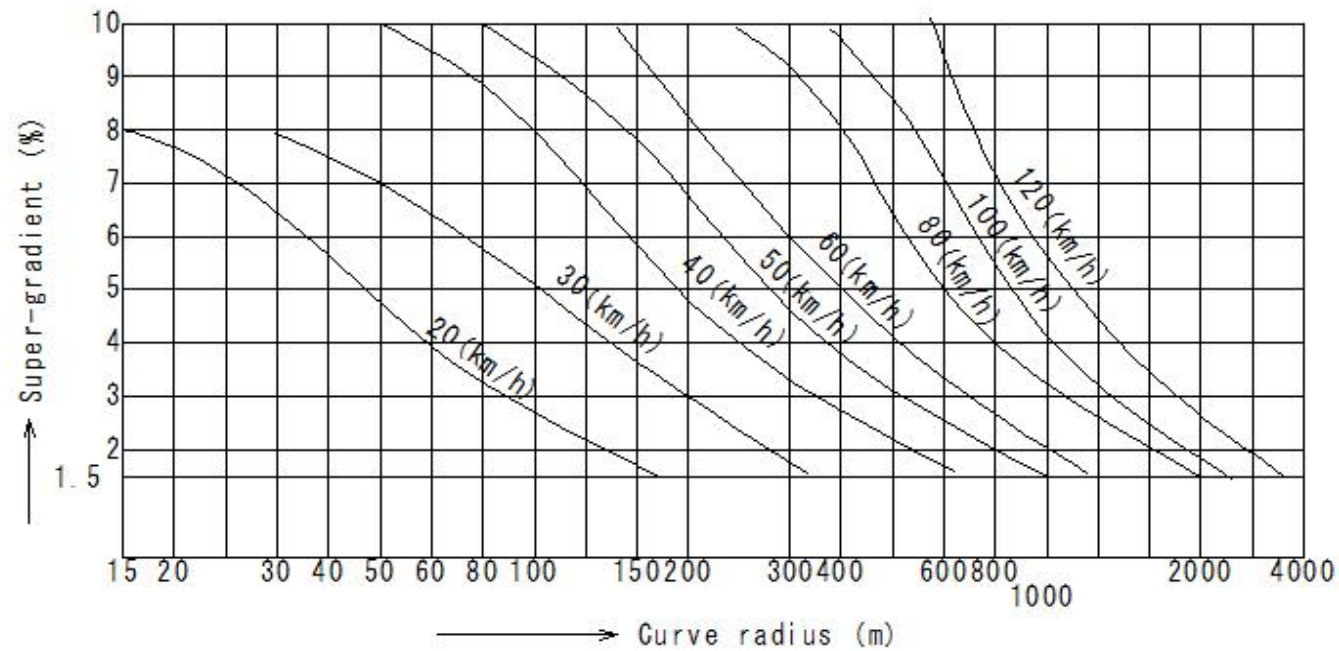


Fig 4-14 Relationship between curve radius and super-gradient

(H706)Road Structure Act(f value in case of exceeding design speed)

(H706)Road Structure Act(f value in case of exceeding design speed)

Road Construction Act

4-6 Super gradient of curved sections

4-6-3 Curve radius and super-gradient value

Table 4-15 f value in case of exceeding design speed

<R=120m, driving speed=60km/h>

Design speed (km/h)	50	40	30	20
i(%)	9	7	4	2
f	0.15	0.17	0.20	0.22

(H707)Road Structure Act(Special value for curve radius and super-gradient in urban areas)

(H707)Road Structure Act(Special value for curve radius and super-gradient in urban areas)

Road Construction Act

4-6 Super gradient of curved sections

4-6-3 Curve radius and super-gradient value

4-6-4 Precautions in case of applying

Table 4-16 Special value for curve radius and super-gradient in urban areas (unit: m)

Design speed (km/h)					Super-gradient (%)
60	50	40	30	20	
-	-	60-63	30-35	15-16	6
-	100-105	63-65	35-37	16-17	5
150-160	105-110	65-70	37-40	17-18	4
160-165	110-115	70-74	40-42	18-19	3
165-220	115-150	74-100	42-55	19-25	2

For standard cross-gradient of 1.5%

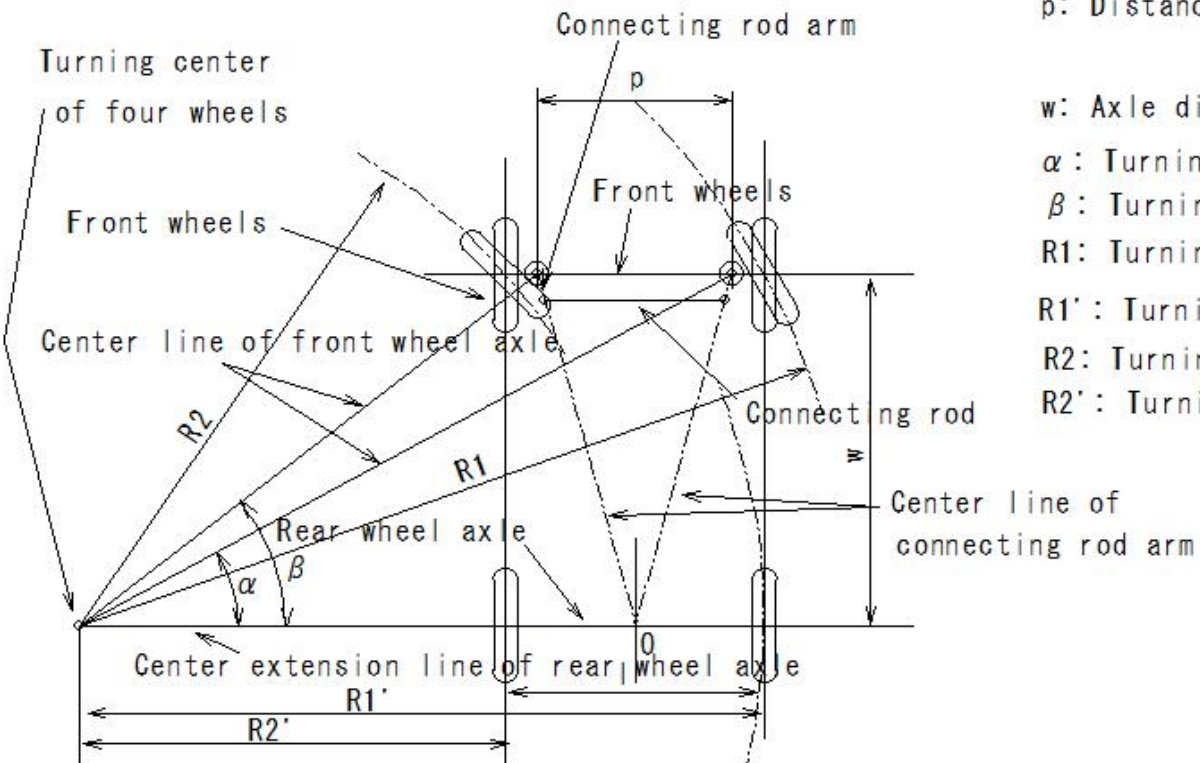
165-170	115-120	74-76	42-43	19-20	2
170-220	120-150	76-100	43-55	20-25	1.5

(H708)Road Structure Act(Widening of curved sections)

(H708)Road Structure Act(Widening of curved sections)

Road Construction Act

4-7 Widening of curved sections



l : Wheel spacing

p : Distance between front wheel turning centers

w : Axle distance

α : Turning angle of outer front wheel

β : Turning angle of inner front wheel

$R1$: Turning radius of outer front wheel

$R1'$: Turning radius of outer rear wheel

$R2$: Turning radius of inner front wheel

$R2'$: Turning radius of inner rear wheel

Fig4-15 Steering operation and turning radius of automobiles

(H710)Road Structure Act(Widening of curved sections)

(H710)Road Structure Act(Widening of curved sections)

Road Structure Act

4-7 Widening of curved sections

4-7-2 Widening of curved sections

Curve radius R (m)

Type 1 Type 2 Type 3 Class 1 Type 4 Class 1	Other roads	Amount of widening (m) (per lane)
150 or more, less than 280	90 or more, less than 160	0.25
100 or more, less than 150	60 or more, less than 90	0.50
70 or more, less than 100	45 or more, less than 60	0.75
50 or more, less than 70	32 or more, less than 45	1.00
	26 or more, less than 32	1.25
	21 or more, less than 26	1.50
	19 or more, less than 21	1.75
	16 or more, less than 19	2.00
	15 or more, less than 16	2.25

(H711)Road Structure Act(Widening of curved sections)

(H711)Road Structure Act(Widening of curved sections)

Road Structure Act

4-7 Widening of curved sections

4-7-2 Widening of curved sections

Maximum vehicle width 2.5m

B: Vehicle running width

Rc: Radius of lane center line

L: Vehicle length

b: Vehicle width

s: Vehicle spacing

a: Wheelbase

Rw: Outer curve radius

Rs: Turning radius of outer front wheel

Ri: Inner curve radius

α : Turning angle of outer front wheel

Uf: Front end overhang

UB: Rear end overhang

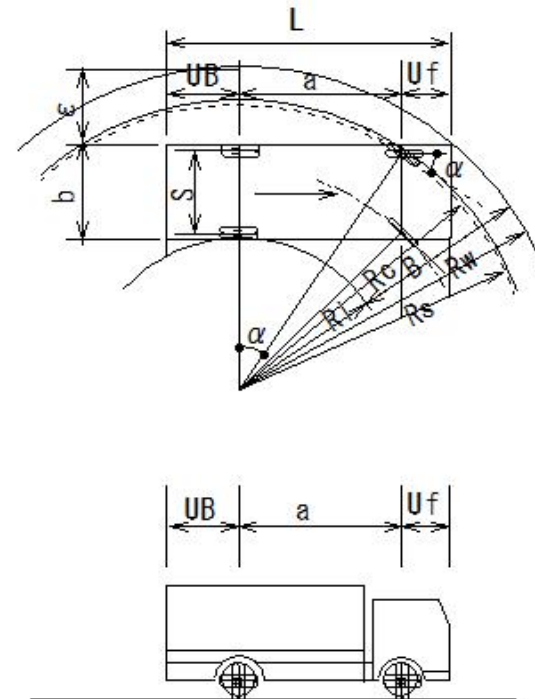


Fig4-17 Widening amount for single cars (ordinary automobiles)

(H712)Road Structure Act(Widening of curved sections)

(H712)Road Structure Act(Widening of curved sections)

Road Structure Act

4-7 Widening of curved sections

4-7-2 Widening of curved sections

B: Vehicle running width

Rc: Radius of lane center line

L: Vehicle length

b: Vehicle width

s: Vehicle spacing

a: Wheelbase

Rw: Outer curve radius

Rs: Turning radius of outer front wheel

Ri: Inner curve radius

α : Turning angle of outer front wheel

Uf: Front end overhang

UB: Rear end overhang

a: Tractor wheelbase (front wheelbase)

a2: Distance from trailer kingpin to rear axle (rear wheelbase)

b2: Trailer width

as: Distance from trailer kingpin to tractor rear axle (offset)

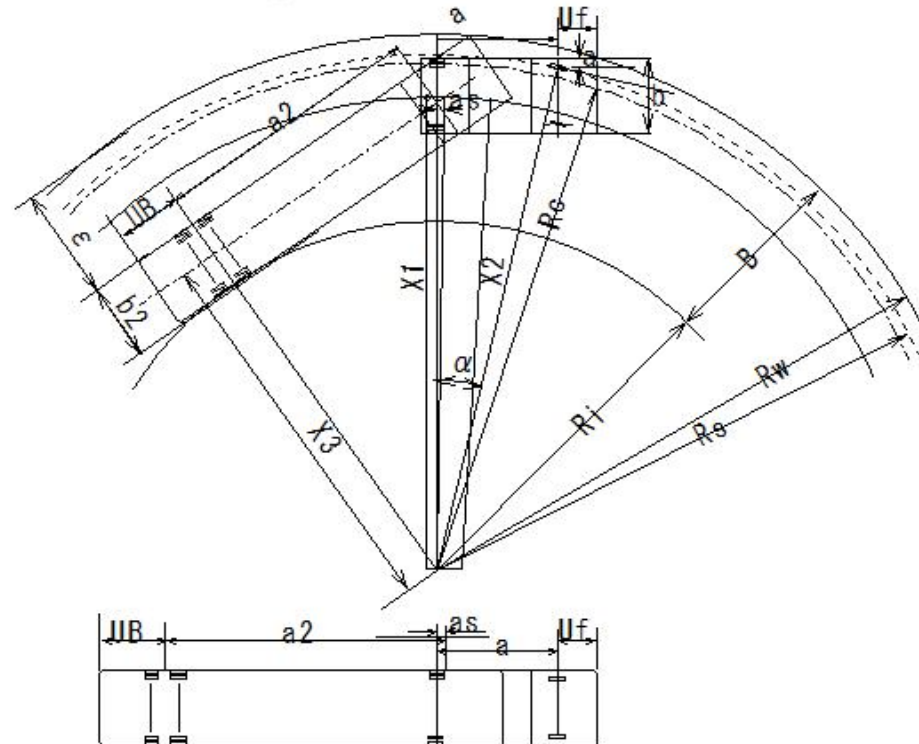


Figure 4-18 Amount of width expansion for semi-trailers

(H713)Road Structure Act(Widening of curved sections)

(H713)Road Structure Act(Widening of curved sections)

Road Structure Act

4-7 Widening of curved sections

4-7-2 Widening of curved sections

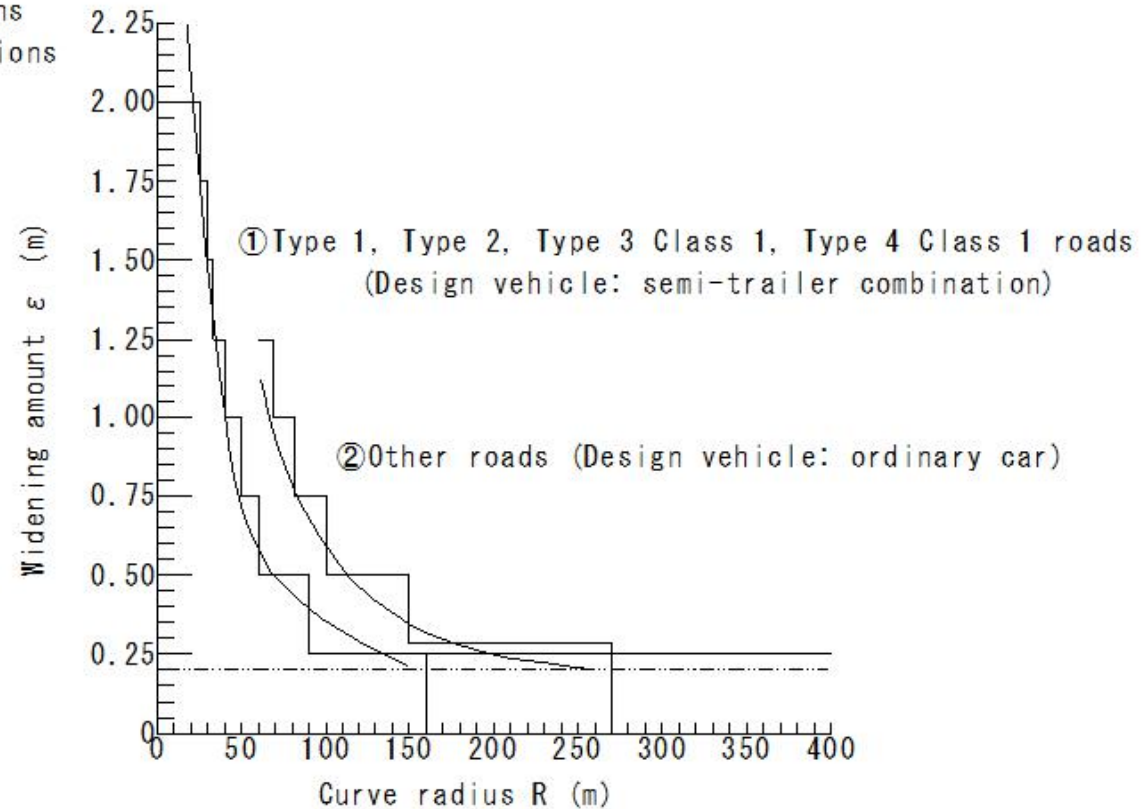


Fig 4-19 Curve radius and widening amount

(H714)Road Structure Act(transition section)

(H714)Road Structure Act(transition section)

Road Structure Act

4-8 Relaxation section

Design speed (unit: kilometers per hour)	Length of Transition section (unit: meters)
V=120km/h	100
100	85
80	70
60	50
50	40
40	35
30	25
20	20

(H715)Road Structure Act(Vehicle's transition driving path)

(H715) Road Structure Act (Vehicle's transition driving path)

Road Structure Act

4-8-2 Vehicle's transition driving path

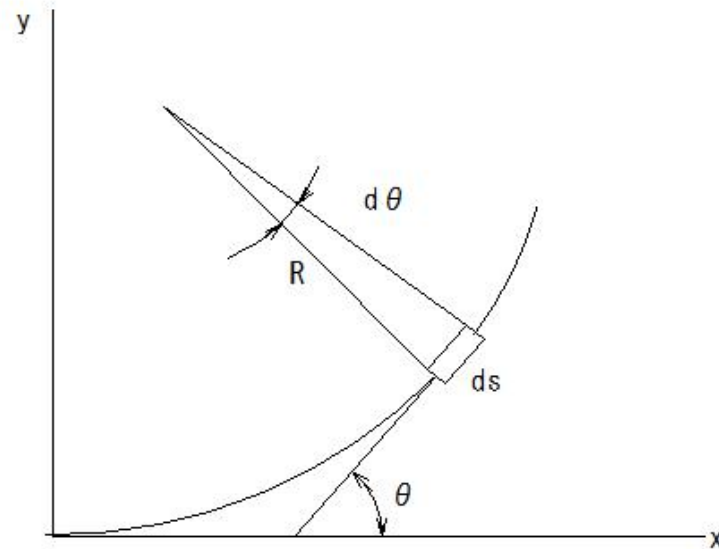


Figure 4-20 Vehicle's transition driving path

(H716)Road Structure Act(Vehicle's transition driving path)

(H716)Road Structure Act(Vehicle's transition driving path)

Road Structure Act

4-8-2 Vehicle's transition driving path

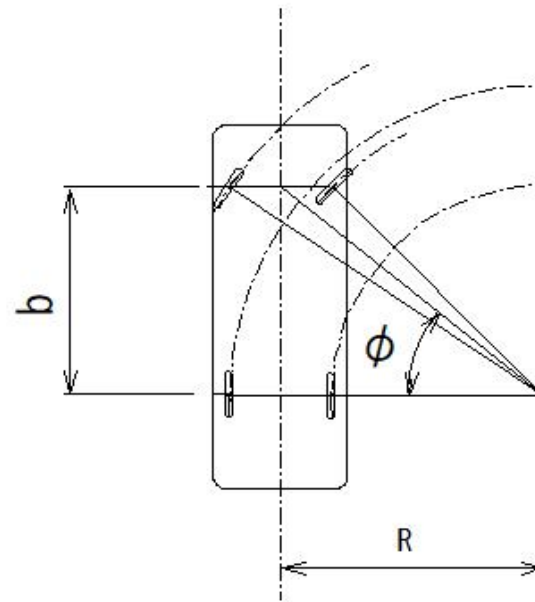


Figure 4-21 Curve radius and transition running path

(H717)Road Structure Act(Vehicle's transition driving path)

(H717)Road Structure Act(Vehicle's transition driving path)

Road Structure Act

4-8-2 Vehicle's transition driving path

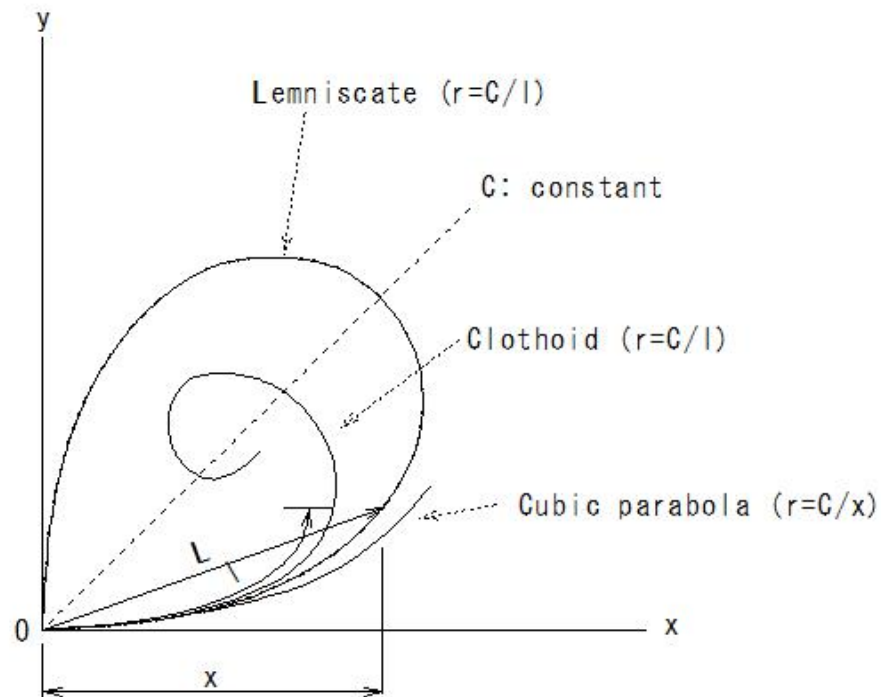


Figure 4-22 Curve similar to the gradual running path

(H718)Road Structure Act(Vehicle's transition driving path)

(H718)Road Structure Act(Vehicle's transition driving path)

Road Structure Act

4-8-2 Vehicle's transition driving path

Fig4-13 Transition Curve Length Calculation Table

(Unit: m)

t (seconds)	Design Speed (km/h) (Unit: m)							
	120	100	80	60	50	40	30	20
2.0	67	56	44	33	28	22	17	11
2.5	83	69	56	42	35	28	21	14
3.0	100	83	67	50	42	33	25	17
3.5	117	97	78	58	49	39	29	19
4.0	133	111	89	67	56	45	33	22
4.5	150	125	100	75	63	50	38	25
5.0	167	137	111	83	69	56	42	29

(H719)Road Structure Act(Vehicle's transition driving path)

(H719)Road Structure Act(Vehicle's transition driving path)

Road Structure Act

4-8-2 Vehicle's transition driving path

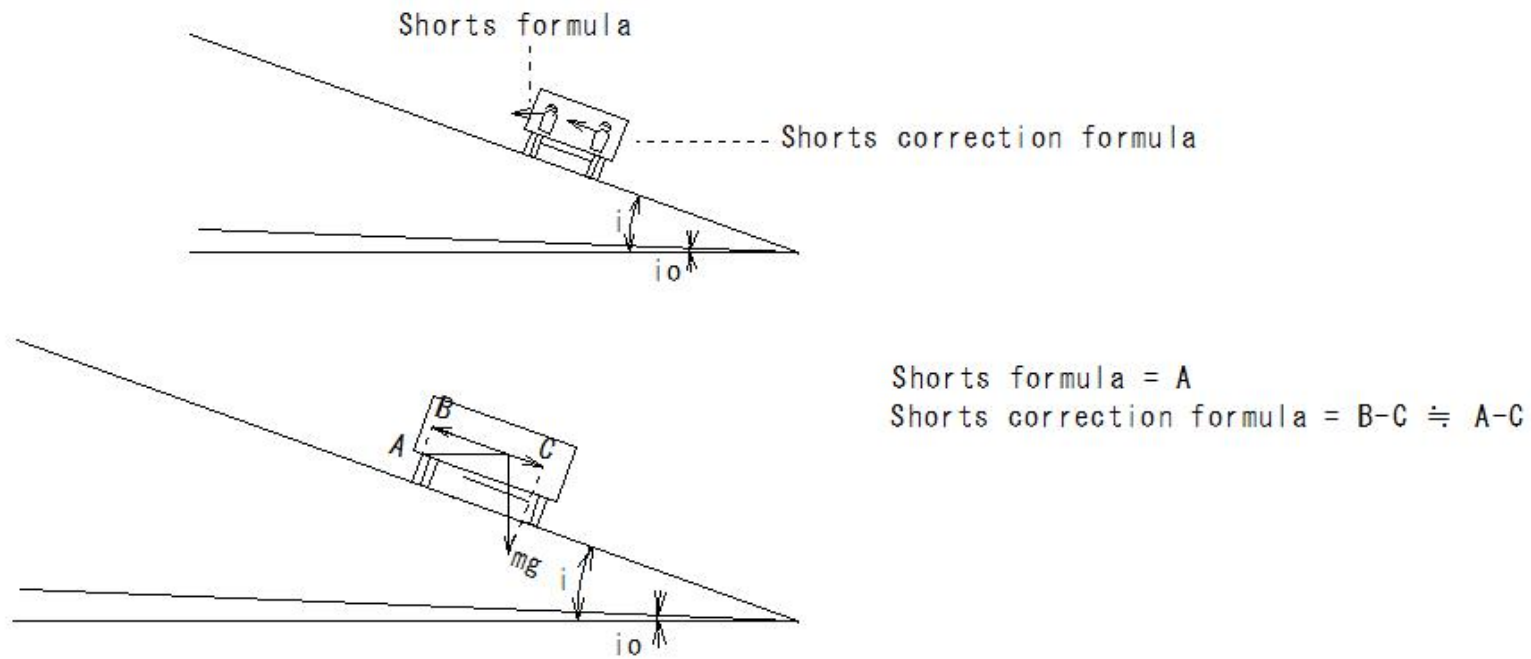


Fig 4-23 Rate of change in centrifugal acceleration

(H720)Road Structure Act(Vehicle's transition driving path)

(H720)Road Structure Act(Vehicle's transition driving path)

Road Structure Act

4-8-2 Vehicle's transition driving path

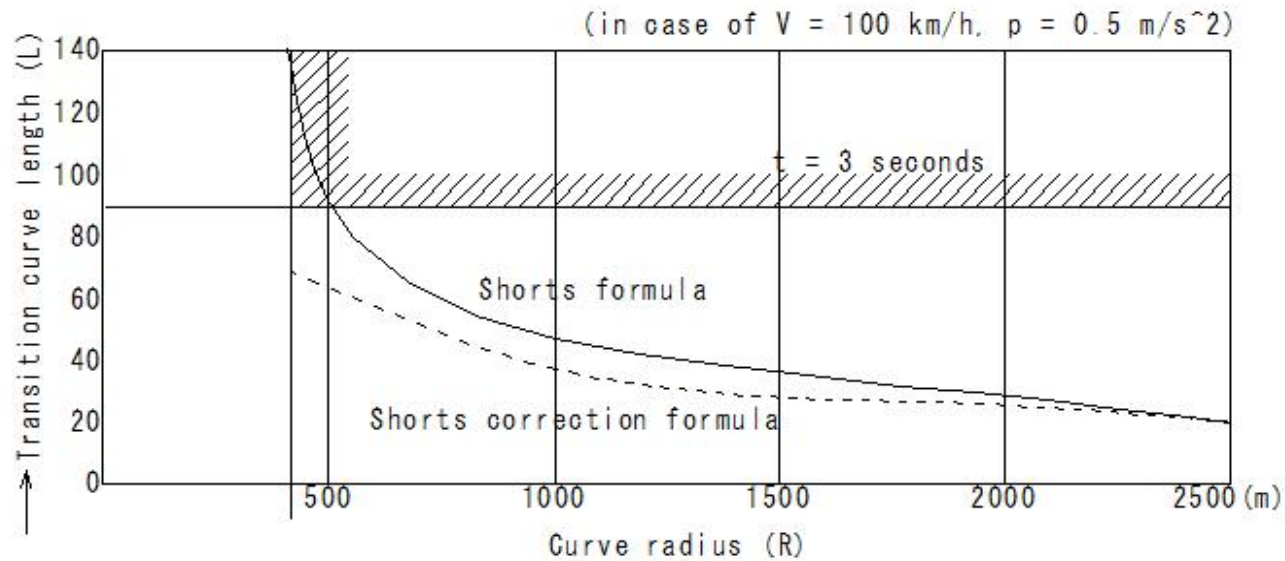


Fig4-24 Circular curve radius and transition curve length

Shorts formula $L \geq (V/3.6)^3 / (p \cdot R) \dots \dots \dots (4-26)$

L: Transition curve length (m)

v: Design speed (m/s)

g: Gravity acceleration 9.8 m/s

i: Super gradient at the end of the transition curve

io: Super gradient at the start of the transition curve

(H721)Road Structure Act(Vehicle's transition driving path)

(H721)Road Structure Act(Vehicle's transition driving path)
 Road Structure Act
 4-8-2 Vehicle's transition driving path

Table 4-19 Length of the transition section and rate of change of centrifugal acceleration (when t = 3 seconds)

V(km/h)	120	100	80	60	50	40	30	20
L(m)	100	85	70	50	40	35	25	20
Rmin of One-way grade(superelevation) 10%	570	380	230	120	80	50	-	-
p for the above minimum radius	0.65-0.32	0.67-0.35	0.68-0.37	0.77-0.45	0.84-0.50	0.78-0.47	-	-
Rmin of One-way grade(superelevation) 8%	630	410	250	140	90	55	30	15
p for the above minimum radius	0.58-0.33	0.62-0.35	0.63-0.39	0.66-0.40	0.74-0.47	0.71-0.46	0.77-0.51	0.57-0.35
Rmin of One-way grade(superelevation) 6%	710	460	280	150	100	60	30	15
p for the above minimum radius	0.52-0.26	0.55-0.26	0.56-0.28	0.62-0.32	0.67-0.36	0.65-0.34	0.77-0.58	0.57-0.40

(H722)Road Structure Act(Vehicle's transition driving path)

(H722)Road Structure Act(Vehicle's transition driving path)

Road Structure Act

4-8-2 Vehicle's transition driving path

Clothoid parameters

Table 4-20 Minimum allowable parameters

Classification	1st and 2nd type		3rd and 4th type	
	① $p=0.35m/s$	② $p=0.5m/s$	③ $p=0.6m/s$	④ $p=0.75m/s$
Design speed (km/h)				
V=120km/h	325	280	-	-
100Km/h	250	210	-	-
80Km/h	180	150	140	-
60Km/h	120	100	90	80
50Km/h	90	75	70	60
40Km/h	70	55	50	40
30Km/h	-	-	35	30
20Km/h	-	-	20	15

①Expressway

②Expressway - minimum value, design speed 80km/h - general national highway

③General national highway with design speed below 80km/h, major local roads

④Mountainous areas, special sections

(H723)Road Structure Act(transition curve)

(H723)Road Structure Act(transition curve)

Road Construction Act

Transition distance of transition curve

4-8-4 Omission of transition curves

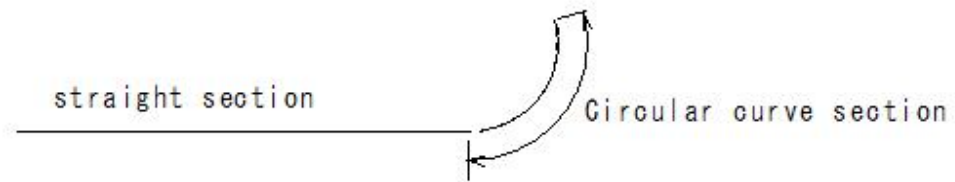
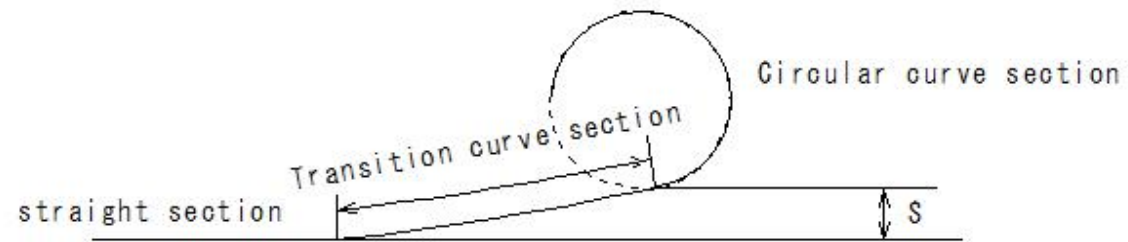


Fig 4-25 Transition distance of transition curve

(H724)Road Structure Act(Transition curves)

(H724)Road Structure Act(Transition curves)

Road Structure Act

Table 4-21 Calculation of limit curve radius

Design speed (km/h)	120	100	80	60	50	40	30	20
Calculated value (m)	2,100	1,450	930	520	360	230	130	58
Round value (m)	2,100	1,500	900	500	350	250	130	60

(H725)Road Structure Act(Transition curves)

(H725)Road Structure Act(Transition curves)

Road Structure Act

4-8-4 Omission of transition curves

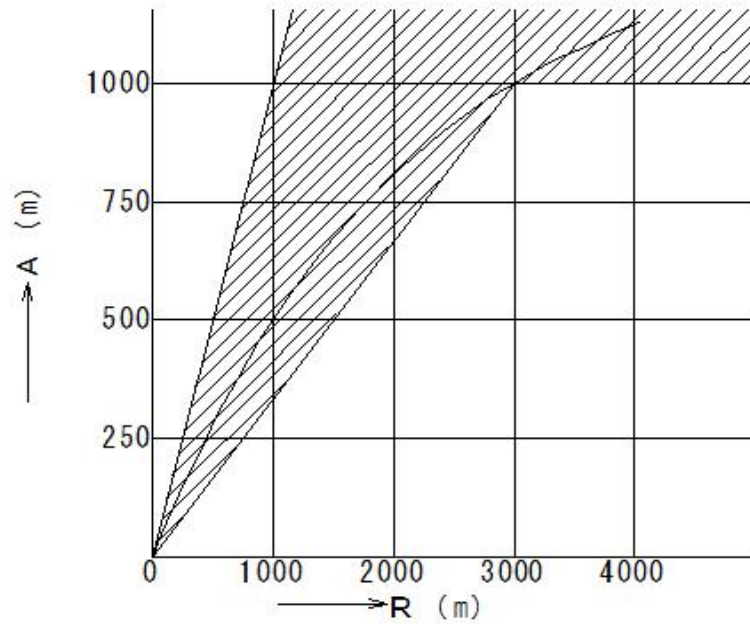


Figure 4-26 Relationship between curve radius and parameters

(H726)Road Structure Act(Transition curves)

(H726)Road Structure Act(Transition curves)

Road Structure Act

4-8-4 Omission of transition curves

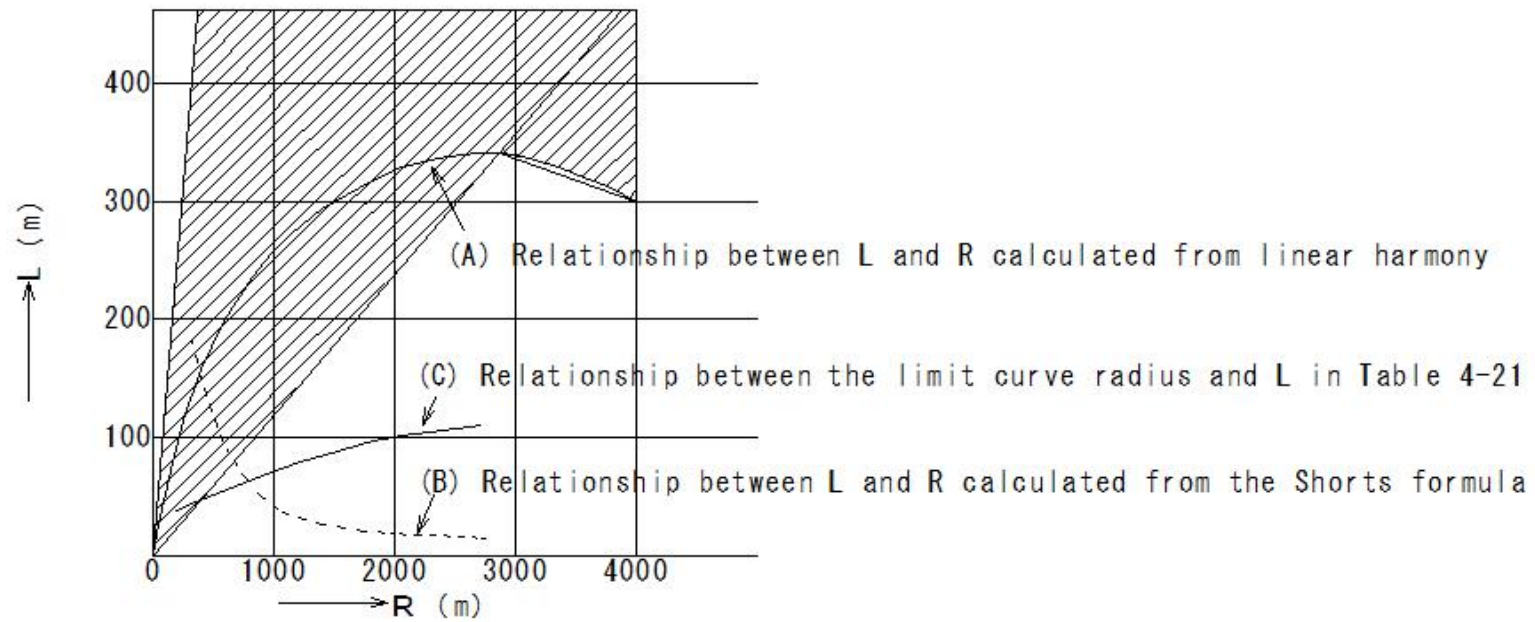


Figure 4-27 Relationship between curve radius and transition curve length

(H727)Road Structure Act(Transition curves)

(H727)Road Structure Act(Transition curves)

Road Structure Act

4-8-4 Omission of transition curves

Table 4-22 Standard limit curve radius (general value)

Design speed (km/h)	120	100	80	60	50	40
Standard limit curve radius (m)	4,000	3,000	2,000	1,000	700	500

(H728)Road Structure Act(Transition curves)

(H728)Road Structure Act(Transition curves)

Road Structure Act

4-8-4 Omission of transition curves

Table 4-23 Value of α for design speed

Design speed (km/h)	Value of α			
	① $p=0.35\text{m/s}$	② $p=0.5\text{m/s}$	③ $p=0.6\text{m/s}$	④ $p=0.75\text{m/s}$
V=120km/h	0.598×10^{-3}	0.759×10^{-3}	0.857×10^{-3}	0.994×10^{-3}
100Km/h	0.862×10^{-3}	1.093×10^{-3}	1.234×10^{-3}	1.432×10^{-3}
80Km/h	1.347×10^{-3}	1.708×10^{-3}	1.929×10^{-3}	2.463×10^{-3}
60Km/h	2.394×10^{-3}	3.036×10^{-3}	3.429×10^{-3}	3.978×10^{-3}
50Km/h	3.447×10^{-3}	4.372×10^{-3}	4.937×10^{-3}	5.720×10^{-3}
40Km/h	5.386×10^{-3}	6.832×10^{-3}	7.715×10^{-3}	8.952×10^{-3}
30Km/h	9.575×10^{-3}	12.15×10^{-3}	13.72×10^{-3}	15.92×10^{-3}
20Km/h	21.54×10^{-3}	27.33×10^{-3}	30.86×10^{-3}	35.81×10^{-3}

$$R < r / (1 - \alpha \cdot r) \dots \dots \dots (4-29)$$

R: Radius of large circle (m)

V:

p: Rate of change of centrifugal acceleration (m/s³)

r: Radius of small circle (m)

S: Distance traveled

(H729)Road Structure Act(Transition curves)

(H729)Road Structure Act(Transition curves)

Road Structure Act

4-8-4 Omission of transition curves

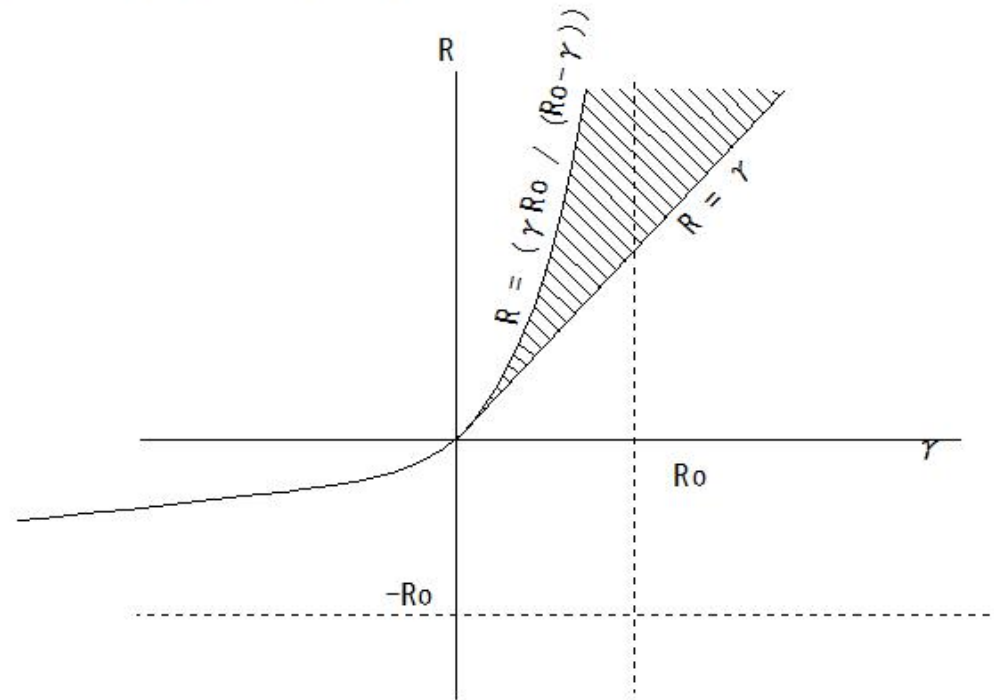


Figure 4-28 Relationship between transition curve and limit curve radius

(H730)Road Structure Act(Transition curves)

(H730)Road Structure Act(Transition curves)

Road Structure Act

4-8-4 Omission of transition curves

Table 4-24 Upper limit of radius R of great circle (unit:m)

Design speed (km/h)	Curve radius (m)	Formula (4-29)				Formula (4-30)
		p=0.35	p=0.5	p=0.6	p=0.75	
V=120km/h	630	1,010	1,207	1,369	1,685	900
100Km/h	410	634	743	830	993	572
80Km/h	250	377	436	483	563	342
60Km/h	140	211	243	269	316	192
50Km/h	90	130	148	162	186	120
40Km/h	55	78	88	96	108	72
30Km/h	30	42	47	51	57	39
20Km/h	15	22	25	28	32	20

(H731)Road Structure Act(One-way grade(superelevation), widening)

(H731)Road Structure Act(One-way grade(superelevation), widening)

Road Structure Act

4-9 Sliding in case of One-way grade(superelevation), widening, etc.

Design speed V (km/h)	Sliding ratio of One-way grade(superelevation)
V=120km/h	1/200
100Km/h	1/175
80Km/h	1/150
60Km/h	1/125
50Km/h	1/115
40Km/h	1/100
30Km/h	1/75
20Km/h	1/50

(H732)Road Structure Act(One-way grade(superelevation), widening)

(H732)Road Structure Act(One-way grade(superelevation), widening)

Road Structure Act

4-9 Sliding in case of One-way grade(superelevation), widening, etc.

4-9-1 How to set One-way grade(superelevation)

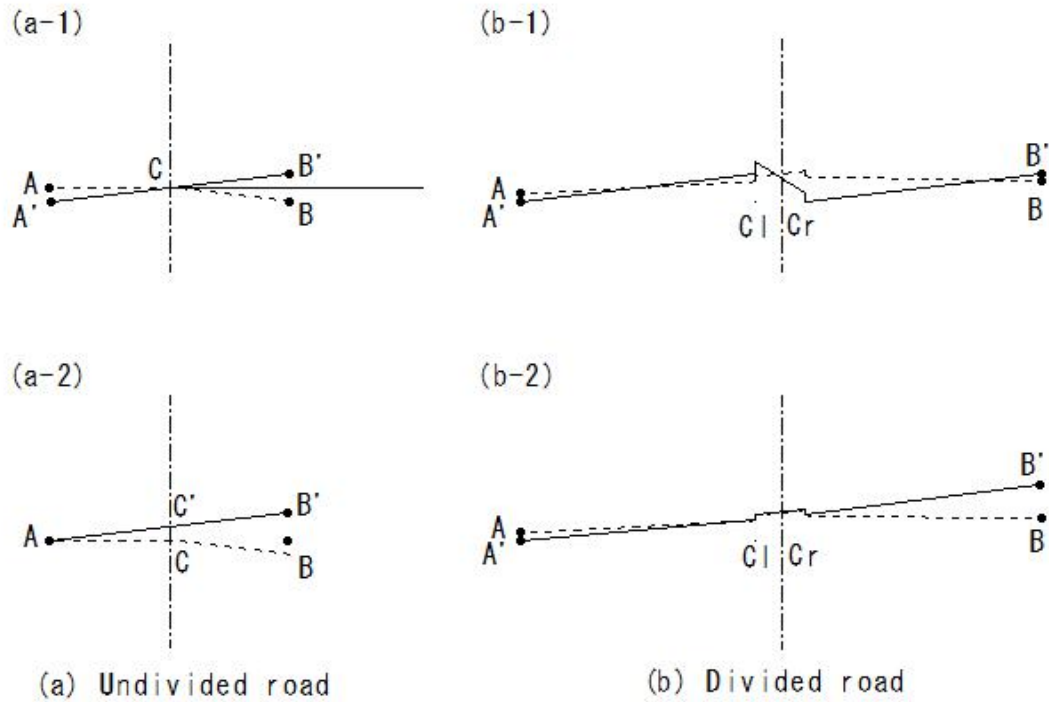


Fig 4-29 How to set One-way grade(superelevation)

(H733)Road Structure Act(One-way grade(superelevation), widening)

(H733)Road Structure Act(One-way grade(superelevation), widening)

Road Structure Act

4-9 Sliding in case of One-way grade(superelevation), widening, etc.

4-9-1 How to set One-way grade(superelevation)

Table 4-25 Comparison of national regulations

Design speed V (km/h)	120	110	100	80	60	50	remarks
AASHTO	-	1/250	1/225	1/200	1/175	1/150	The center line of the roadway of a 2-lane road is used as the reference line
RAL	-	-	1/200	1/200	1/100	1/100	The same as above is used as the standard
Japan (recommended)	1/200	-	1/175	1/150	1/125	1/115	No regulations on where to place the reference line
AASHTO	-	1/190	1/170	1/150	1/130	1/110	The center line of the roadway of a 4-lane road is used as the reference line

In AASHTO, the grading length for pavements with 2 or more lanes is as follows

3-lane road: 1.2 times the grading length of a 2-lane road

4-lane road: 1.5 times the grading length of a 2-lane road

6-lane road: 2.0 times the grading length of a 2-lane road

(H734)Road Structure Act(One-way grade(superelevation), widening)

(H734)Road Structure Act(One-way grade(superelevation), widening)

Road Structure Act

4-9 Sliding in case of One-way grade(superelevation), widening, etc.

4-9-1 How to set One-way grade(superelevation)

Table 4-26 Turning angular velocity and rising speed of roadway line (when 1 lane width = 3.5m)

Design speed V (km/h)	Sliding ratio q (m/m)	Rotational speed ω (rad/s)		Rising speed of the roadway edge (m/s)
		Position of the turning axis		
		Position of the 2nd lane	Outside of the 2nd lane (inner edge)	
V=120km/h	1/200	0.048	0.024	0.166
100Km/h	1/175	0.045	0.023	0.159
80Km/h	1/150	0.042	0.021	0.148
60Km/h	1/125	0.038	0.019	0.134
50Km/h	1/115	0.035	0.017	0.121
40Km/h	1/100	0.032	0.016	0.111
30Km/h	1/75	0.032	0.016	0.111
20Km/h	1/50	0.032	0.016	0.111

(H736)Road Structure Act(One-way grade(superelevation), widening)

(H736)Road Structure Act(One-way grade(superelevation), widening)

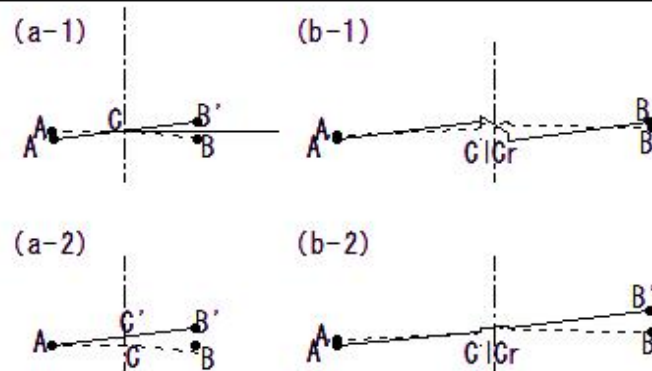
Road Structure Act

4-9 Sliding in case of One-way grade(superelevation), widening, etc.

4-9-1 How to set One-way grade(superelevation)

Alignment of linearity and One-way grade(superelevation)

Classification	Areas where roads exist	Maximum side slope (%)	
Type 1, 2, 3	Snowy and cold regions	Areas with high snowfall and cold	6
		Other regions	8
	Other regions	10	
Type 4		6	



(a) Undivided road (b) Divided road

Fig4-30 Example of One-way grade(superelevation) installation

H732

H502

(H737)Road Structure Act(One-way grade(superelevation), widening)

(H737)Road Structure Act(One-way grade(superelevation), widening)

Road Structure Act

4-9 Sliding in case of One-way grade(superelevation), widening, etc.

4-9-1 How to set One-way grade(superelevation)

Alignment and One-way grade(superelevation) fitting

a: Straight line - transition curve - circular curve (in case of $L_s \leq 40m$)

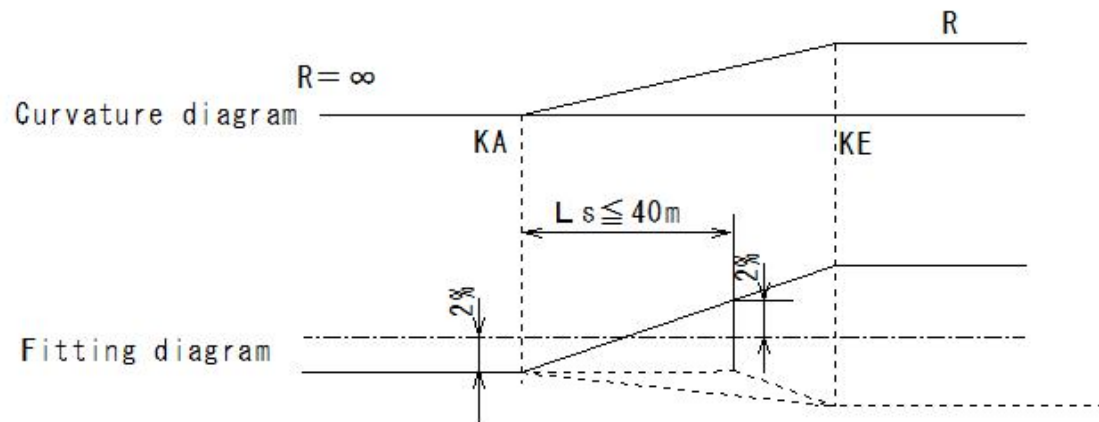
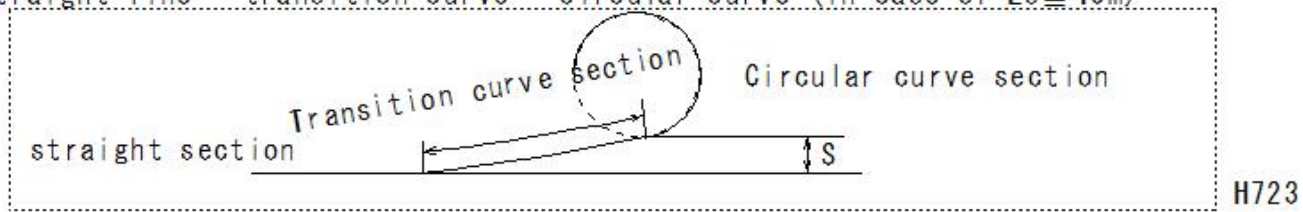


Figure 4-31 (a) Example of One-way grade(superelevation) installation

(H738)Road Structure Act(One-way grade(superelevation), widening)

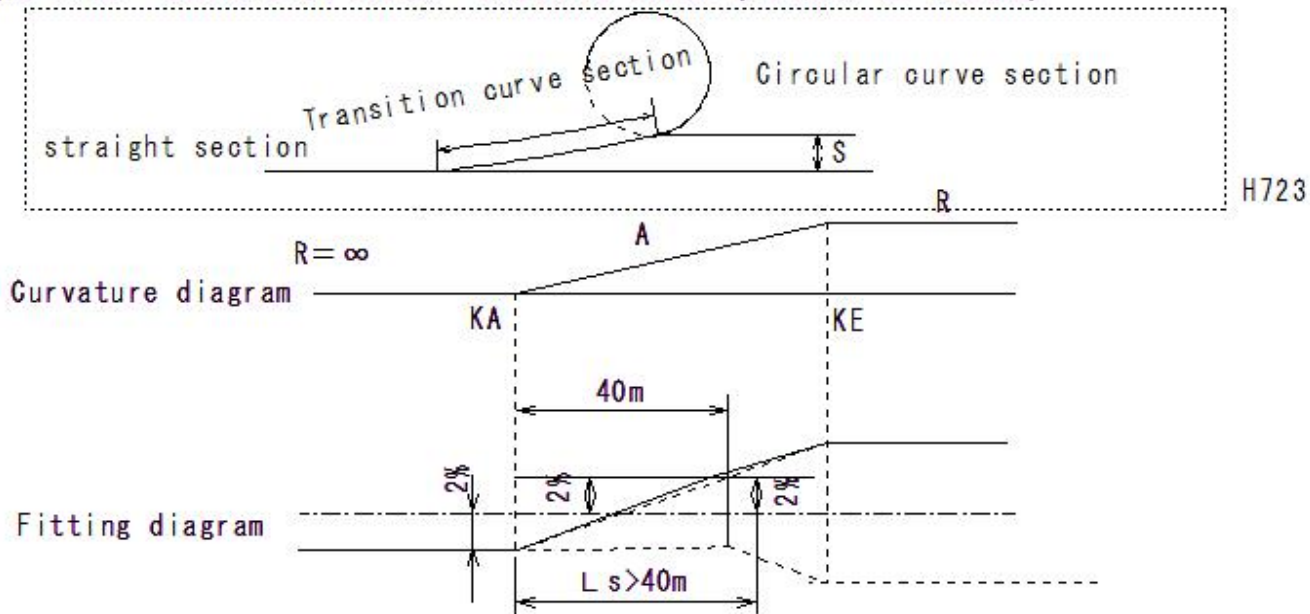
(H738)Road Structure Act(One-way grade(superelevation), widening)
Road Structure Act

4-9 Sliding in case of One-way grade(superelevation), widening, etc.

4-9-1 How to set One-way grade(superelevation)

Alignment and One-way grade(superelevation) fitting

b: Straight line - transition curve - circular curve (in case of $L_s > 40m$)



b: Straight line - transition curve - circular curve (in case of $L_s > 40m$)

Figure 4-31 (b) Example of One-way grade(superelevation) installation

(H739)Road Structure Act(One-way grade(superelevation), widening)

(H739) Road Structure Act (One-way grade (superelevation), widening)

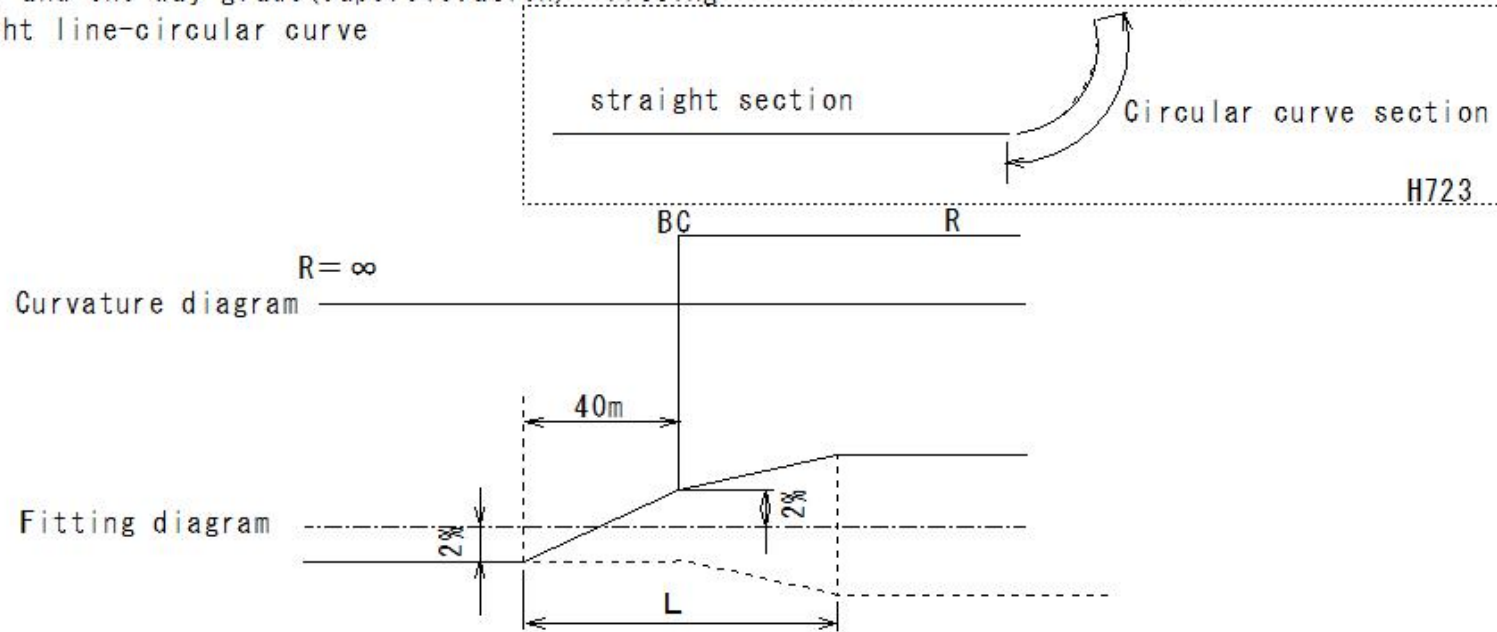
Road Structure Act

4-9 Sliding in case of One-way grade (superelevation), widening, etc.

4-9-1 How to set One-way grade (superelevation)

Alignment and One-way grade (superelevation) fitting

c: Straight line-circular curve



c: Straight line-circular curve

Figure 4-31 (c) Example of One-way grade (superelevation) installation

(H740)Road Structure Act(One-way grade(superelevation), widening)

(H740)Road Structure Act(One-way grade(superelevation), widening)

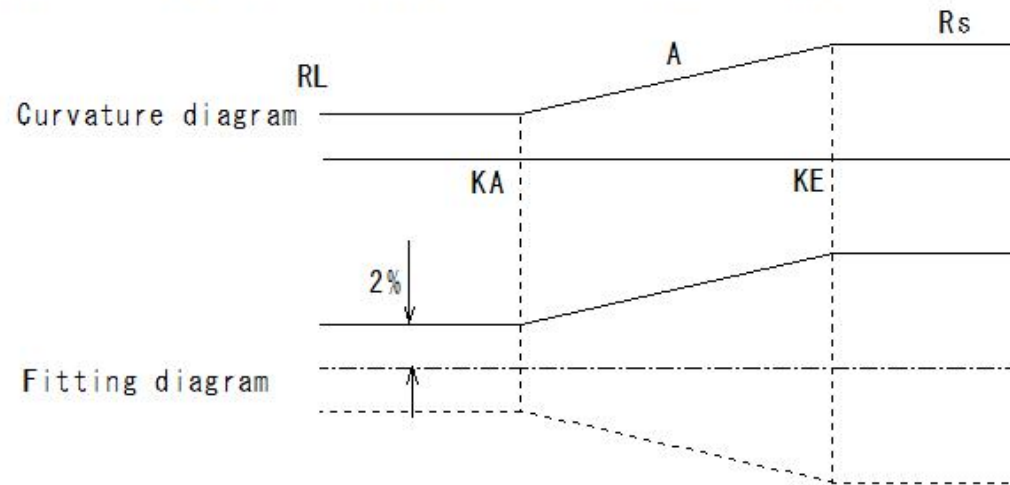
Road Structure Act

4-9 Sliding in case of One-way grade(superelevation), widening, etc.

4-9-1 How to set One-way grade(superelevation)

Alignment and One-way grade(superelevation) fitting

d: Large circle - egg-shaped transition curve - small circle



d: Large circle - egg-shaped transition curve - small circle

Figure 4-31 (d) Example of One-way grade(superelevation) installation

(H741)Road Structure Act(One-way grade(superelevation), widening)

(H741)Road Structure Act(One-way grade(superelevation), widening)

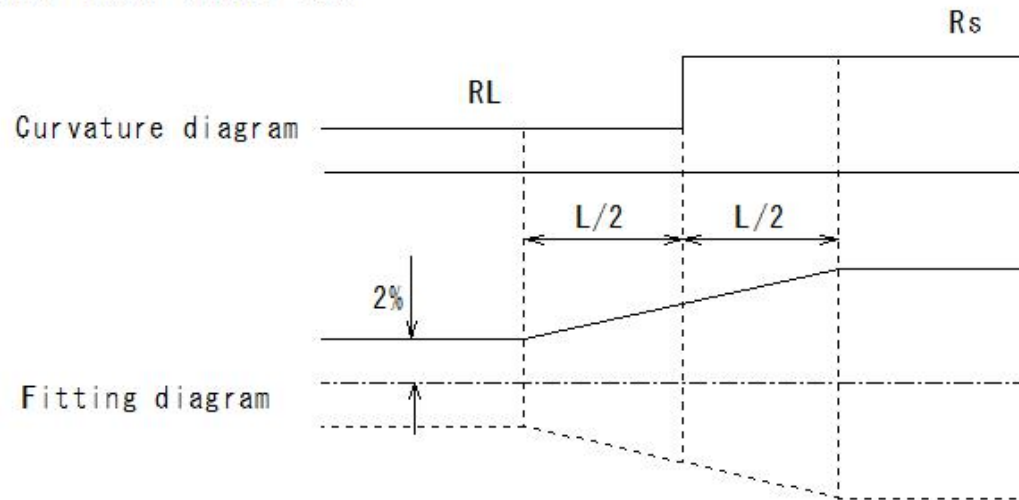
Road Structure Act

4-9 Sliding in case of One-way grade(superelevation), widening, etc.

4-9-1 How to set One-way grade(superelevation)

Alignment and One-way grade(superelevation) fitting

e: Large circle-small circle case



e: Large circle-small circle case

Figure 4-31 Example of One-way grade(superelevation) installation

(H742)Road Structure Act(One-way grade(superelevation), widening)

(H742)Road Structure Act(One-way grade(superelevation), widening)

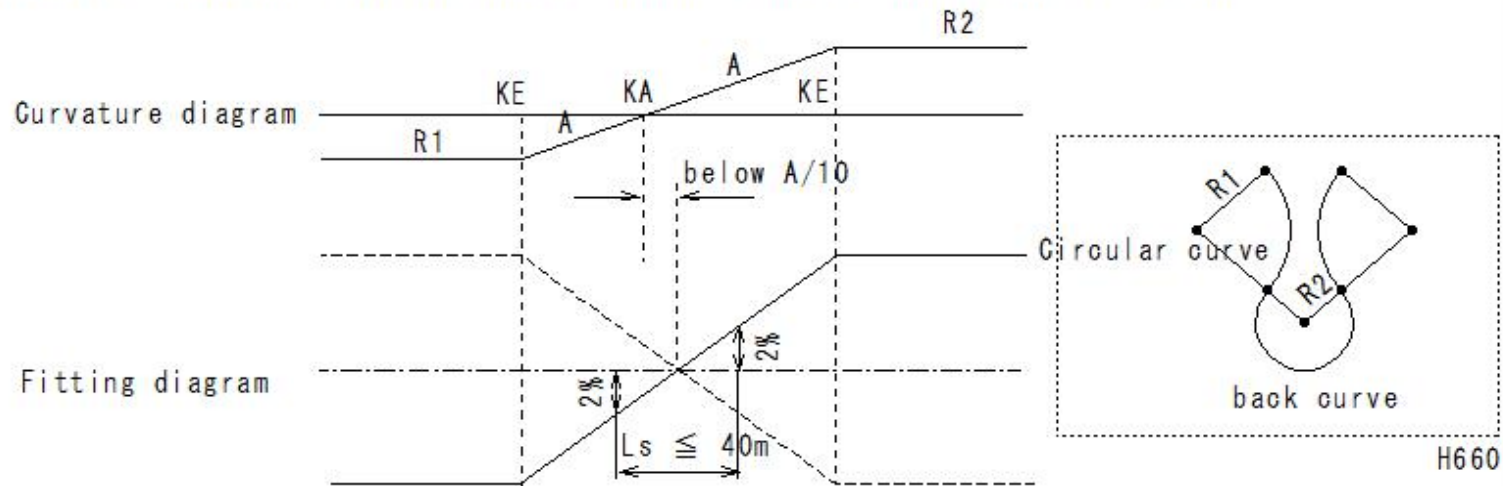
Road Structure Act

4-9 Sliding in case of One-way grade(superelevation), widening, etc.

4-9-1 How to set One-way grade(superelevation)

Alignment and One-way grade(superelevation) fitting

f: Circular curve - back-up transition curve - circular curve (in case of $L_s \leq 40m$)



f: Circular curve - back-up transition curve - circular curve (in case of $L_s \leq 40m$)

Figure 4-31 (d) Example of One-way grade(superelevation) installation

(H743)Road Structure Act(One-way grade(superelevation), widening)

(H743)Road Structure Act(One-way grade(superelevation), widening)

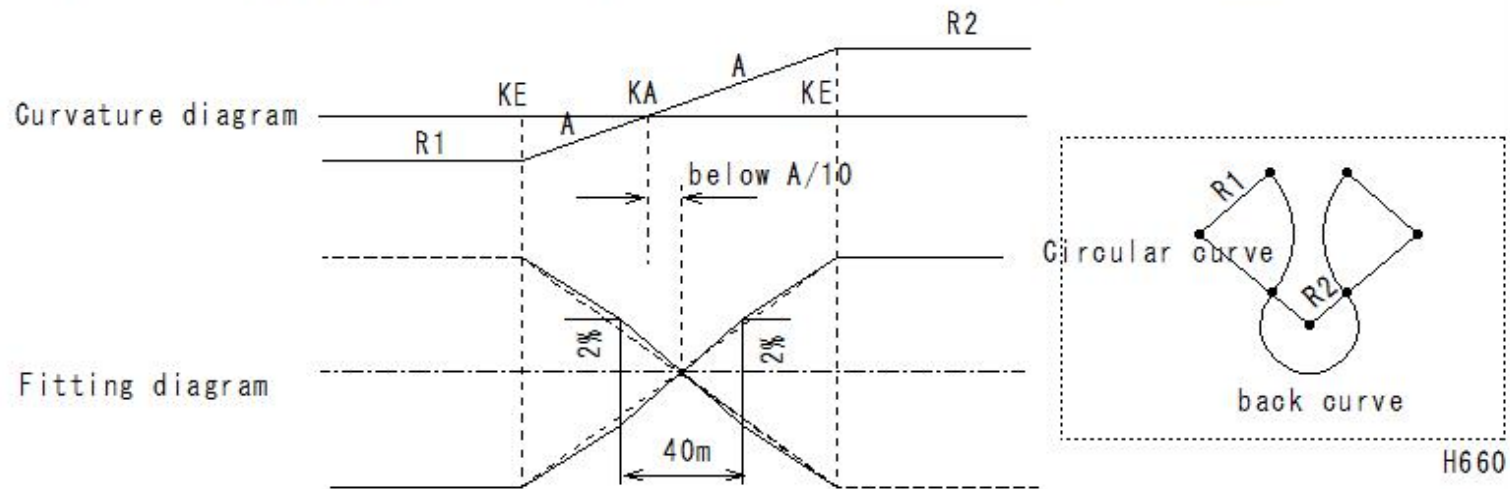
Road Structure Act

4-9 Sliding in case of One-way grade(superelevation), widening, etc.

4-9-1 How to set One-way grade(superelevation)

Alignment and One-way grade(superelevation) fitting

g: Circular curve - back-sloping transition curve - circular curve (in case of $L_s > 40m$)



g: Circular curve - back-sloping transition curve - circular curve (in case of $L_s > 40m$)

Figure 4-31 Example of One-way grade(superelevation) installation

(H744)Road Structure Act(Size of buffer vertical curve)

(H744)Road Structure Act(Size of buffer vertical curve)

Road Structure Act

4-9 Sliding in case of One-way grade(superelevation), widening, etc.

4-9-1 How to set One-way grade(superelevation)

Table 4-27 Size of buffer vertical curve

Design speed (km/h)	Curve radius K (m)	Curve length l (m)
V=120km/h	5,000	5000q
100Km/h	4,000	4000q
80Km/h	3,000	3000q
60Km/h	2,500	2500q
50Km/h	2,000	2000q

K: Constant or curve radius of quadratic parabola (m)

(See 4-13 Vertical curve)

q: Algebraic difference in gradient at bending point (m/m) = friction ratio

l: Buffer vertical curve length (m) = K q

(H745)Road Structure Act(Buffer vertical curve)

(H745)Road Structure Act(Buffer vertical curve)

Road Structure Act

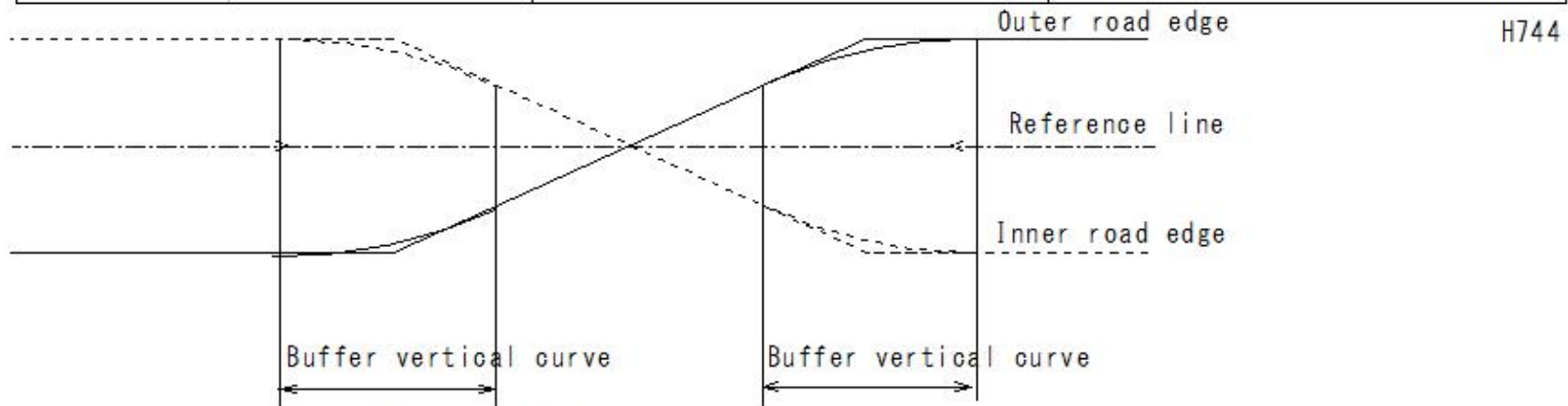
4-9 Sliding in case of One-way grade(superelevation), widening, etc.

4-9-1 How to set One-way grade(superelevation)

Alignment and One-way grade(superelevation) fitting

Table 4-27 Size of buffer vertical curve

Design speed (km/h)	Curve radius K (m)	Curve length l (m)
V=120km/h	5000	5000q
100Km/h	4000	4000q
80Km/h	3000	3000q
60Km/h	2500	2500q
50Km/h	2000	2000q



H744

Figure 4-32 Buffer vertical curve

(H746)Road Structure Act(Buffer vertical curve)

(H746)Road Structure Act(Buffer vertical curve)

Road Structure Act

4-9 Sliding in case of One-way grade(superelevation), widening, etc.

4-9-1 How to set One-way grade(superelevation)

Alignment and One-way grade(superelevation) fitting

Figure 4-33 Applying a one-sided slope on a longitudinal curve

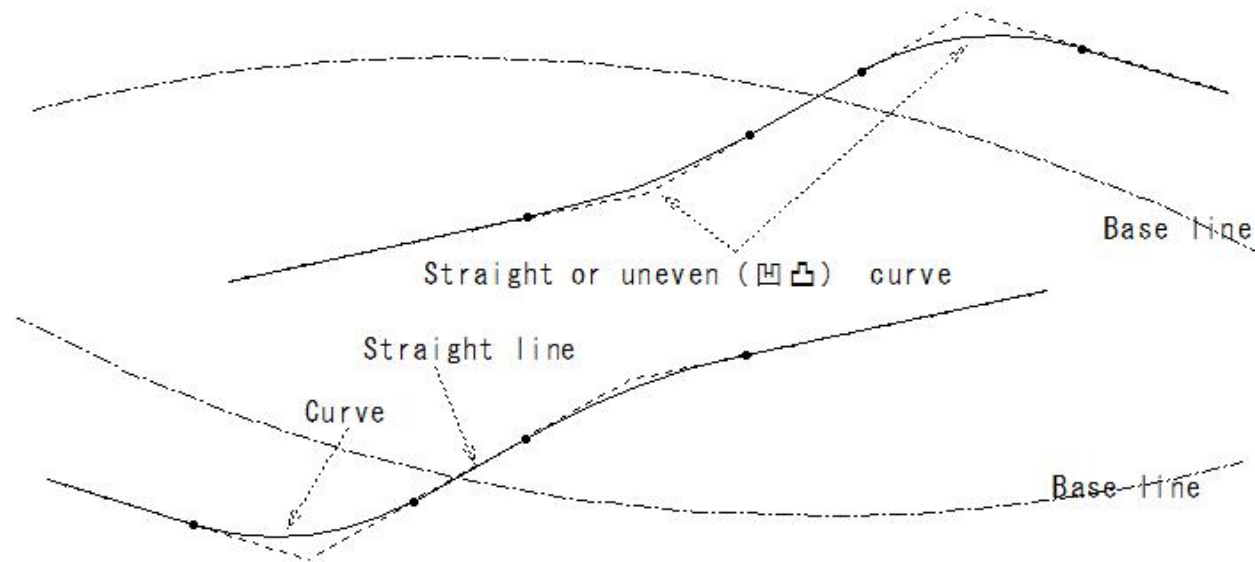


Figure 4-33 Applying a one-sided slope on a longitudinal curve

(H747)Road Structure Act(Widening adjustment)

(H747)Road Structure Act(Widening adjustment)

Road Structure Act

4-9 Sliding in case of One-way grade(superelevation), widening, etc.

4-9-2 Widening adjustment

Figure 4-34 Adjustment by transition curve

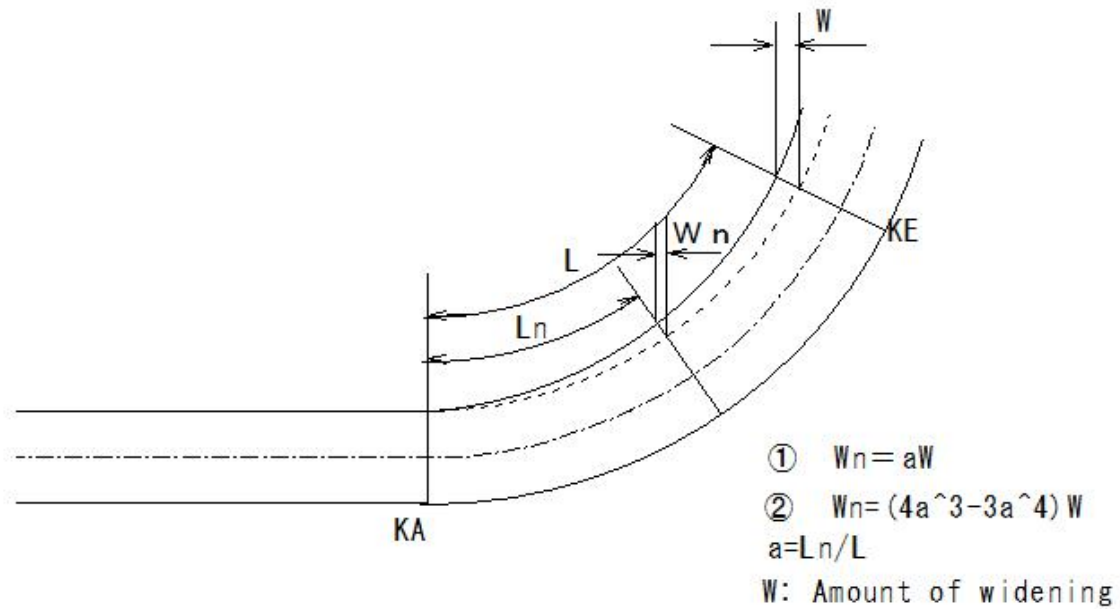


Figure 4-34 Adjustment by transition curve

(H748)Road Structure Act(Adjustment by transition tangent)

(H748)Road Structure Act(Adjustment by transition tangent)

Road Structure Act

4-9 Sliding in case of One-way grade(superelevation), widening, etc.

4-9-2 Widening adjustment

Figure 4-35 Adjustment by transition tangent

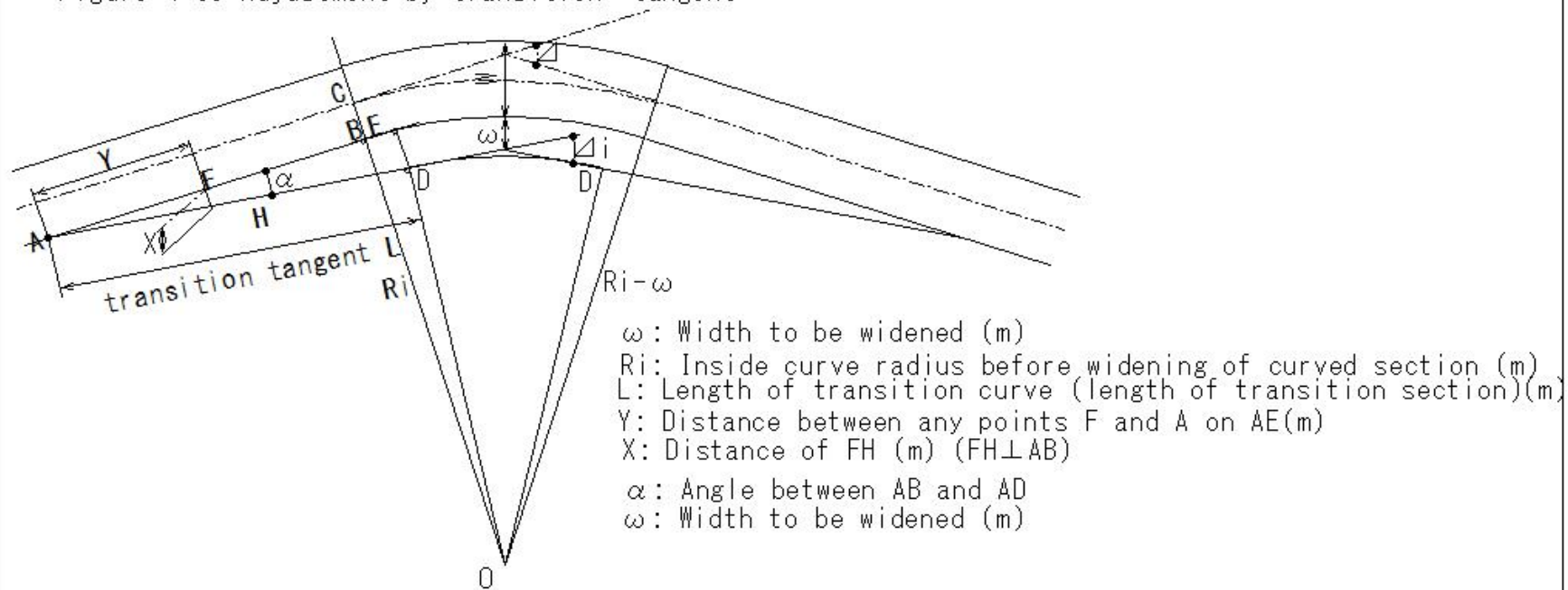


Figure 4-35 Adjustment by transition tangent

(H749)Road Structure Act(Stretching in case of the number of lanes increases or decreases)

(H749)Road Structure Act(Stretching in case of the number of lanes increases or decreases)

Road Structure Act

4-9 Sliding in case of One-way grade(superelevation), widening, etc.

4-9-3 Stretching in case of the number of lanes increases or decreases

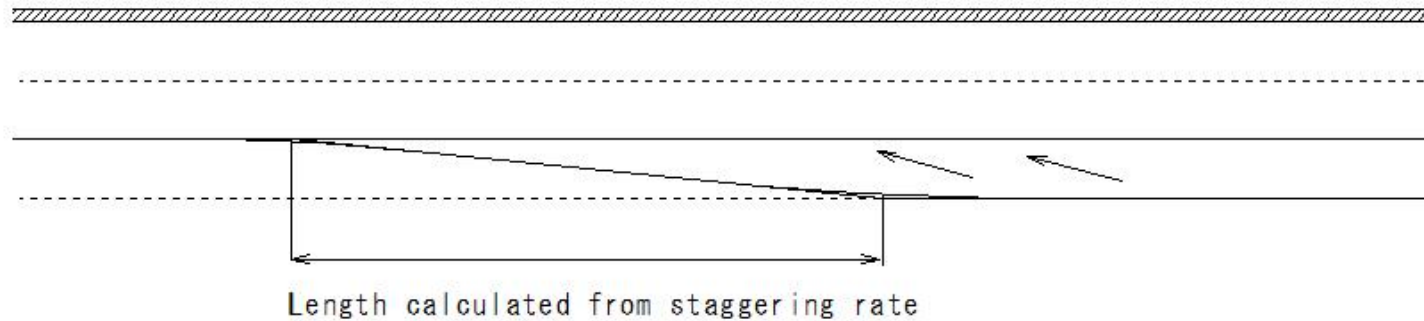


Figure 4-36 Staggering in case of the number of lanes increases or decreases

(H750)Road Structure Act(Stretching in case of the number of lanes increases or decreases)

(H750)Road Structure Act(Stretching in case of the number of lanes increases or decreases)

Road Structure Act

4-9 Sliding in case of One-way grade(superelevation), widening, etc.

4-9-3 Stretching in case of the number of lanes increases or decreases

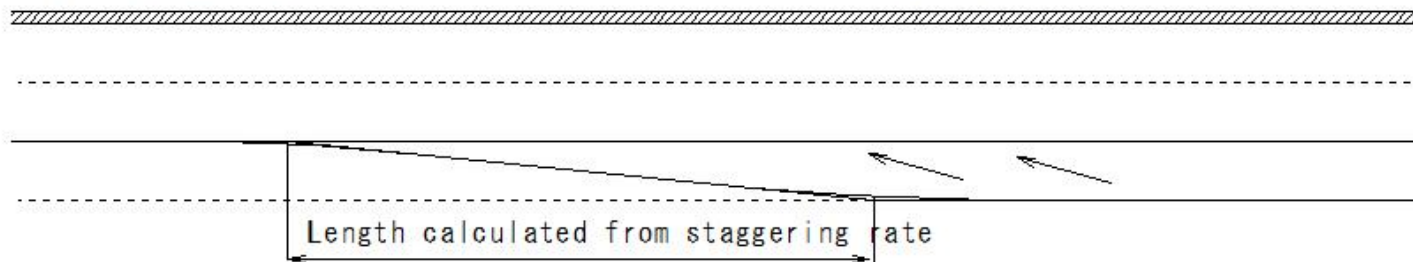


Figure 4-36 Staggering in case of the number of lanes increases or decreases

Table 4-28 Standard values for friction ratio

Design speed (km/h)	Standard values for friction ratio	
	Rural areas	Urban areas
120	1/70	-
100	1/60	-
80	1/50	1/40
60	1/40	1/30
50	1/30	1/25
40	1/25	1/20
30	1/20	1/15
20	1/15	1/10

(H751)Road Structure Act(Braking and stopping distance and overtaking sight distance)

(H751)Road Structure Act(Braking and stopping distance and overtaking sight distance)

Road Structure Act

4-10 Braking and stopping distance and overtaking sight distance

Design speed (unit: kilometers per hour)	Sight distance (unit: meters)
120	210
100	160
80	110
60	75
50	55
40	40
30	30
20	20

(H752)Road Structure Act(Braking and stopping distance and overtaking sight distance)

(H752)Road Structure Act(Braking and stopping distance and overtaking sight distance)

Road Structure Act

4-10 Braking and stopping distance and overtaking sight distance

4-10-1 International comparison of regulations regarding driver's eye height
and object height

Table 4-29 International comparison of regulations regarding driver's eye height
and object height

	Driver's eye height (m)	Object height (m)
Austria	1.14	0.23
West Germany	1.0	0
Finland	-	0
Finland (special exception)	-	0.1
France	1.0	0.15
Italy	-	-
Netherlands	-	-
England	1.05	1.05
USA (stop)	1.14	0.15
USA (overtaking)	1.14	1.37

(H753)Road Structure Act(Sight distance)

(H753)Road Structure Act(Sight distance)

Road Structure Act

4-10 Braking and stopping distance and overtaking sight distance

4-10-1 International comparison of regulations regarding driver's eye height and object height

Fig4-37 Ensuring sight distance

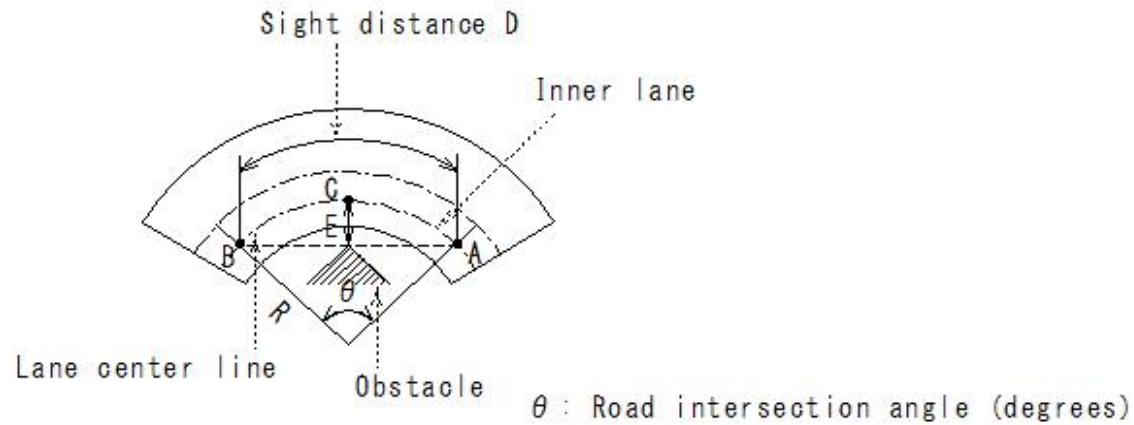


Fig4-37 Ensuring sight distance

(H754)Road Structure Act(Braking stopping distance on wet road surface)

(H754)Road Structure Act(Braking stopping distance on wet road surface)

Road Structure Act

4-10 Braking and stopping distance and overtaking sight distance

4-10-2 Sight distance calculation

Table 4-31 Braking stopping distance on wet road surface

Design speed V (km/h)	Traveling speed (km/h)	f	$0.694V$	$0.00394V^2$	D(m)	Standard value (m)
120km/h	102	0.29	70.7	141.3	212.0	210
100Km/h	85	0.30	58.9	94.8	153.7	160
80Km/h	68	0.31	47.1	58.7	105.8	110
60Km/h	54	0.33	37.4	34.8	72.2	75
50Km/h	45	0.35	31.2	22.8	54.0	55
40Km/h	36	0.38	24.9	13.4	38.3	40
30Km/h	30	0.44	20.8	8.1	29.9	30
20Km/h	20	0.44	13.8	3.5	17.8	20

(H756)Road Structure Act(Braking stopping distance in case of the road surface is frozen in cold regions (f = 0.15))

(H756)Road Structure Act(Braking stopping distance in case of the road surface is frozen in cold regions (f = 0.15))

Road Structure Act

4-10 Braking and stopping distance and overtaking sight distance

4-10-2 Sight distance calculation

Table 4-33 Braking stopping distance when the road surface is frozen in cold regio Design speed V (km/h)

Design speed V (km/h)	Travel speed (km/h)	f	$0.694V$	$0.00394 V^2/f$	D(m)	Round value (m)
80Km/h	60	0.15	41.6	94.6	136.2	135
60Km/h	50	0.15	34.7	65.7	100.4	100
50Km/h	40	0.15	27.8	42.0	69.8	70
40Km/h	30	0.15	20.8	23.6	44.4	45
30Km/h	20	0.15	13.9	10.5	24.4	25
20Km/h	20	0.15	13.9	10.5	24.4	25

(H757)Road Structure Act(Braking distance in case of traveling at or above the design speed)

(H757)Road Structure Act(Braking distance in case of traveling at or above the design speed)

Road Structure Act

4-10 Braking and stopping distance and overtaking sight distance

4-10-2 Sight distance calculation

Table 4-34 Braking distance when traveling at or above the design speed

Design speed V (km/h)	Traveling speed (km/h)	Reaction time	f (dry)	$V \cdot t / 3.6$	$0.00394 V^2 / f$	L	Sight distance
40Km/h	60	1 second	0.60	16.7	23.7	40.4	40
30Km/h	50	1 second	0.61	14.9	16.2	31.1	30
20Km/h	40	1 second	0.63	11.1	10	21.1	20

(H758)Road Structure Act(Overtaking sight distance)

(H758)Road Structure Act(Overtaking sight distance)

Road Structure Act

4-10 Braking and stopping distance and overtaking sight distance

4-10-2 Sight distance calculation

Figure 4-38 Overtaking sight distance

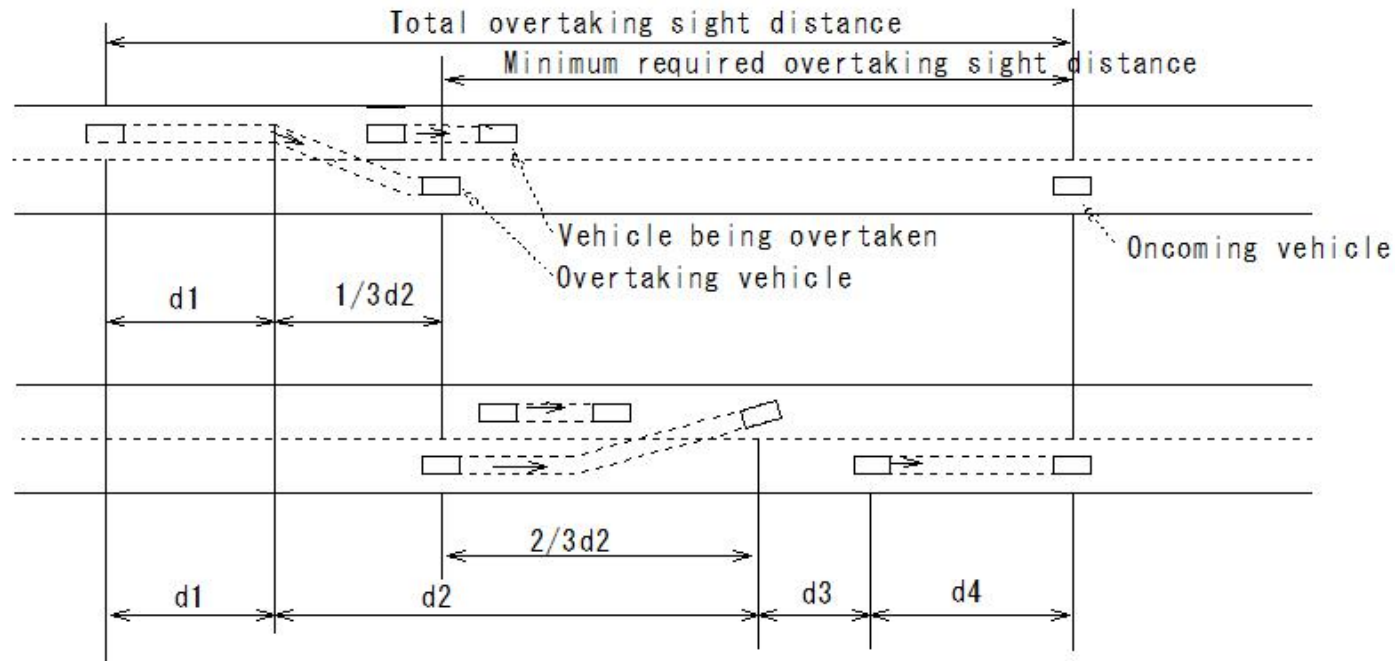


Figure 4-38 Overtaking sight distance

(H759)Road Structure Act(Overtaking sight distance)

(H759)Road Structure Act(Overtaking sight distance)

Road Structure Act

4-10 Braking and stopping distance and overtaking sight distance

4-10-2 Sight distance calculation

Table 4-35 Calculated overtaking sight distance

Speed of overtaking and oncoming vehicles (km/h)		100	80	60	50	40	30	20
Speed of overtaken vehicle (km/h)		80	65	45	37.5	30	20	15
d1	①Average acceleration α (m/s ²)	0.66	0.65	0.63	0.62	0.61	0.6	0.6
	②Acceleration time t1 (s)	4.5	4.2	3.7	3.4	3.1	2.9	2.7
	③Acceleration distance d1 (m)	113	82	51	34	28	19	10
d2	④Opposite lane travel time t2 (s)	11.4	10.4	9.5	9.0	8.5	8.0	7.6
	⑤Oncoming vehicle travel distance d4 = $\frac{2}{3} d2$ (m)	317	231	159	125	95	67	42
d3	⑥Oncoming vehicle distance d3 (m)	80	60	40	30	25	20	15
d4	⑦Oncoming vehicle travel distance d4 = $\frac{2}{3} d2$ (m)	211	154	106	81	63	45	28
⑧Total overtaking sight distance ($\hat{=}$ d1 + d2 + d3 + d4 (m))		700	550	350	250	200	150	100
⑨Minimum required overtaking sight distance ($\hat{=}$ $\frac{2}{3} d2$ + d3 + d4 (m))		500	350	250	200	150	100	70

(H760)Road Structure Act(Percentage of overtaking visibility sections to total sections)

(H760)Road Structure Act(Percentage of overtaking visibility sections to total sections)

Road Structure Act

4-10 Braking and stopping distance and overtaking sight distance

4-10-2 Sight distance calculation

able 4-36 Percentage of overtaking visibility sections to total sector

Design speed	1 minute driving distance	Overtaking Sight Distance	1 time per minute	1 time in 3 minutes
80Km/h	1.33km	550m	38%	13%
60Km/h	1.00	350	35	12
50Km/h	0.83	250	30	10
40Km/h	0.67	200	30	10
30Km/h	0.50	150	30	10

(H761)Road Structure Act(Overtaking sight distance (RAL))

(H761)Road Structure Act(Overtaking sight distance (RAL))

Road Structure Act

4-10 Braking and stopping distance and overtaking sight distance

4-10-2 Sight distance calculation

Table 4-37 Overtaking sight distance (RAL)

Design speed (km/h)	60	80	100
Total overtaking sight distance (m)	250	450	600
Reduced overtaking sight distance (m)	250	300	400

(H762)Road Structure Act(Passenger car equivalent daily traffic volume in the first year of sharing)

(H762)Road Structure Act(Passenger car equivalent daily traffic volume in the first year of sharing)

Road Structure Act

4-10 Braking and stopping distance and overtaking sight distance

4-10-2 Sight distance calculation

Table 4-38 Minimum Percentage of Extension (RAL) with a Minimum Overtaking Sight Distance

or Greater than or equal to the Minimum Overtaking Sight Distance

Design speed (km/h)	Passenger car equivalent daily traffic volume in the first year of sharing		
	1000~2000	2000~3000	3000
60	1/4	1/3	1/3
80	1/4	1/3	1/2
100	1/3	1/3	1/2

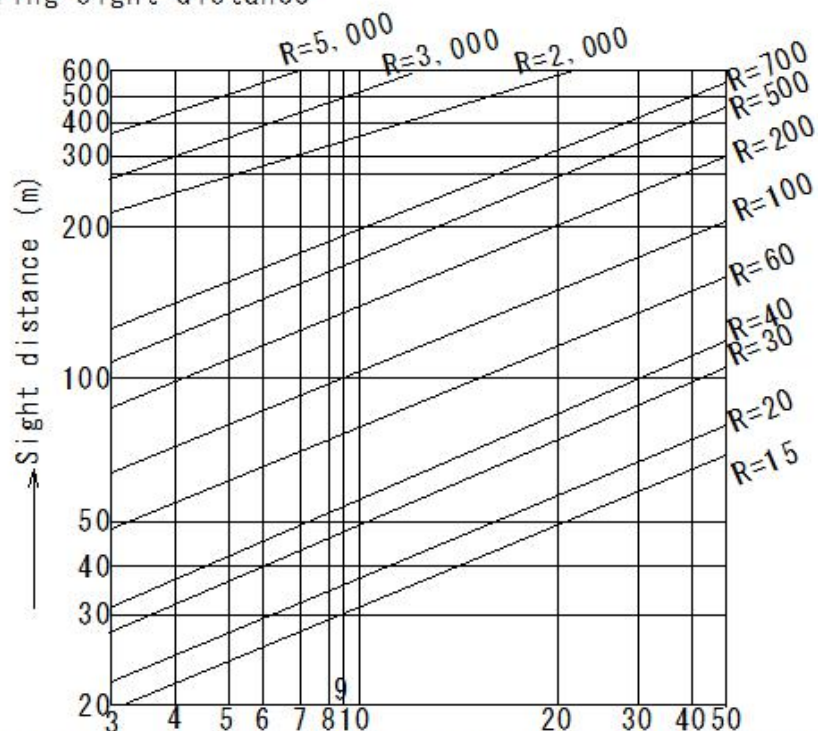
(H763)Road Structure Act(Ensuring sight distance)

(H763)Road Structure Act(Ensuring sight distance)

Road Structure Act

4-10 Braking and stopping distance and overtaking sight distance

4-10-3 Ensuring sight distance



Sight distance, radius, and distance to the enveloping circle within a circular curve

Table 4-39 Sight distance, radius, and distance to the enveloping circle within a circular curve

(H764)Road Structure Act(Ensuring sight distance)

(H764)Road Structure Act(Ensuring sight distance)

Road Structure Act

4-10 Braking and stopping distance and overtaking sight distance

4-10-3 Ensuring sight distance

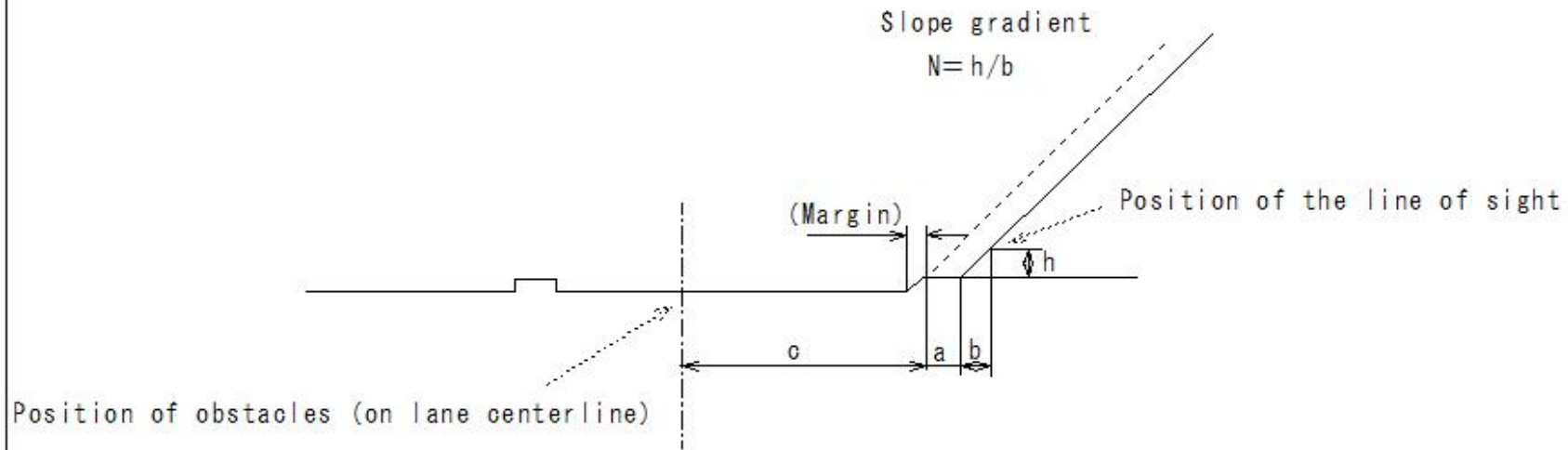


Figure 4-40 in case of horizontal curves and longitudinal curves overlap

(H765)Road Structure Act(Ensuring sight distance)

(H765)Road Structure Act(Ensuring sight distance)

Road Structure Act

4-11 Longitudinal gradient

4-11-1 Longitudinal gradient

Design speed (km/h)	Longitudinal gradient (%)
V=120km/h	2
100Km/h	3
80Km/h	4
60Km/h	5
50Km/h	6
40Km/h	7
30Km/h	8
20Km/h	9

(H766)Road Structure Act(Horsepower per unit weight of automobiles)

(H766)Road Structure Act(Horsepower per unit weight of automobiles)

Road Structure Act

4-11 Longitudinal gradient

4-11-1 Longitudinal gradient

Road Structure Act

Table 4-39 Horsepower per unit weight of automobiles

Type	Vehicle name	Power (PS)	Maximum speed (km/h)	Vehicle weight	Maximum load	Total vehicle weight (kg)	Horsepower per unit weight (PS/t)
Articulated vehicle	Full trailer truck A	350	105			36,880	9.5
Large freight vehicle	11t truck A	280	105	8,775	10,750	19,690	14.2
	8t truck A	190	95	6,790	7,500	14,455	13.1
	6t truck A	130	80	4,655	6,000	10,820	12.0
	4t truck A	145	110	3,555	4,500	8,220	17.6
Small freight vehicle	2t truck A	74	105	1,630	2,000	3,795	19.5
Passenger car	A	135	160	1,460	275	1,735	77.8

(H767)Road Structure Act(Forces acting on a car)

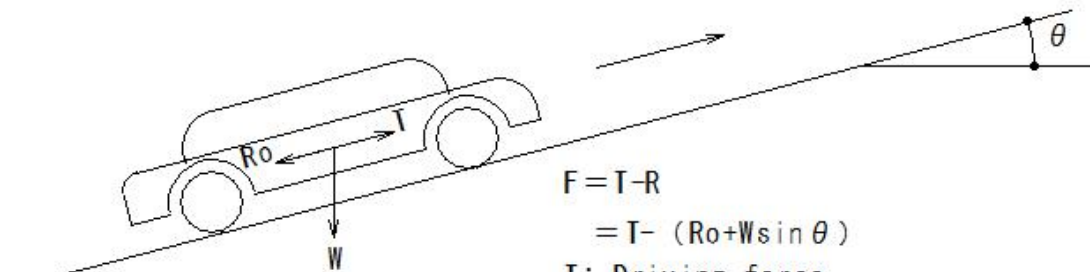
(H767)Road Structure Act(Forces acting on a car)

Road Structure Act

4-11 Longitudinal gradient

4-11-1 Longitudinal gradient

Figure 4-41 Forces acting on a car



$$F = T - R$$

$$= T - (R_o + W \sin \theta)$$

T: Driving force

R: Running resistance force

R_o : Running resistance force on flat areas

θ : Gradient of a slope

W: Total weight of the car

Figure 4-41 Forces acting on a car

(H768)Road Structure Act(Horsepower per unit weight of automobiles)

(H768)Road Structure Act(Horsepower per unit weight of automobiles)

Road Structure Act

4-11 Longitudinal gradient

4-11-1 Longitudinal gradient

Table 4-40 Standard vehicle specifications for each vehicle type

By gear	Low		2nd		3rd		Top	
Connection of different design sections	Vm	η	Vm	η	Vm	η	Vm	η
Semi-trailer	15km/h	0.80	25km/h	0.85	45km/h	0.85	80km/h	0.90
Ordinary truck	15	0.80	25	0.85	45	0.85	80	-
Passenger car	60	0.80	90	0.85	-	-	150	0.90

(H769)Road Structure Act(Horsepower per unit weight of automobiles)

(H769)Road Structure Act(Horsepower per unit weight of automobiles)

Road Structure Act

4-11 Longitudinal gradient

4-11-1 Longitudinal gradient

Table 4-41 Climbing gradient

(unit:%)

Design speed (km/h)		120	100	80	60	50	40	30	20
Allowable speed (km/h)	Semi-trailer truck	60	50	40	30	30	25	20	15
	Passenger car	90	90	80	60	50	40	20	20
Semi-trailer (full load)		1.5	1.5	2.5	3.5	3.5	5.5	6.0	9.5
Semi-trailer (half load)		3.5	4.0	6.5	7.5	7.5	11.0	-	-
Regular truck (full load)		2.0	2.5	4.5	5.0	5.0	8.0	9.0	-
Regular truck (half load)		3.5	4.0	6.5	7.5	7.5	11.5	-	-
Passenger car (2,000cc class)		4.5	4.5	10.0	11.0	11.5	11.5	-	-

(H770)Road Structure Act(Special values for longitudinal gradient)

(H770)Road Structure Act(Special values for longitudinal gradient)

Road Structure Act

4-11 Longitudinal gradient

4-11-2 Special values for longitudinal gradient

Design speed (km/h)	Gradient value (%)	Limited length (m)
120	3	800
	4	500
	5	400
100	4	700
	5	500
	6	400
80	5	600
	6	500
	7	400
60	6	500
	7	400
	8	300
50	7	500
	8	400
	9	300
40	8	400
	9	300
	10	200

(H771)Road Structure Act(Gradient value and limit length)

(H771)Road Structure Act(Gradient value and limit length)

Road Structure Act

4-11 Longitudinal gradient

4-11-2 Special values for longitudinal gradient

Figure 4-43 Gradient value and limit length

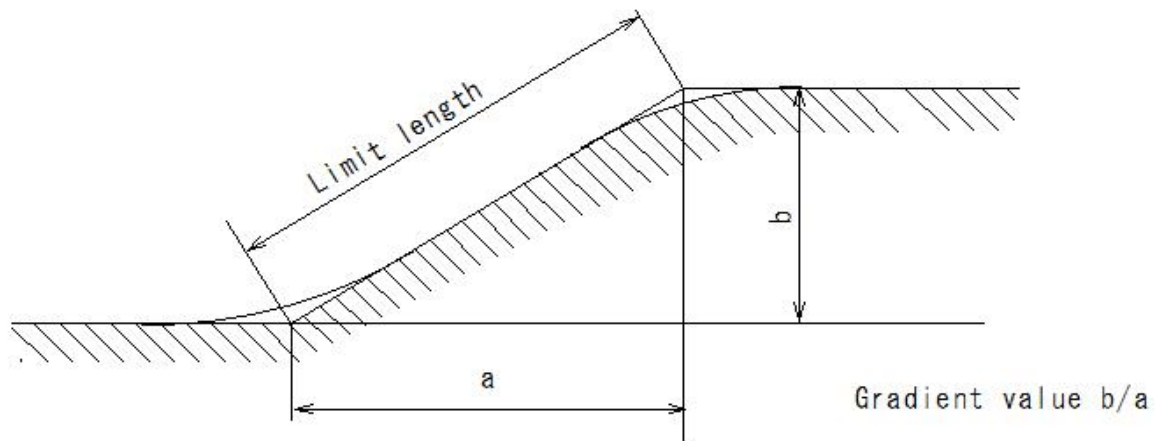


Figure 4-43 Gradient value and limit length

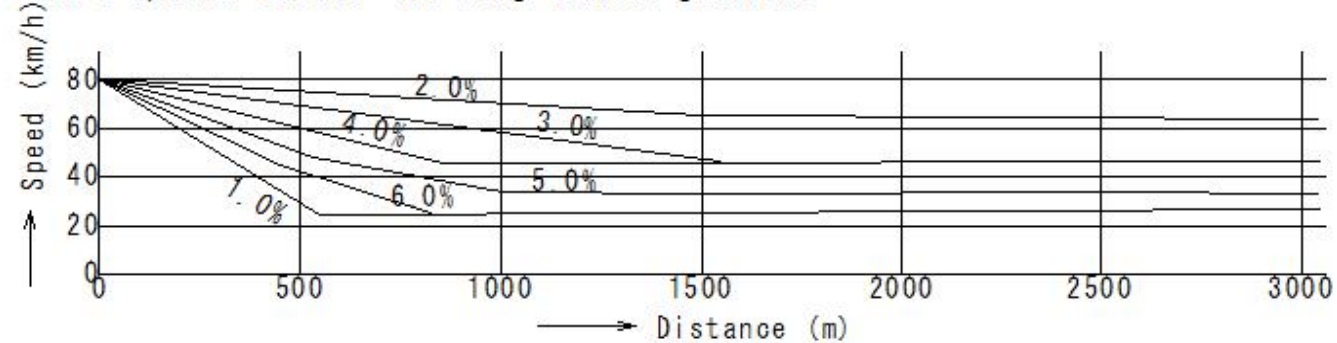
(H772)Road Structure Act(Climbing performance curve)

(H772)Road Structure Act(Climbing performance curve)

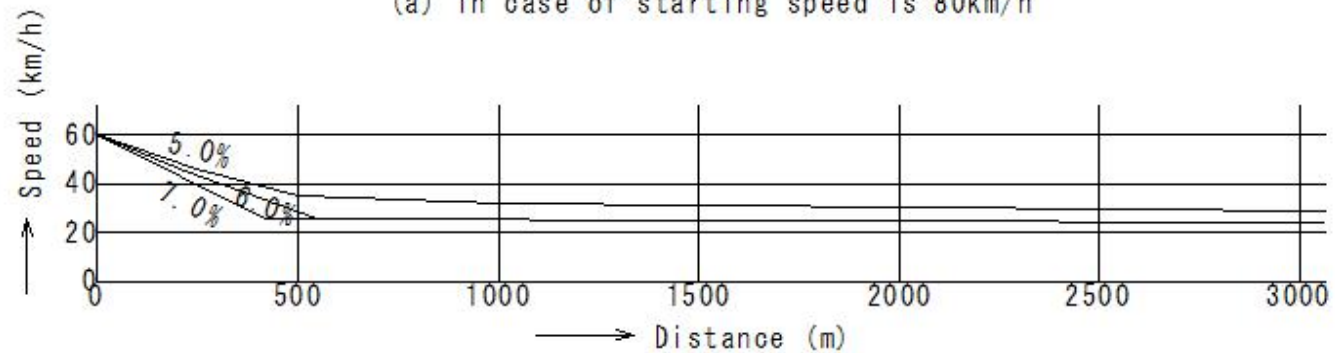
Road Structure Act

4-11 Longitudinal gradient

4-11-2 Special values for longitudinal gradient



(a) in case of starting speed is 80km/h



(b) in case of starting speed is 60km/h

Figure 4-44 Climbing performance curve

(H773)Road Structure Act(Longitudinal gradient and limit length)

(H773)Road Structure Act(Longitudinal gradient and limit length)

Road Structure Act

4-11 Longitudinal gradient

4-11-2 Special values for longitudinal gradient

Longitudinal gradient and limit length

Table 4-42: Permitted climbing distance by gradient

Design speed (km/h)		120	100	80	60	50	40
Starting speed (km/h)		80	80	80	60	50	40
Allowable speed (km/h)		60	50	40	30	30	25
Gradient value (%)	3	830					
	4	480	720				
	5	340	500	760			
	6		380	520	490		
	7			410	320	230	
	8				240	170	130
	9					130	100
	10						80

(H774)Road Structure Act(Characteristic values of longitudinal gradient in snowy and cold regions)

(H774)Road Structure Act(Characteristic values of longitudinal gradient in snowy and cold regions)

Road Structure Act

4-11 Longitudinal gradient

4-11-2 Special values for longitudinal gradient

Characteristic values of longitudinal gradient in snowy and cold regions

Table 4-43 Special values of longitudinal gradient in snowy and cold regions

Design speed (km/h)	Areas with severe snowy and cold regions	Other regions (%)
V=120km/h	4	4
100Km/h	5	5
80Km/h	6	6
60Km/h	7	8
50Km/h	7	8
40Km/h	7.5	8
30Km/h	7.5	10
20Km/h	7.5	10

(H775)Road Structure Act(Longitudinal gradient)

(H775) Road Structure Act(Longitudinal gradient)

Road Structure Act

4-11 Longitudinal gradient

4-11-3 Longitudinal gradient

Design speed (unit: kilometers per hour)	Longitudinal gradient (unit: %)
120	2
100	3
80	4
60	5
50	6
40	7
30	8
20	9

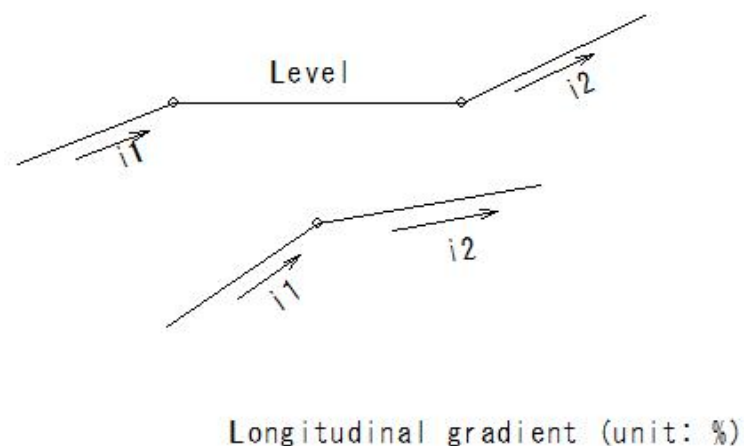


Figure 4-45 Longitudinal gradient

(H776)Road Structure Act(Longitudinal gradient)

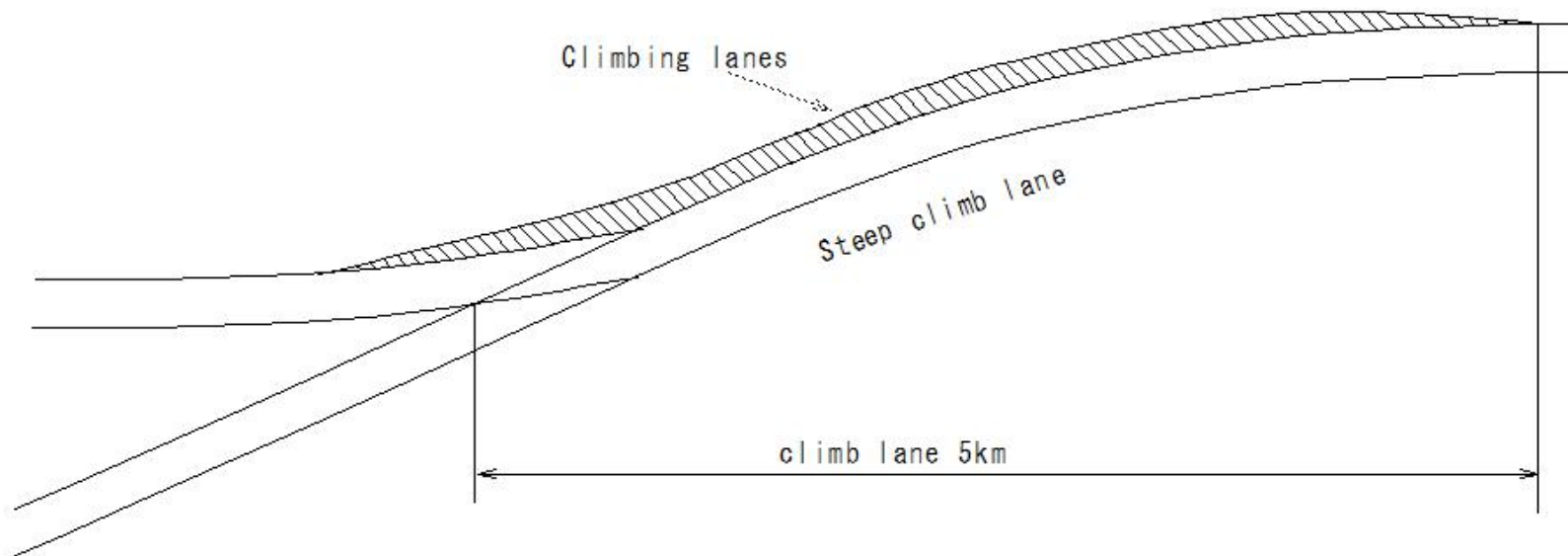
(H776)Road Structure Act(Longitudinal gradient)

Road Structure Act

4-12 Climbing lanes

Article 21

Climbing lanes shall be provided as necessary on roads with a longitudinal gradient of more than 5%
The width of the climbing lane shall be 3m



(H777)Road Structure Act(Cross-sectional configuration of climbing lanes)

(H777)Road Structure Act(Cross-sectional configuration of climbing lanes)

Road Structure Act

4-12 Climbing lanes

(a) Embankment section

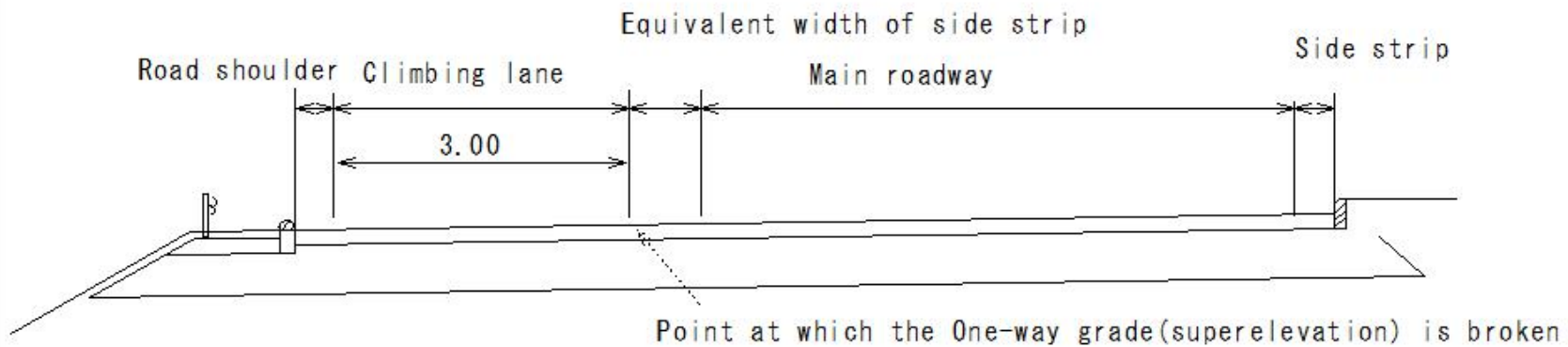


Figure 4-46 Cross-sectional configuration of climbing lanes

(H778)Road Structure Act(Cross-sectional configuration of climbing lanes)

(H778)Road Structure Act(Cross-sectional configuration of climbing lanes)

Road Structure Act

4-12 Climbing lanes

(b) Cut section

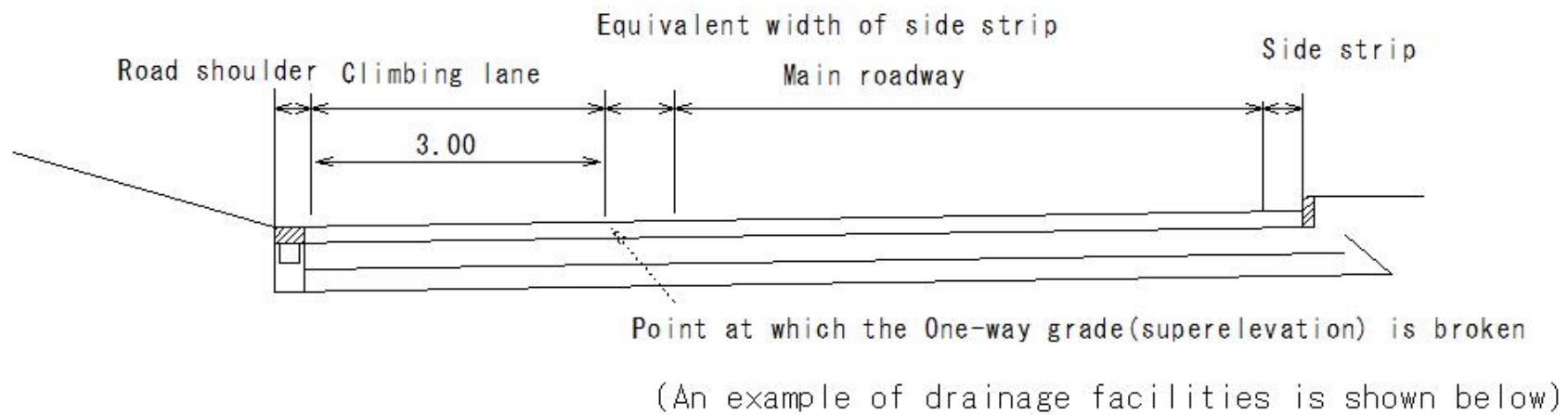


Figure 4-46 Cross-sectional configuration of climbing lanes

(H779)Road Structure Act(Single slope of main line)

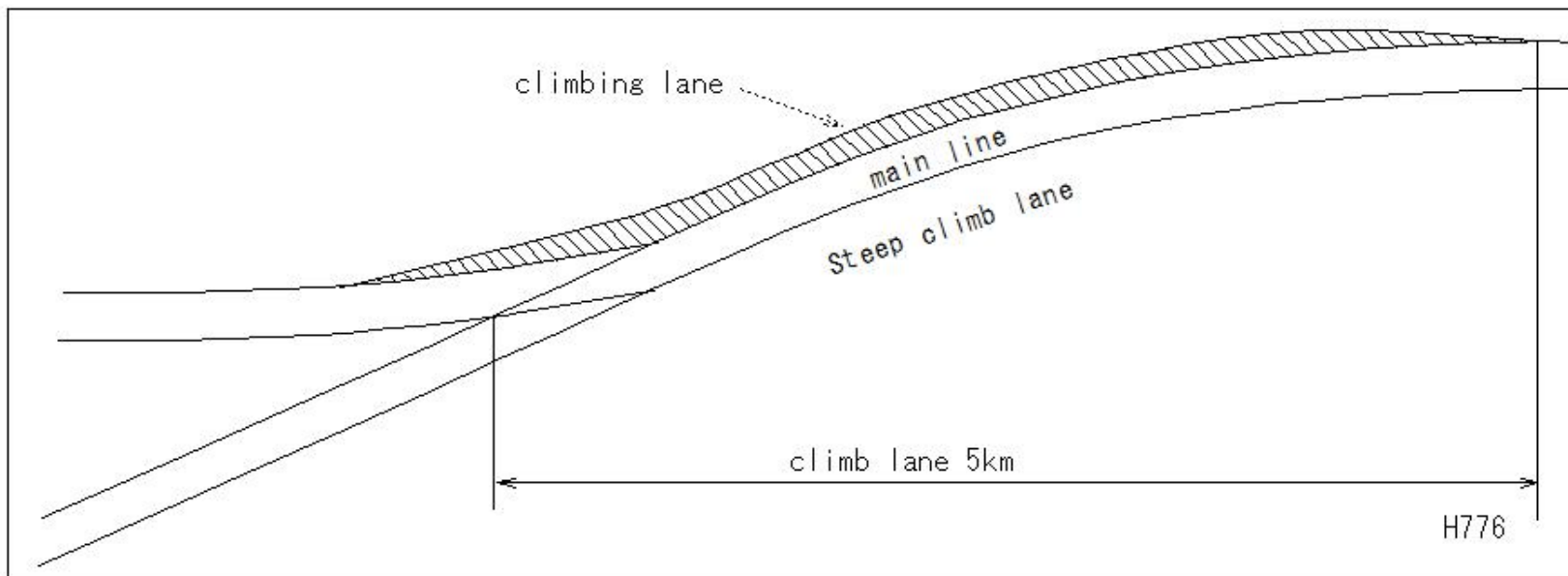
(H779)Road Structure Act(Single slope of main line)

Road Structure Act

4-12 Climbing lanes

Table 4-44 One-way grade(superlevation) of climbing lane

One-way grade(superlevation) of main line (%)	10	9	8	7	6	5	4	3	2
One-way grade(superlevation) of climbing lane (%)	5	5	4	4	4	4	4	3	2



(H780)Road Structure Act(Speed gradient diagram)

(H780)Road Structure Act(Speed gradient diagram)

Road Structure Act

4-12 Climbing lanes

4-12-2 Sections where installation is required

Figure 4-47 Speed gradient diagram

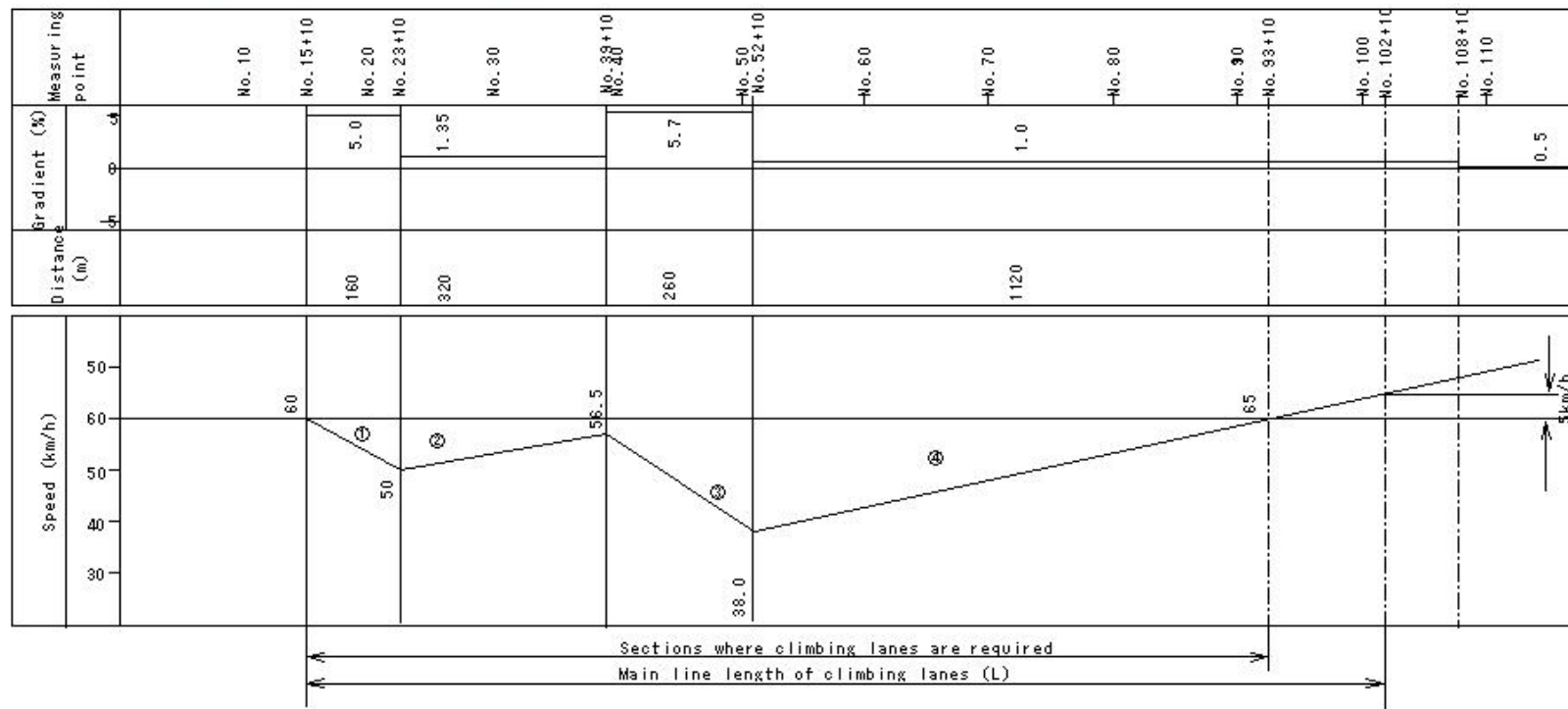


Figure 4-47 Speed gradient diagram

(H781)Road Structure Act(Climbing performance curve)

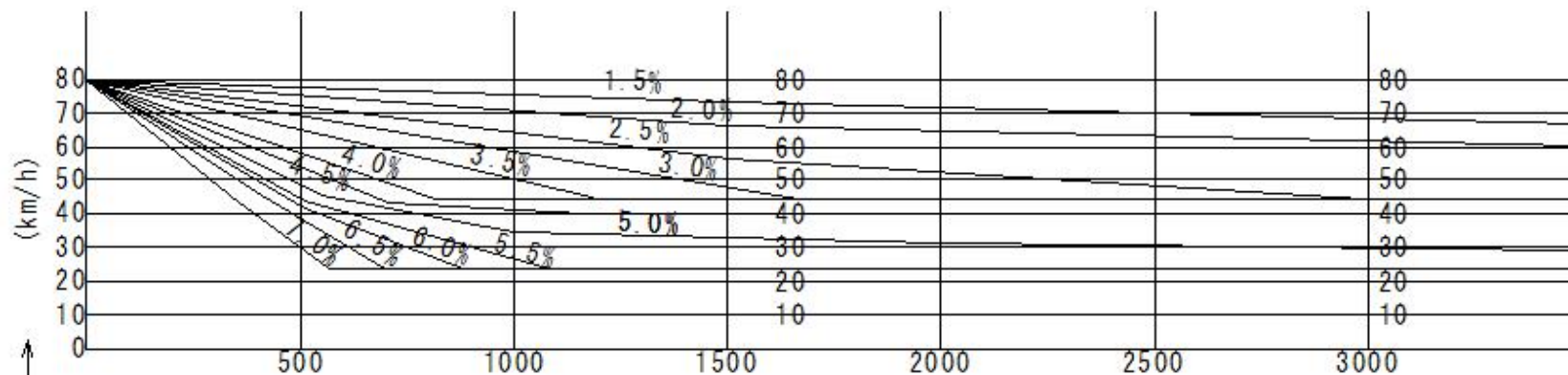
(H781)Road Structure Act(Climbing performance curve)

Road Structure Act

4-12 Climbing lanes

4-12-2 Sections where installation is required

Figure 4-48 Climbing performance curve



3rd
2nd

Horsepower per ton 10PS/t
 Efficiency: Top 90%, 3rd, 2nd, 85%, Low 80%
 Maximum speed: 80km/h (top)
 Resistance: $r=10+10i+0.0016V$
 Gear ratio: 1:1.775:3.200:5.333
 Gear change time: 2sec

(H782)Road Structure Act(Climbing performance curve)

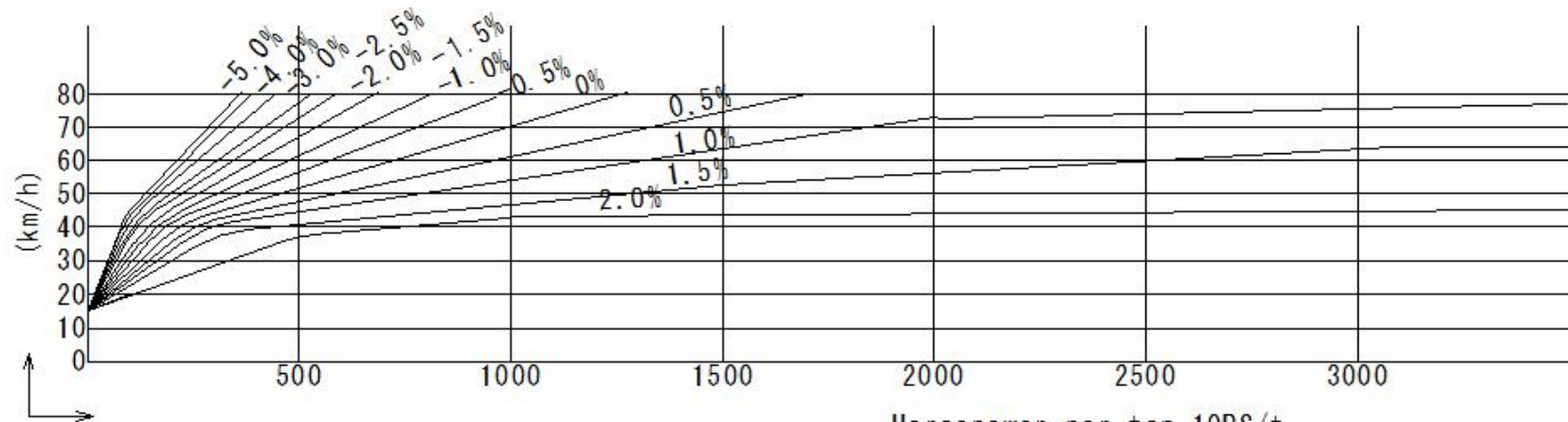
(H782)Road Structure Act(Climbing performance curve)

Road Structure Act

4-12 Climbing lanes

4-12-2 Sections where installation is required

Figure 4-48 Climbing performance curve



3rd
2nd

Horsepower per ton 10PS/t
Efficiency: Top 90%, 3rd, 2nd, 85%, Low 80%
Maximum speed: 80km/h (top)
Resistance: $r=10+10i+0.0016V$
Gear ratio: 1:1.775:3.200:5.333
Gear change time: 2sec

(H783)Road Structure Act(Vertical curves)

(H783)Road Structure Act(Vertical curves)

Road Structure Act

4-13 Vertical curves

4-13-1 Vertical curves

Table 4-13-1 Longitudinal curves

Design speed (unit: kilometers per hour)	Curve shape of vertical curve	Radius of vertical curve (unit: meters)
V=120km/h	凸curve	11,000
	凹curve	4,000
100Km/h	凸curve	6,500
	凹curve	3,000
80Km/h	凸curve	3,000
	凹curve	2,000
60Km/h	凸curve	1,400
	凹curve	1,000
50Km/h	凸curve	800
	凹curve	700
40Km/h	凸curve	450
	凹curve	450
30Km/h	凸curve	250
	凹curve	250
20Km/h	凸curve	100
	凹curve	100

(H784)Road Structure Act(Vertical curves)

(H784)Road Structure Act(Vertical curves)

Road Structure Act

4-13 Vertical curves

4-13-1 Vertical curves

Design speed (unit: kilometers per hour)	Length of vertical curve (unit: meters)
120	100
100	85
80	70
60	50
50	40
40	35
30	25
20	20

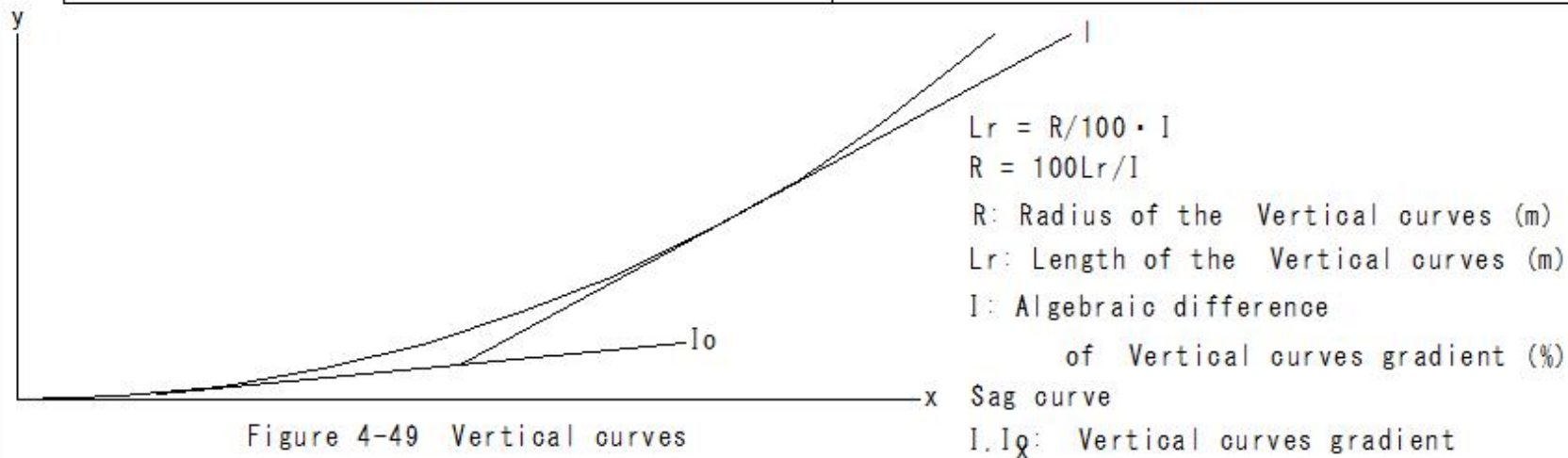


Figure 4-49 Vertical curves

(H785)Road Structure Act(Vertical curves)

(H785)Road Structure Act(Vertical curves)

Road Structure Act

4-13 Vertical curves

4-13-1 Vertical curves

- Calculation of vertical curve length

Table 4-45 Length of the vertical curve required for shock mitigation

Design speed (unit: kilometers per hour)	120	100	80	60	50	40	30	20
Required length of the vertical curve (m)	40.0i	27.8i	17.8i	10.0i	7.0i	4.4i	2.5i	1.1i
Required radius of the vertical curve (m)	4,000	2,780	1,780	1,000	700	440	250	110

$I=|I1-I2|(\%)$

$L=V^2|I1-I2|(\%)/360$

L: Length of the transition curve

V: Travel speed (km/h)

$|I1-I2|$: Absolute value of the algebraic difference of the vertical gradient (%)

(H786)Road Structure Act(Vertical curves)

(H786)Road Structure Act(Vertical curves)

Road Structure Act

4-13 Vertical curves

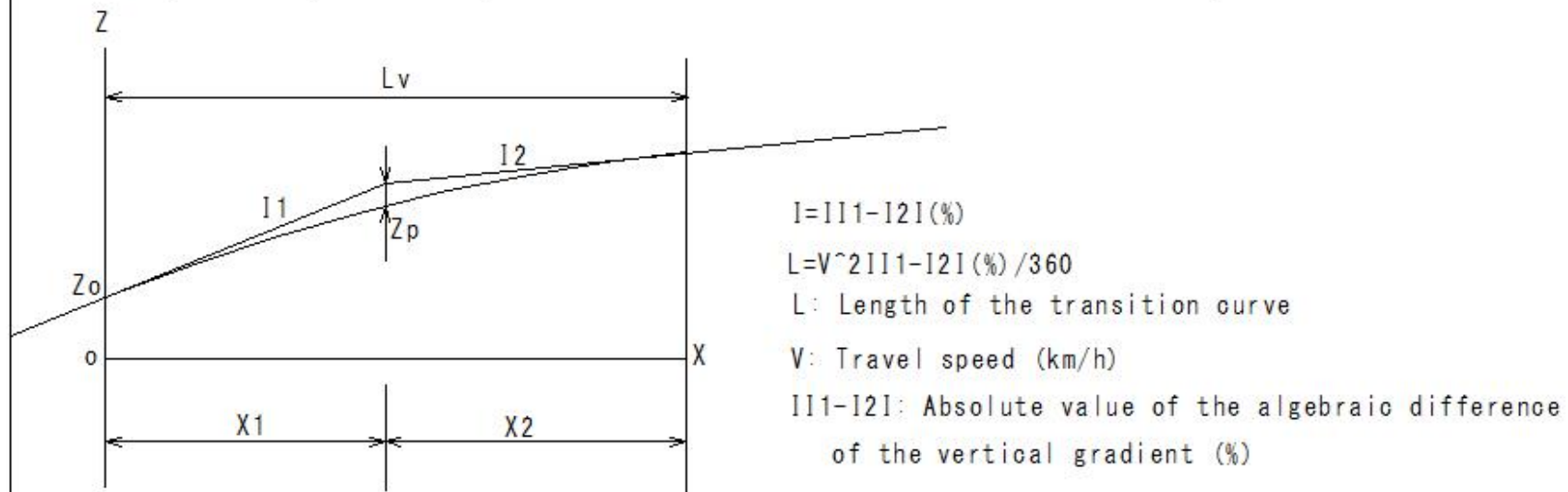
4-13-1 Vertical curves

① Length of vertical curve required to ensure visibility

Convex vertical curve

Figure 4-50 Length of vertical curve required to ensure visibility

The quadratic parabolic equation in is k is a constant and I1 and I2 are gradients



$$I = |I_1 - I_2| (\%)$$

$$L = \frac{V^2 |I_1 - I_2| (\%)}{360}$$

L: Length of the transition curve

V: Travel speed (km/h)

$|I_1 - I_2|$: Absolute value of the algebraic difference of the vertical gradient (%)

Figure 4-50

(H787)Road Structure Act(Vertical curves)

(H787)Road Structure Act(Vertical curves)

Road Structure Act

4-13 Vertical curves

4-13-1 Vertical curves

①Length of vertical curve required to ensure visibility

Convex vertical curve

Figure 4-51 in case of both points are on a vertical curve ($S \leq L_v$)

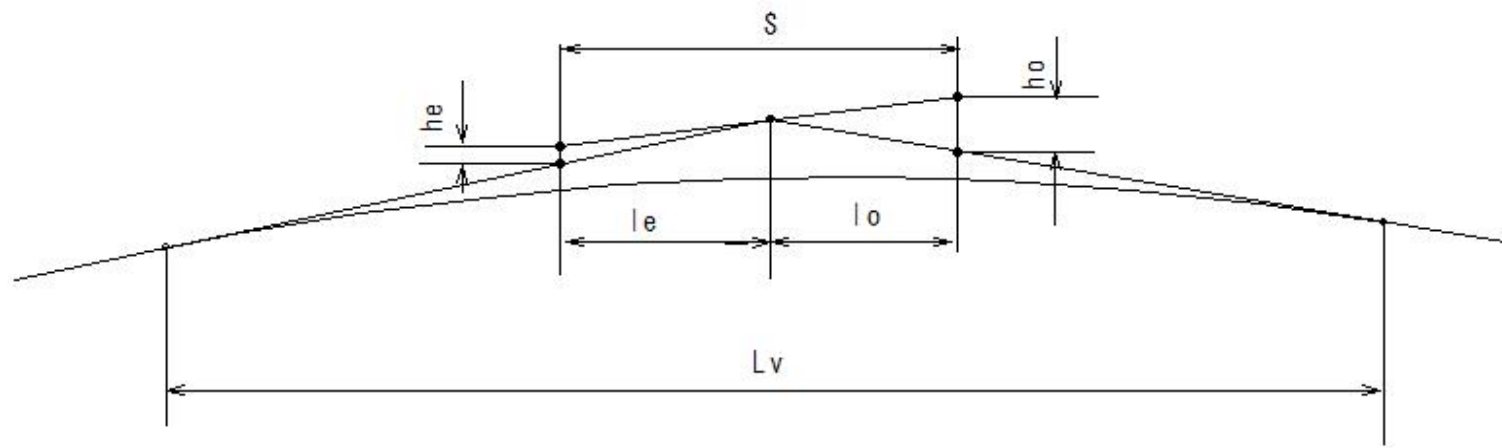


Figure 4-51

(H788)Road Structure Act(Vertical curves)

(H788)Road Structure Act(Vertical curves)

Road Structure Act

4-13 Vertical curves

4-13-1 Vertical curves

①Length of vertical curve required to ensure visibility

Convex vertical curve

Figure 4-52 in case of one point is on the vertical curve and another point is outside the vertical curve

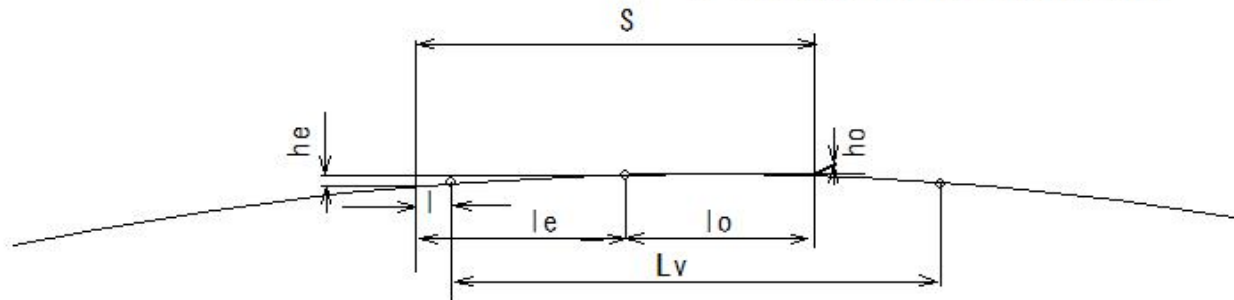


Figure 4-52

(H789)Road Structure Act(Vertical curves)

(H789)Road Structure Act(Vertical curves)

Road Structure Act

4-13 Vertical curves

4-13-1 Vertical curves

①Length of vertical curve required to ensure visibility

Convex vertical curve

Figure 4-53 in case of two points are outside the vertical curve ($S > L_v$)

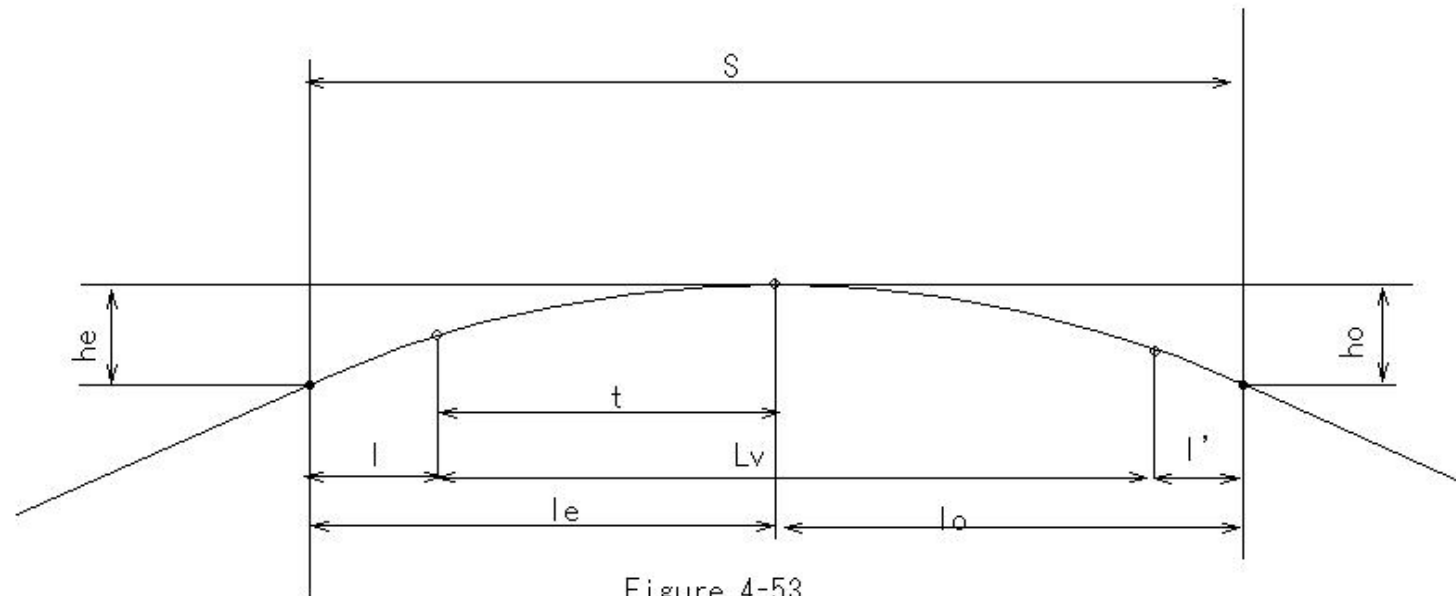


Figure 4-53

(H790)Road Structure Act(Vertical curves)

(H790)Road Structure Act(Vertical curves)

Road Structure Act

4-13 Vertical curves

4-13-1 Vertical curves

Convex longitudinal curve

Table 4-26 Calculation of convex longitudinal curve

Calculation of convex(凸) longitudinal curve	① Impact mitigation $L_v = \frac{V^2 i_1 - i_2 }{360}$	② Sight distance $L_v = \frac{D^2 i_1 - i_2 }{398}$	③ Required longitudinal curve length
V=120km/h	40.0△	111.0△	110△
100Km/h	27.8△	64.5△	65△
80Km/h	17.8△	30.2△	30△
60Km/h	10.0△	14.1△	14△
50Km/h	7.0△	7.6△	8△
40Km/h	4.4△	4.1△	4.5△
30Km/h	2.5△	2.3△	2.5△
20Km/h	1.1△	1.0△	1.0△

△: Gradient difference (%)

D: Visual distance (m)

V: Traveling speed (km/h) (design speed)

(H791)Road Structure Act(Vertical curves)

(H791)Road Structure Act(Vertical curves)

Road Structure Act

4-13 Vertical curves

4-13-1 Vertical curves

Concave(凹) longitudinal curve

Figure 4-54 Concave longitudinal curve

View under the overpass

• in case of two points are on the longitudinal curve

h:Clearance under the overpass

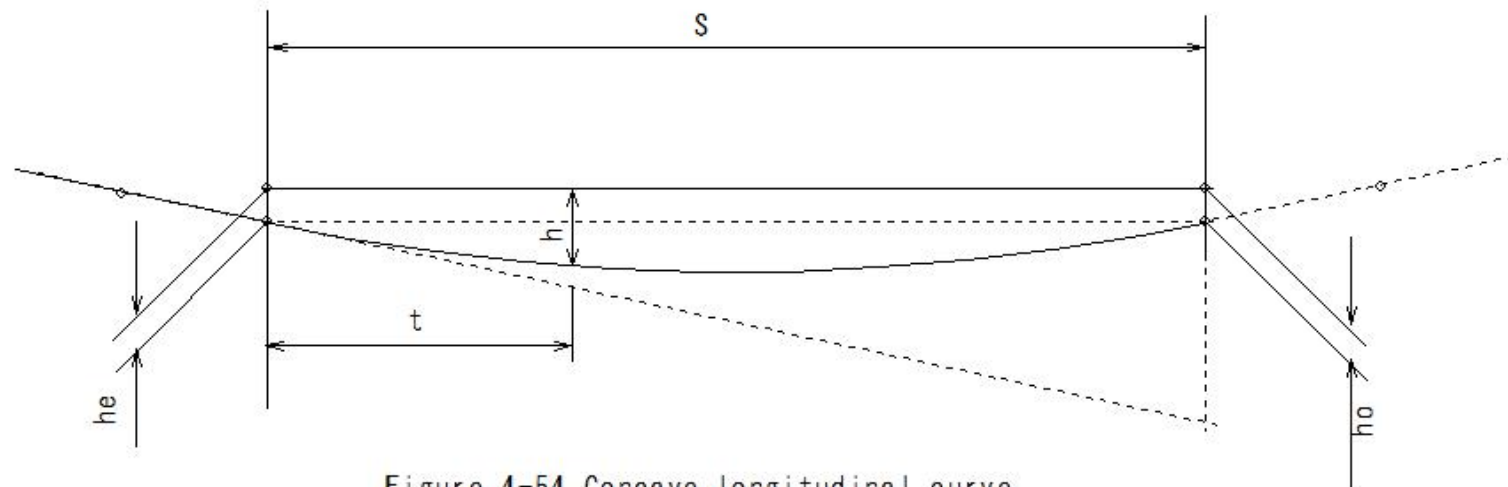


Figure 4-54 Concave longitudinal curve

(H792)Road Structure Act(Vertical curves)

(H792)Road Structure Act(Vertical curves)

Road Structure Act

4-13 Vertical curves

4-13-1 Vertical curves

Concave(凹) longitudinal curve

Figure 4-54 Concave longitudinal curve

View under the overpass

in case of two points are outside the vertical curve

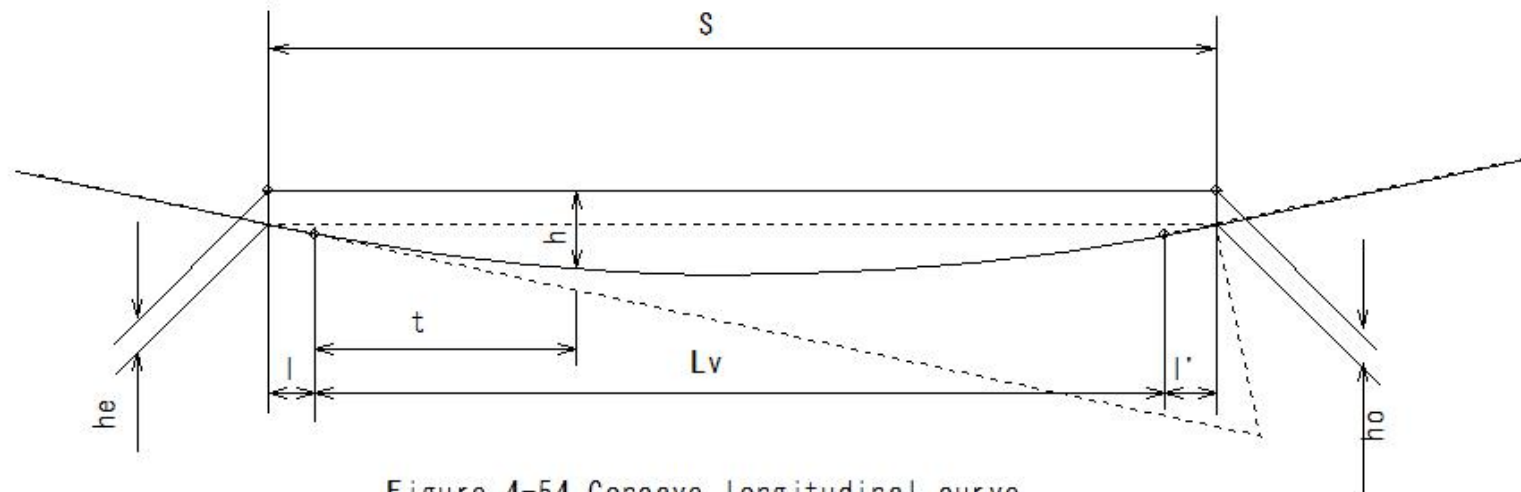


Figure 4-54 Concave longitudinal curve

(H793)Road Structure Act(Vertical curves)

(H793)Road Structure Act(Vertical curves)

Road Structure Act

4-13 Vertical curves

4-13-1 Vertical curves

Concave(凹) longitudinal curve

Table 4-47 Calculation of concave longitudinal curve length

Design speed (km/h)	① Impact mitigation $L_v = \frac{V^2 i_1 - i_2 }{360}$	② Sight distance $L_v = \frac{D^2 i_1 - i_2 }{398}$	③ Required longitudinal curve length
V=120km/h	40.0△	16.4△	40△
100Km/h	27.8△	9.5△	30△
80Km/h	17.8△	4.5△	20△
60Km/h	10.0△	2.1△	10△
50Km/h	7.0△	1.1△	7△
40Km/h	4.5△	0.6△	4.5△
30Km/h	2.5△	0.3△	2.5△
20Km/h	1.1△	0.1△	1.0△

△: Slope difference (%)

D: Sight distance (m)

V: Traveling speed (km/h) (design speed)

(H794)Road Structure Act(Vertical curves)

(H794)Road Structure Act(Vertical curves)

Road Structure Act

4-13 Vertical curves

4-13-2 Desirable value of longitudinal curve radius

Range of longitudinal curve (m)

Design speed (km/h)	Vertical curve radius (m)	
	Convex curve (凸)	Concave curve(凹)
120km/h	17000	6000
100Km/h	10000	4500
80Km/h	4500	3000
60Km/h	2000	1500
50Km/h	1200	1000
40Km/h	700	700
30Km/h	400	400
20Km/h	200	200

(H795)Road Structure Act(Vertical curves)

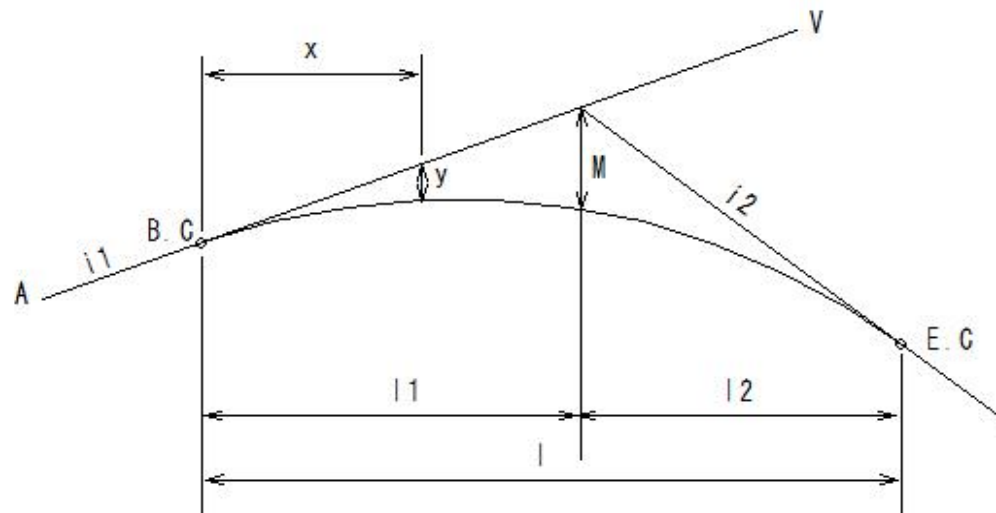
(H795)Road Structure Act(Vertical curves)

Road Structure Act

4-13 Vertical curves

4-13-3 Calculating the intermediate value of a vertical curve

Figure 4-56 Calculating the intermediate value of a vertical curve



$$M = i_1 - i_2 / 800 \cdot l$$
$$y = Mx^2 / ((l/2)^2)$$
$$= i_1 - i_2 / 200l \cdot (x^2)$$

x: horizontal distance (m)
y: vertical distance (m)
i1: vertical gradient (%)
i2: vertical gradient (%)
l: vertical curve length (m)

Figure 4-56 Calculating the intermediate value of a vertical curve

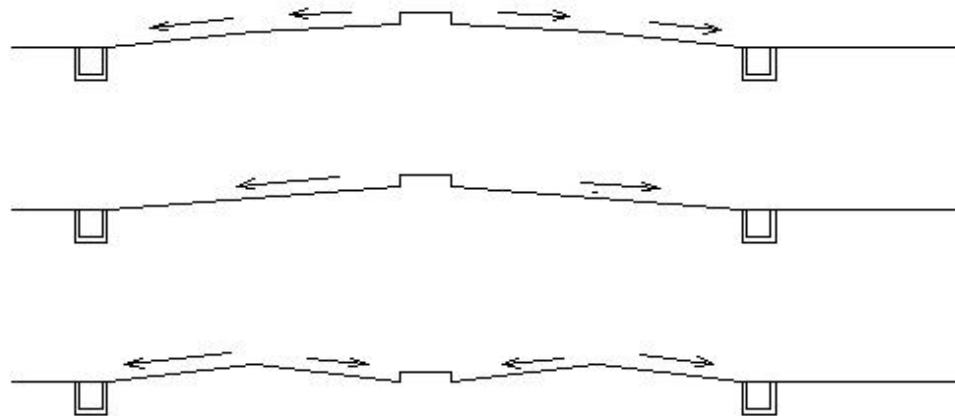
(H796)Road Structure Act(Cross Slope)

(H796)Road Structure Act(Cross Slope)

Road Structure Act
4-14 Cross Slope

Type of road surface	Gross slope (unit: %)
Cement concrete pavement and asphalt concrete pavement	1.5 to 2
Other	3 to 5

Gross slope



H508

(H797)Road Structure Act(Cross Slope)

(H797)Road Structure Act(Cross Slope)

Road Structure Act

4-14 Cross Slope

Table 4-28 Standard values for cross slope

Type of road surface	Cross slope (unit: %)	
	For one lane on each side	For one lane on each side
①Cement concrete pavement and asphalt concrete pavement	1.5	2.0
②Other	3.0-5.0	

(H798)Road Structure Act(Cross Slope)

(H798)Road Structure Act(Cross Slope)

Road Structure Act

4-14 Cross Slope

Figure 4-57 Cross slope

in case of increasing the cross slope of the outer lane on a wide road

Combine two types of linear slopes

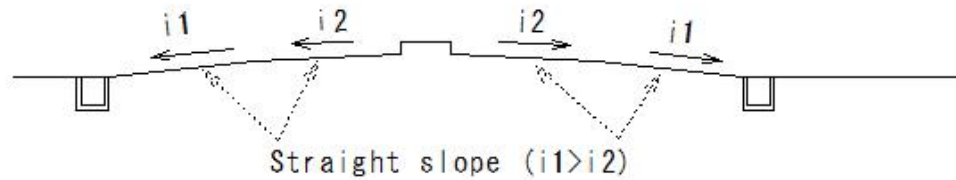
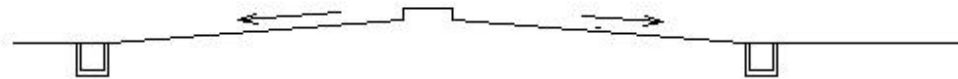


Figure 4-57 Cross slope

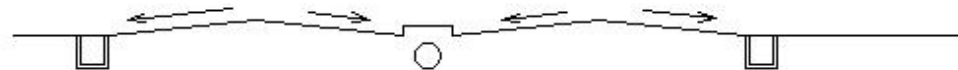
(H799)Road Structure Act(Cross Slope)

(H799)Road Structure Act(Cross Slope)

Road Structure Act
Figure 4-58 Cross slope



(a) in case of the road is not divided into two directions



(b) in case of the road is divided into two directions

The origin of the road surface is in the center
Downward slope on both sides

Figure 4-58 Cross slope

(H800)Road Structure Act(Cross Slope)

(H800) Road Structure Act(Cross Slope)

Road Structure Act

Figure 4-59 Curve section gradient

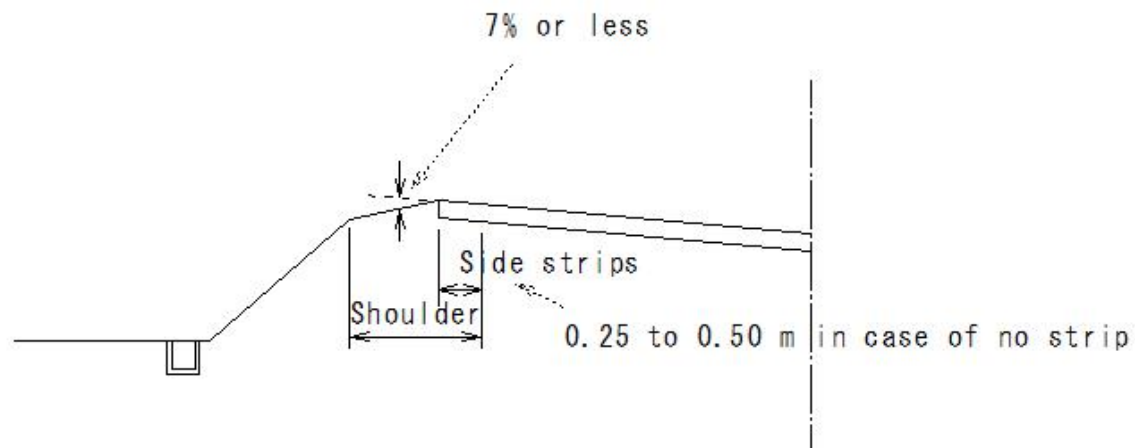


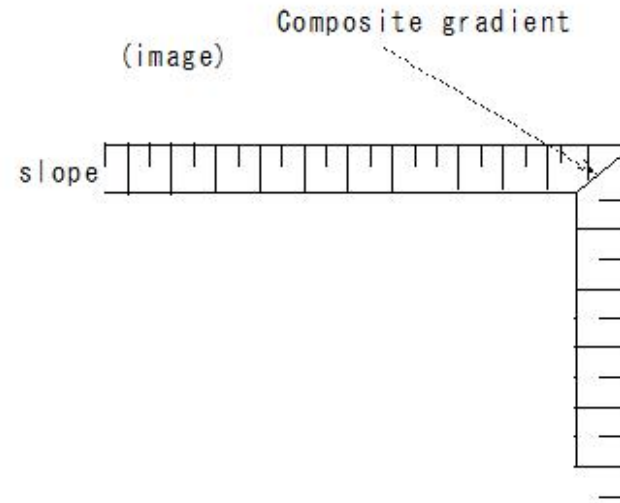
Figure 4-59 Curve section gradient

(H801)Road Structure Act(Composite gradient)

(H801)Road Structure Act(Composite gradient)

Road Structure Act
4-15 Composite gradient

Design speed (unit: kilometers per hour)	Composite gradient (unit: %)
120	10
100	
80	10.5
60	
50	11.5
40	
30	
20	



(H802)Road Structure Act(Composite gradient)

(H802)Road Structure Act(Composite gradient)

Road Structure Act

4-15 Composite gradient

Table 4-49 Calculated and prescribed values of composite gradient

Design speed (km/h)	①jMax	i	R	② $((V/3.6)^2/g R)i$	$j(①-②)$	Composite gradient ($\sqrt{i^2+j^2}$)	Default value
	%	%	m	%	%	%	%
120	2	10	570	2.0	0	10.0	10.0
100	3	10	380	2.1	0.9	10.0	10.5
80	4	10	230	2.2	1.8	10.2	
60	5	10	120	2.4	2.6	10.3	
50	6	10	80	2.5	3.5	10.6	11.5
40	7	10	50	2.5	4.5	11.2	
30	8	8	30	1.9	6.1	10.1	
20	9	8	15	1.7	7.3	10.7	

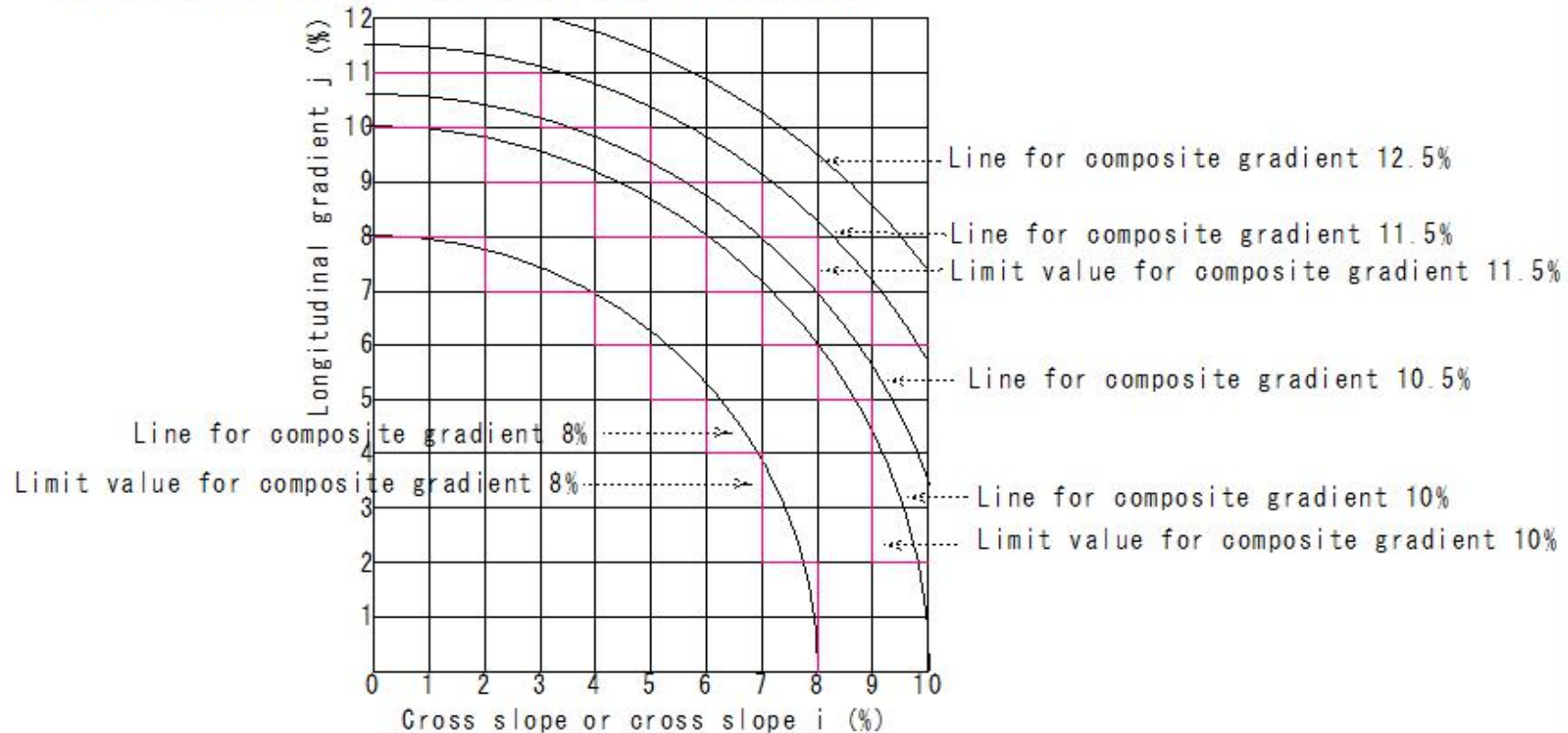
(H803)Road Structure Act(Composite gradient)

(H803)Road Structure Act(Composite gradient)

Road Structure Act

4-15 Composite gradient

Figure 4-61 Diagram for calculating composite gradient



(H804)Road Structure Act(Composite gradient)

(H804)Road Structure Act(Composite gradient)

Road Structure Act

5 Level crossings

5-1 Planning and design of level crossings

5-1-3 Design vehicles, traffic methods, and design speeds

Table 5-1 Acceleration and deceleration values when considering speed changes

(Unit: m/s²)

Classification	Acceleration	Deceleration value
Urban area	1.5	-3.0
Rural area-main road side	1.0	-2.5
Rural area-minor road side	1.5	-3.0

Acceleration is reduced by 0.1m/s² for every 1% uphill gradient.

$$L = \frac{1}{2 \times 3.6^2 \times \alpha} (V^2 - V_o^2)$$

L: Travel distance (m)

α : Acceleration speed (m/s²)

V: Final speed (km/h)

V_o: Initial speed (km/h)

(H805)Road Structure Act(Intersection angle)

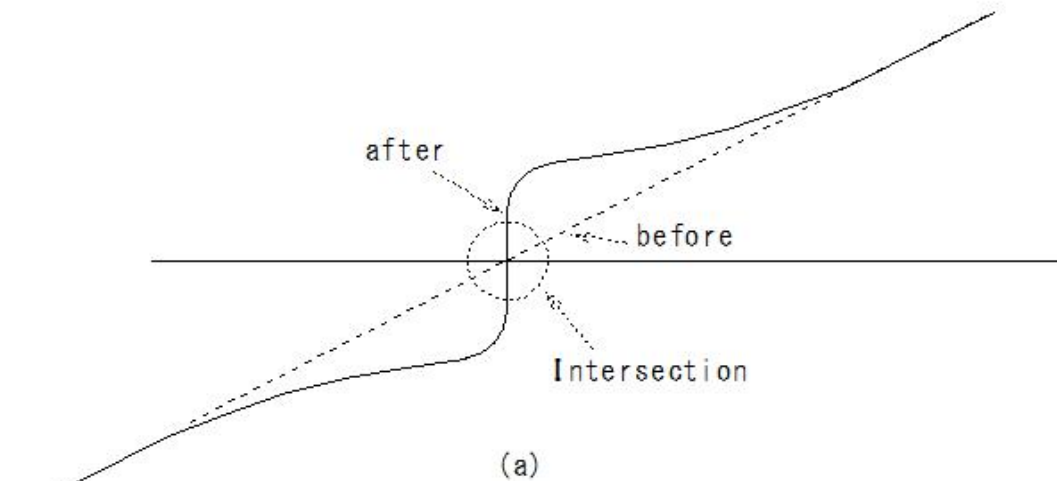
(H805)Road Structure Act(Intersection angle)

Road Structure Act

5-2 Shape and spacing of at-grade intersections

5-2-1 Number of branches and intersection angle

Planning and designing at-grade intersections



Plan so that intersecting traffic flows intersect at right angles or close to right angles

Figure 5-1 Correcting intersection angle

(H806)Road Structure Act(Intersection angle)

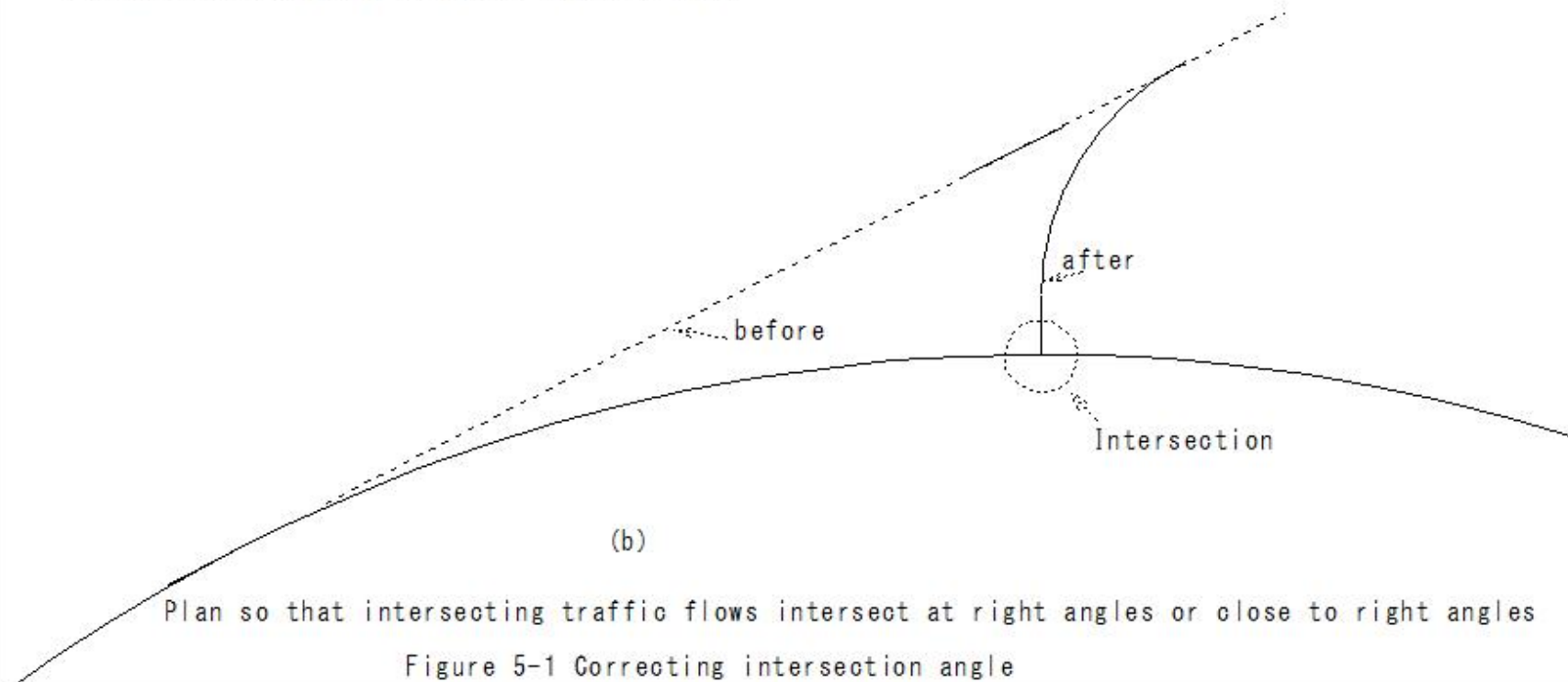
(H806)Road Structure Act(Intersection angle)

Road Structure Act

5-2 Shape and spacing of at-grade intersections

5-2-1 Number of branches and intersection angle

Planning and designing at-grade intersections



(H807)Road Structure Act(Intersection angle)

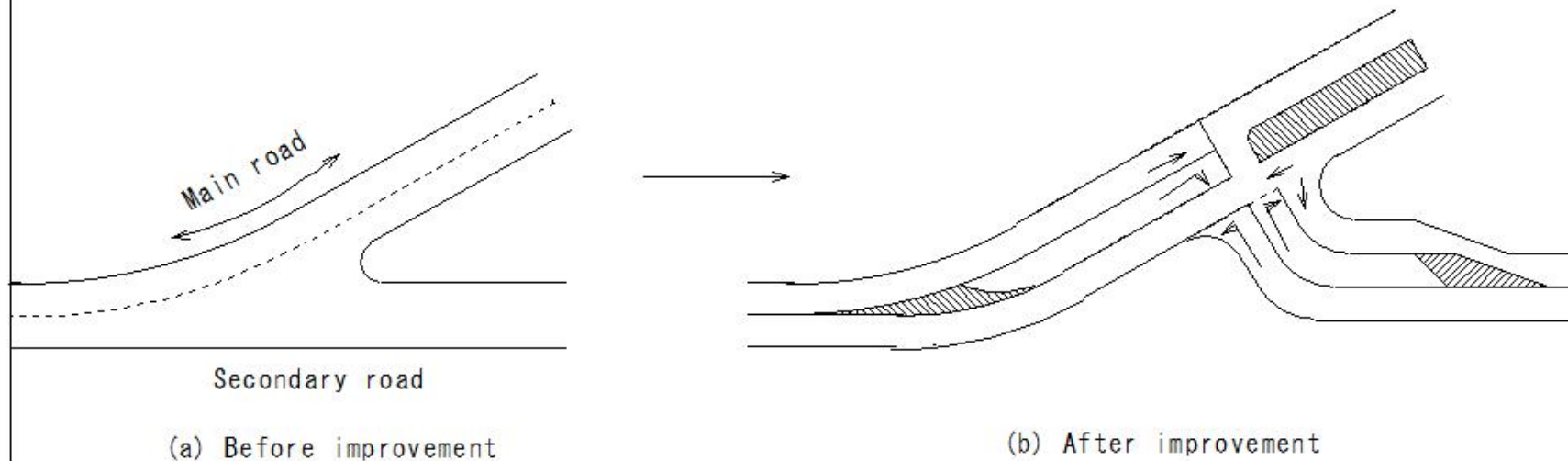
(H807)Road Structure Act(Intersection angle)

Road Structure Act

5-2 Shape and spacing of at-grade intersections

5-2-1 Number of branches and intersection angle

Planning and designing at-grade intersections



Plan so that intersecting traffic flows intersect at right angles or close to right angles

Figure 5-2 Connection of secondary roads at Y-shaped intersections

(H808)Road Structure Act(Intersection shapes)

(H808)Road Structure Act(Intersection shapes)

Road Structure Act

5-2 Shape and spacing of at-grade intersections

Planning and designing at-grade intersections

5-2-2 Intersection shapes

- ① Staggered intersections - avoid
 - ② Main traffic - linear alignment close to a straight line
 - ③ Intersection angle close to a right angle
- Speed-changing intersection

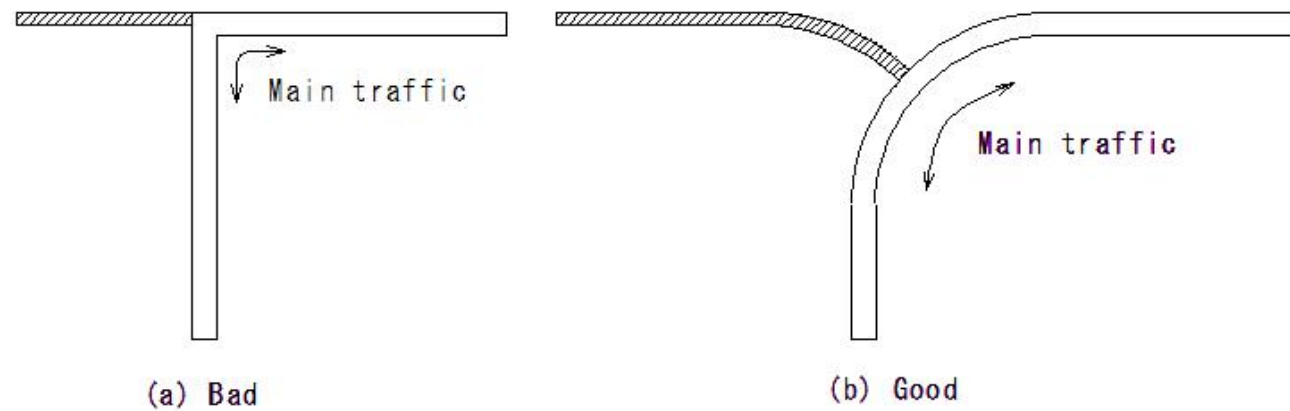


Figure 5-3 Improvements to T-shaped intersections

(H809)Road Structure Act(Intersection shapes)

(H809)Road Structure Act(Intersection shapes)

Road Structure Act

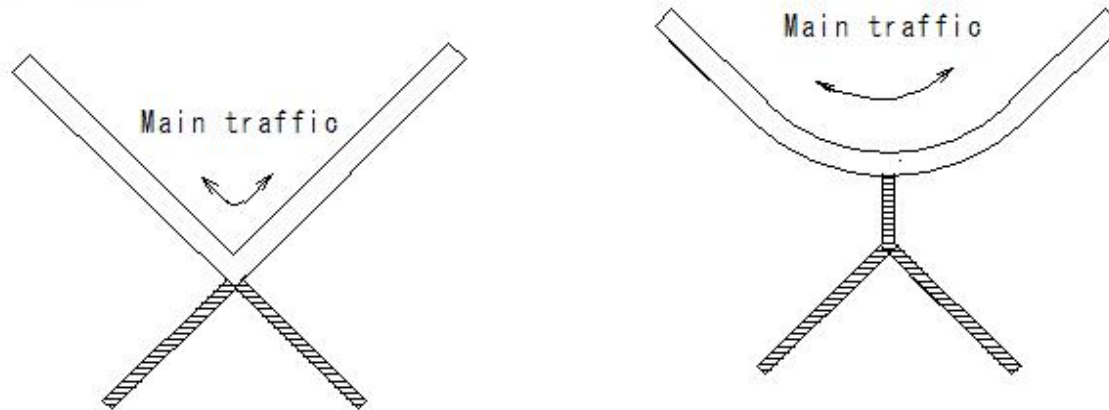
5-2 Shape and spacing of at-grade intersections

Planning and designing at-grade intersections

5-2-2 Intersection shapes

- ① Staggered intersections - avoid
- ② Main traffic - linear alignment close to a straight line
- ③ Intersection angle close to a right angle

Speed-changing intersection



(a) Bad

(b) Good

Figure 5-4 Improvement of cross-shaped intersections

(H810)Road Structure Act(Intersection shapes)

(H810)Road Structure Act(Intersection shapes)

Road Structure Act

5-2 Shape and spacing of at-grade intersections

Planning and designing at-grade intersections

5-2-2 Intersection shapes

- ① Staggered intersections - avoid
- ② Main traffic - linear alignment close to a straight line
- ③ Intersection angle close to a right angle

Speed-changing intersection

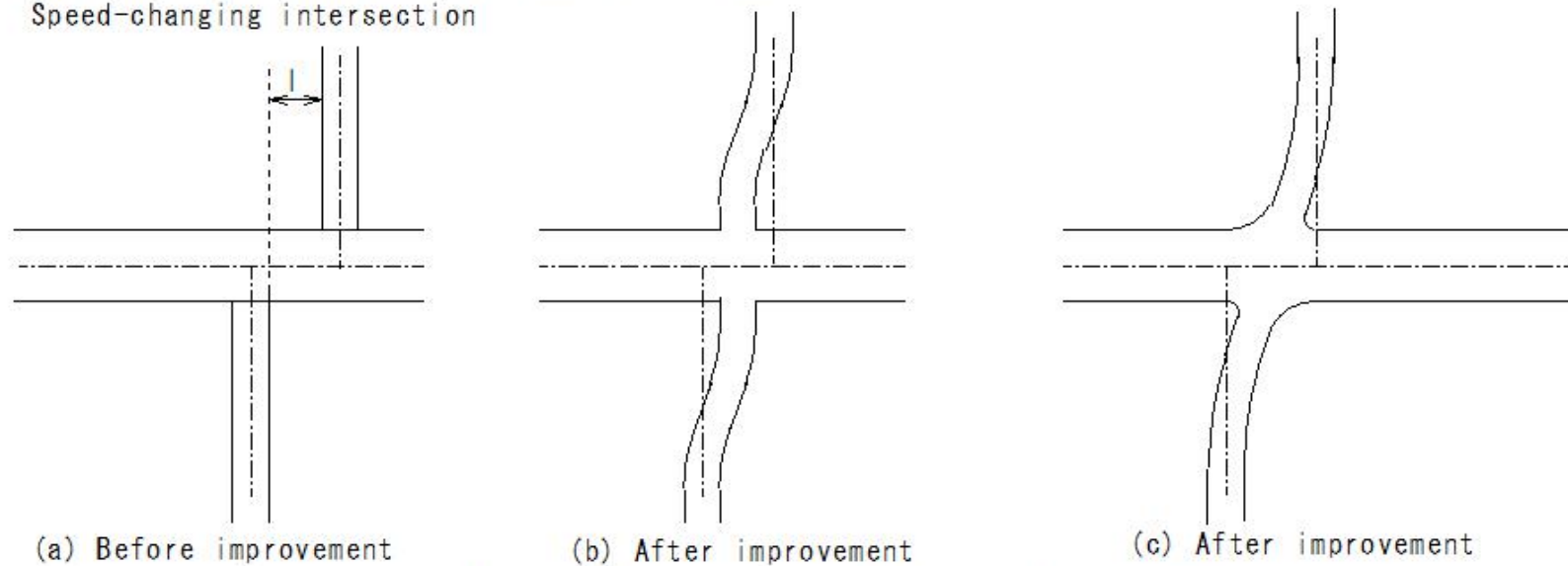


Figure 5-5 Improvement of staggered intersections

(H811)Road Structure Act(Intersection shapes)

(H811)Road Structure Act(Intersection shapes)

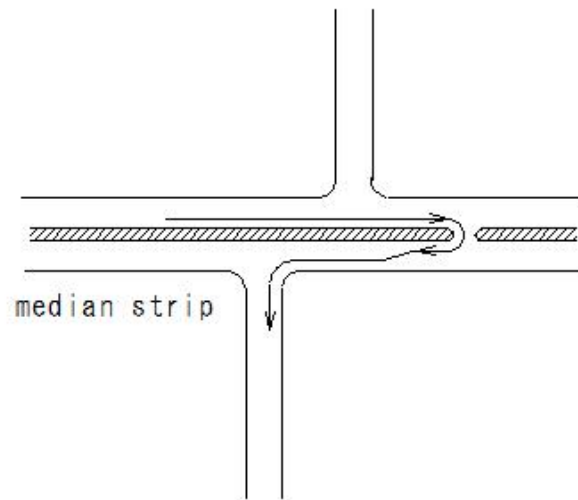
Road Structure Act

5-2 Shape and spacing of at-grade intersections

Planning and designing at-grade intersections

5-2-2 Intersection shapes

- ① Staggered intersections - avoid
- ② Main traffic - linear alignment close to a straight line
- ③ Intersection angle close to a right angle



Median strip

in case of crossing at an angle

Allow only left turns

Provide a median strip

Figure 5-6 Restrictions using medians

(H812)Road Structure Act(Intersection shapes)

(H812) Road Structure Act (Intersection shapes)

Road Structure Act

5-2 Shape and spacing of at-grade intersections

Planning and designing at-grade intersections

5-2-2 Intersection shapes

- ① Staggered intersections - avoid
- ② Main traffic - linear alignment close to a straight line
- ③ Intersection angle close to a right angle

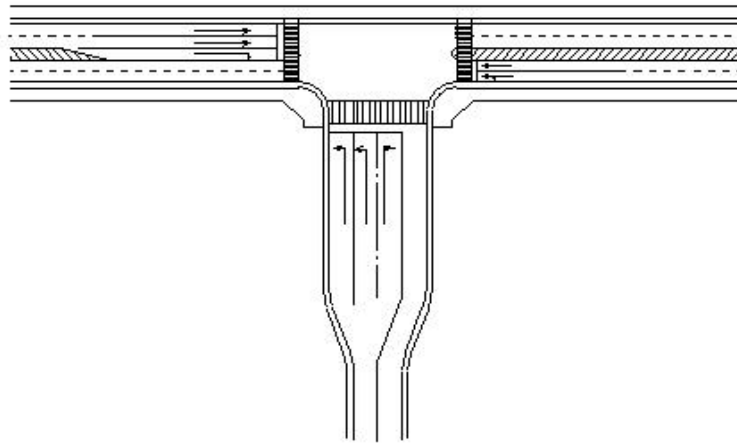


Figure 5-7 Widening of intersecting roads

(H813)Road Structure Act(Intersection spacing)

(H813)Road Structure Act(Intersection spacing)

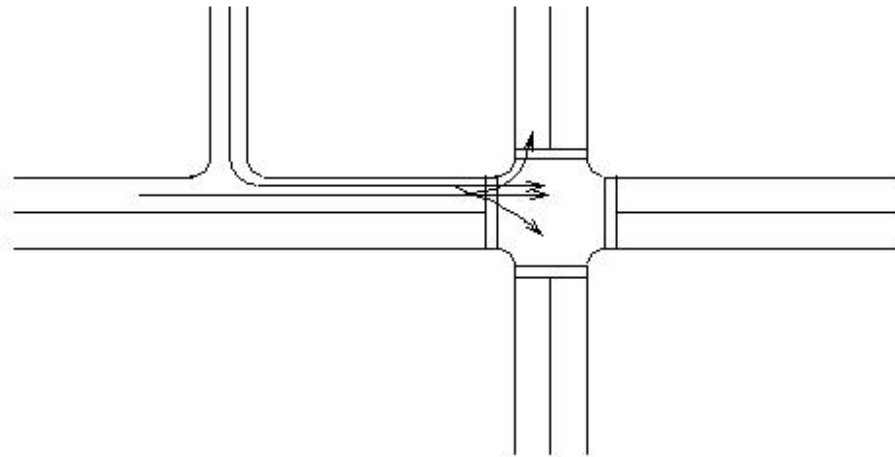
Road Structure Act

5-2 Shape and spacing of at-grade intersections

Planning and designing at-grade intersections

5-2-3 Intersection spacing

Intersection spacing: Keep it as large as possible



(a) Restrictions due to weaving length

Figure 5-8 Example of weaving between adjacent intersections

(H814)Road Structure Act(Intersection spacing)

(H814)Road Structure Act(Intersection spacing)

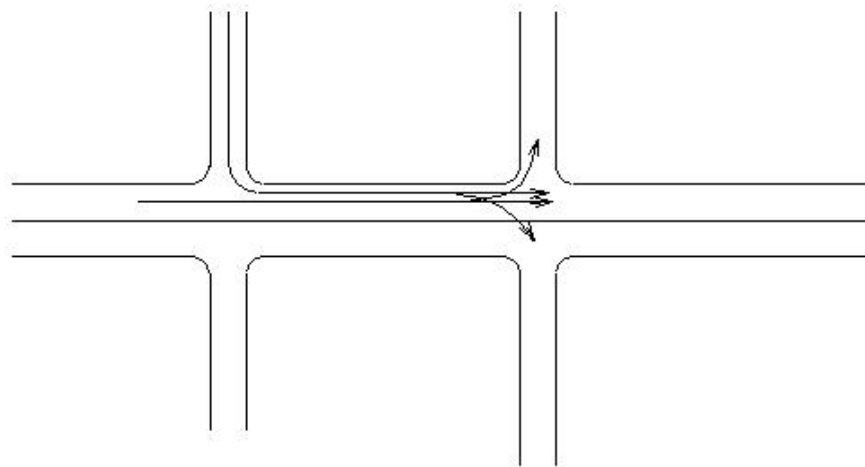
Road Structure Act

5-2 Shape and spacing of at-grade intersections

Planning and designing at-grade intersections

5-2-3 Intersection spacing

Intersection spacing: Keep it as large as possible



(b) Restrictions due to signal control hold-up length

Figure 5-8 Example of weaving between adjacent intersections

(H815)Road Structure Act(Intersection spacing)

(H815)Road Structure Act(Intersection spacing)

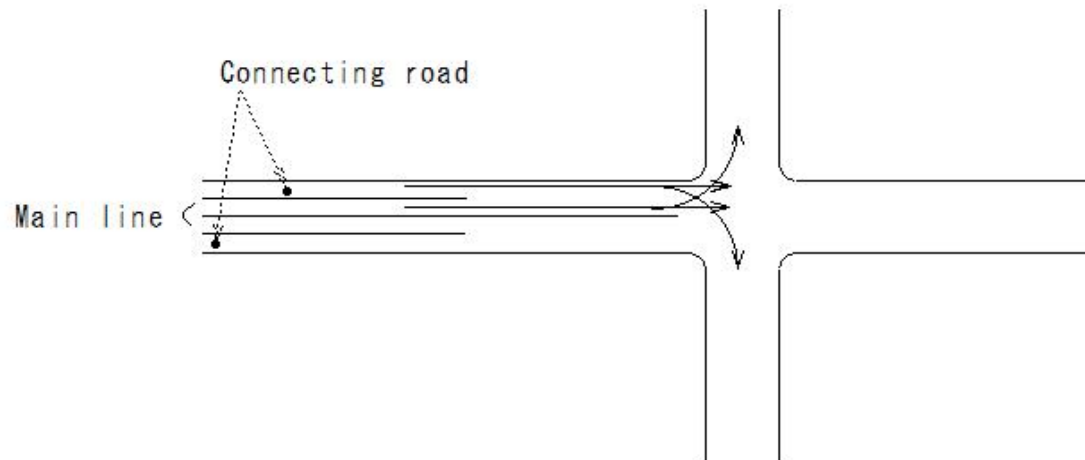
Road Structure Act

5-2 Shape and spacing of at-grade intersections

Planning and designing at-grade intersections

5-2-3 Intersection spacing

Intersection spacing: Keep it as large as possible



(c) Restrictions due to right-turn lane length, etc.

Figure 5-8 Example of weaving between adjacent intersections

(H816)Road Structure Act(Intersection spacing)

(H816)Road Structure Act(Intersection spacing)

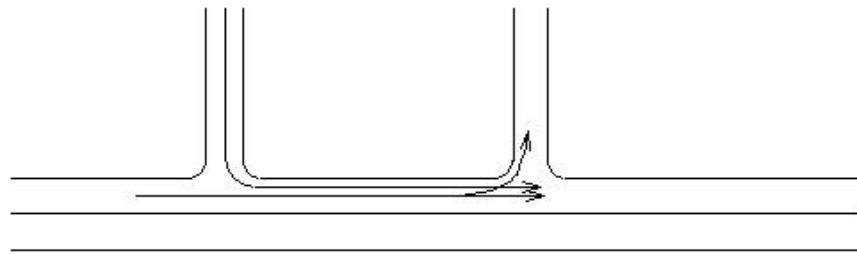
Road Structure Act

5-2 Shape and spacing of at-grade intersections

Planning and designing at-grade intersections

5-2-3 Intersection spacing

Intersection spacing: Keep it as large as possible



(d) Restrictions due to the driver's limited attention

Figure 5-8 Example of weaving between adjacent intersections

(H817)Road Structure Act(Intersection spacing)

(H817)Road Structure Act(Intersection spacing)

Road Structure Act

5-2 Shape and spacing of at-grade intersections

Planning and designing at-grade intersections

5-2-3 Intersection spacing

Intersection spacing: Keep it as large as possible

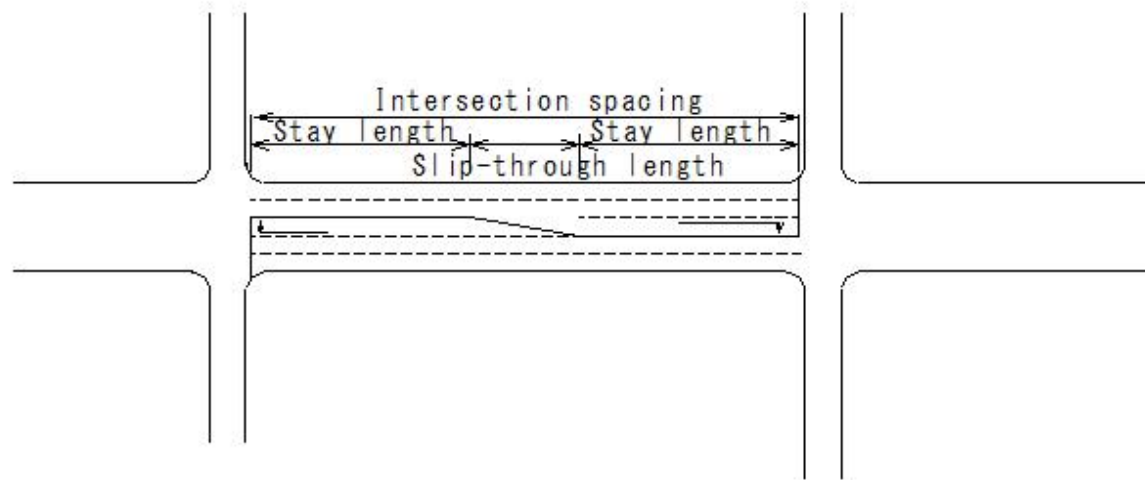


Figure 5-9 Restrictions due to right-turn lane length

(H818)Road Structure Act(Intersection spacing)

(H818)Road Structure Act(Intersection spacing)

Road Structure Act

5-2 Shape and spacing of at-grade intersections

Planning and designing at-grade intersections

5-2-3 Intersection spacing

Intersection spacing: Keep it as large as possible

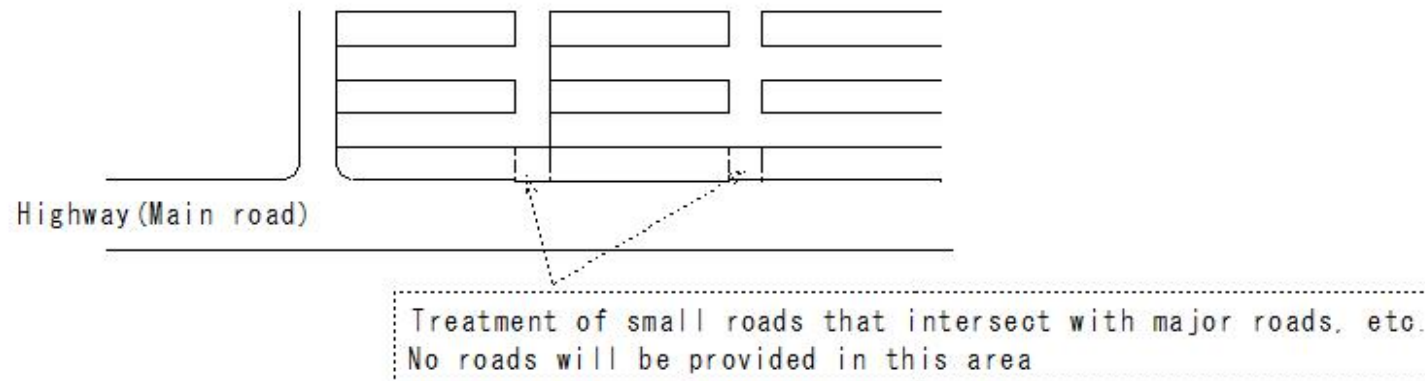


Figure 5-10 Treatment of narrow streets

(H819)Road Structure Act(Intersection spacing)

(H819)Road Structure Act(Intersection spacing)

Road Structure Act

5-2 Shape and spacing of at-grade intersections

Planning and designing at-grade intersections

5-2-3 Intersection spacing

Intersection spacing: Keep it as large as possible



(a) Before improvement

(b) After improvement

Limiting ingress and egress to left turns only

Restricting right crossing from main roads by using medians, etc.

Figure 5-11 Example of treatment for nearby small intersections

(H820)Road Structure Act(Alignment near intersections)

(H820)Road Structure Act(Alignment near intersections)

Road Structure Act

Road Structure Act

5-3 Alignment near grade intersections

5-3-1 Sight distance at intersections

Minimum sight distance (m) Design speed (km/h)	Signal control		Stop control
	Type 3	Type 4	
80	350	-	-
60	240	170	105
50	190	130	80
40	140	100	55
30	100	70	35
20	60	40	20

(H821)Road Structure Act(Alignment near intersections)

(H821)Road Structure Act(Alignment near intersections)

Road Structure Act

5-3 Alignment near grade intersections

5-3 -2 Curve radius

Minimum curve radius (m)	Main road at signalized intersection and stop-controlled intersection		Secondary road at stop-controlled intersection
	Standard value	Exceptional value	
80	280	230	-
60	150	120	60
50	100	80	40
40	60	50	30
30	30	-	15
20	15	-	15

(H822)Road Structure Act(Longitudinal Alignment)

(H822)Road Structure Act(Longitudinal Alignment)

Road Structure Act

5-3 Alignment near grade intersections

5-3 -3 Longitudinal Alignment

Table 5-2 Minimum Length of Gentle Gradient Section Near Intersection

Road Classification System		Minimum Section Length (m)
Type 3	Type 4	
Class 1, Class 2	Class 1	40
Class 3	Class 2	35
Class 4	Class 3	15
Class 5	-	10
-	Class 4	6

(H823)Road Structure Act(Lane width and lane width)

(H823)Road Structure Act(Lane width and lane width)

Road Structure Act

5-4 Crossing configuration near grade intersections

5-4-1 Lane width and number of lanes

unit: m

Lane type		Lane width on single-lane sections	Width of straight lanes where additional lanes are provided	Width of additional lanes
Road classification				
Type 3	Class 1	3.5	3.5	3.25, 3.0 or 2.75 (2.5)
	Class 2	3.25[3.5]	3.25[3.5]	
	Class 3	3	3.0	
	Class 4	2.75	2.75	
Type 4	Class 1	3.25[3.5]	3.25 or 3.0	
	Class 2	3.0	3.0 or 2.75	
	Class 3			

[] indicates width when necessary due to traffic conditions

() indicates minimum value for right-turn lanes in urban areas when unavoidable

(H824)Road Structure Act(Lane width and number of lanes)

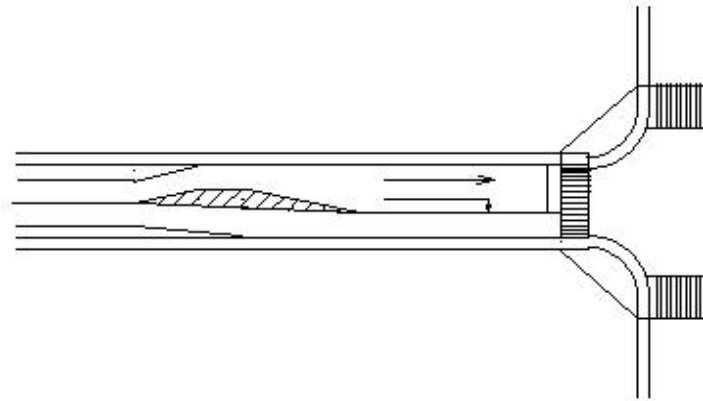
(H824)Road Structure Act(Lane width and number of lanes)

Road Structure Act

5-4 Crossing configuration near intersections

5-4-1 Lane width and number of lanes

Ensuring width equivalent to right-turn lane



Width equivalent to right-turn lane: 1.5m

Figure 5-12 Bulge equivalent to right-turn lane

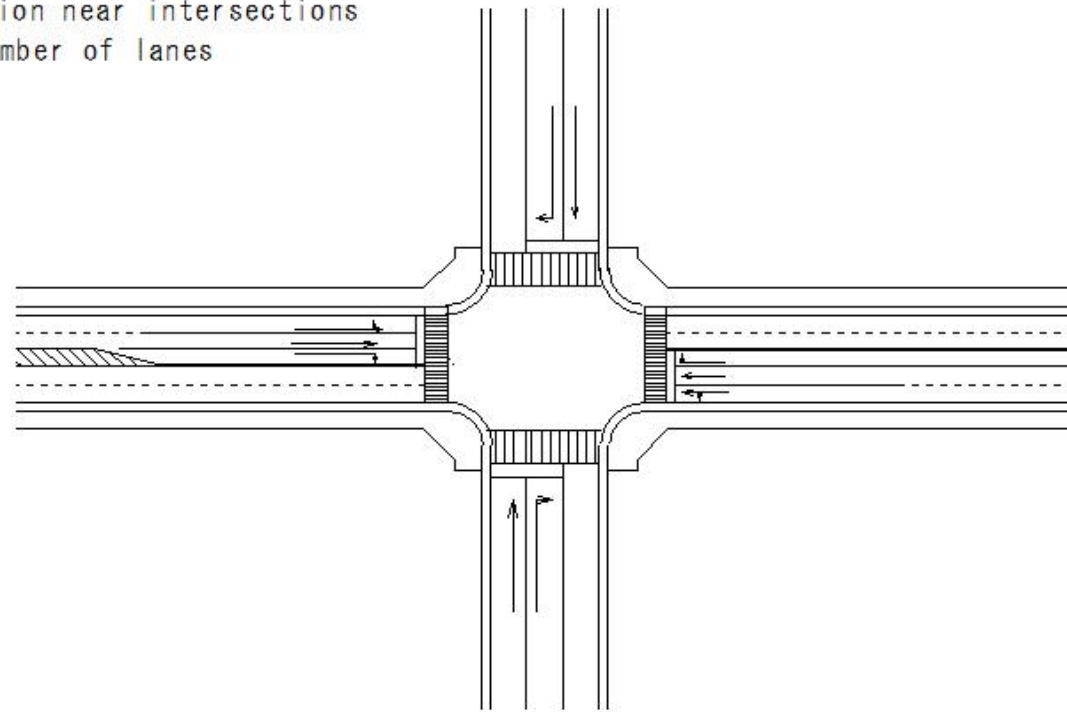
(H825)Road Structure Act(Lane width and number of lanes)

(H825)Road Structure Act(Lane width and number of lanes)

Road Structure Act

5-4 Crossing configuration near intersections

5-4-1 Lane width and number of lanes



Number of lanes

Figure 5-13 Straight lanes at the outflow corresponding to the shift at the inflow

(H826)Road Structure Act(Main line shift)

(H826)Road Structure Act(Main line shift)

Road Structure Act

5-4 Crossing configuration near intersections

5-4-2 Main line shift

Level intersection: When shifting the main line (transition) to provide additional lanes

Table 5-3 Section length of main line shift

Area classification	Rural areas		Urban areas	
Design speed (km/h)	Calculation formula	Minimum value	Calculation formula	Minimum value
80	$V \cdot \Delta W/2$	85	-	-
60		60	$V \cdot \Delta W/3$	40
50	$V \cdot \Delta W/3$	40		35
40		35		30
30		30		25
20		25		20

ΔW : Horizontal shift of the main line (m)

(H827)Road Structure Act(Right turn lane)

(H827)Road Structure Act(Right turn lane)

Road Structure Act

5-4 Crossing configuration near intersections

5-4 -3 Right turn lane

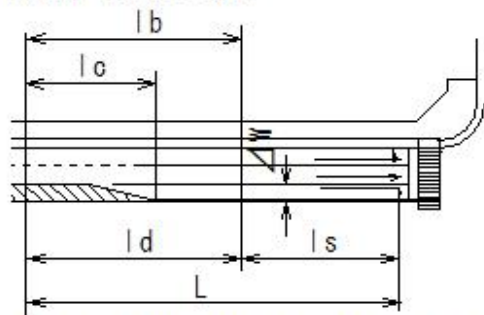


Figure 5-14 Length of right-turn lane

Table 5-4 Minimum speed reduction required (lb)

Category	Main roads	Secondary roads
	in rural areas	in rural areas and and roads in urban areas
Design speed		
80	60	45
60	40	30
50	30	20
40	20	15
30	10	10
20	10	10

Unit: m

l_b : Minimum length required for deceleration at grade intersections

l_c : Minimum length required to shift from a straight lane to a right-turn lane

$$l_c = V \times \Delta W / 6 \dots \dots \dots (5-3)$$

V : Design speed (km/h)

ΔW : Amount of lateral shift (m) (can be considered as the width of the additional lane)

$$l_d = \max(l_b, l_c) \dots \dots \dots (5-4)$$

$$l_s = 1.5 \times N \times S \dots \dots \dots (5-5)$$

N : Average number of right-turning vehicles per cycle (vehicles)

S : Average headway (m)

(H828)Road Structure Act(Left turn lane)

(H828)Road Structure Act(Left turn lane)

Road Structure Act

5-4 Crossing configuration near intersections

5-4 -4 Left turn lane

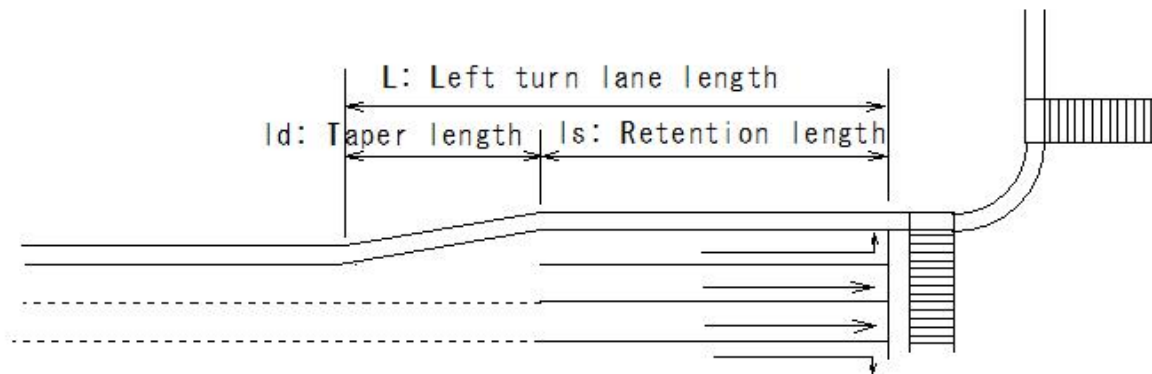


Figure 5-15 Left turn lane

(H829)Road Structure Act(Left turn lane)

(H829) Road Structure Act(Left turn lane)

Road Structure Act

5-4 Crossing configuration near intersections

5-4 -4 Left turn lane

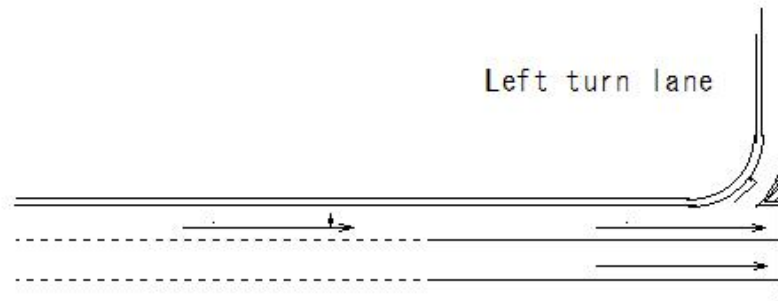


Figure 5-16 Left turn road (in case of used alone)

(H830)Road Structure Act(Shift lanes)

(H830)Road Structure Act(Shift lanes)

Road Structure Act

5-4 Crossing configuration near intersections

5-4 -5 Shift lanes

Table 5-5 Shift lane length (not including taper)

Classification	Deceleration lane length (m)						Acceleration lane length (m)					
	Main roads in rural areas			Secondary roads in rural areas and urban roads			Main roads in rural areas			Secondary roads in rural areas and urban roads		
Design speed (km/h)	Until stop	Up to 20km/h	Up to 40km/h	Until stop	Up to 20km/h	Up to 40km/h	Until stop	Up to 20km/h	Up to 40km/h	Until stop	Up to 20km/h	Up to 40km/h
80	60	50	30	45	40	25	140	120	80	90	80	50
60	40	30	20	30	20	10	100	80	40	65	55	25
50	30	20	-	20	15	-	60	50	-	40	30	-
40	20	10	-	15	10	-	40	20	-	25	15	-
30	10	-	-	10	-	-	20	-	-	10	-	-

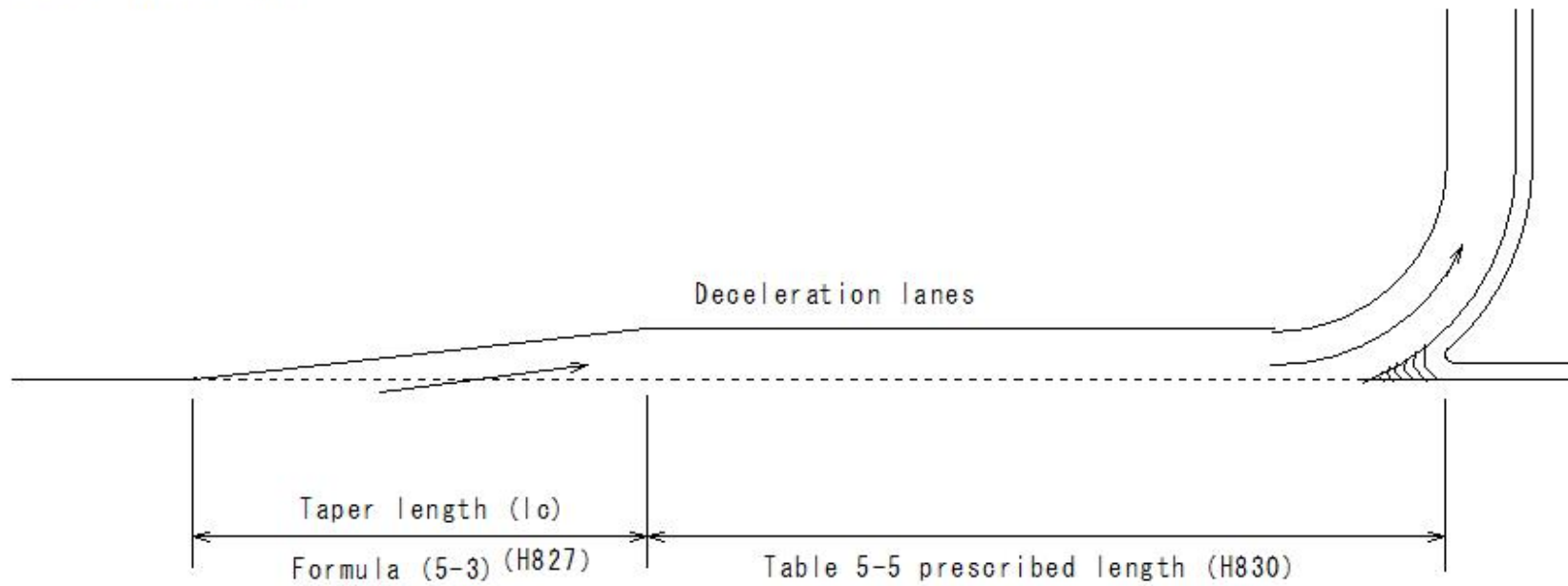
(H831)Road Structure Act(Shift lanes)

(H831)Road Structure Act(Shift lanes)

Road Structure Act

5-4 Crossing configuration near intersections

5-4 -5 Shift lanes



$$l_c = V \times \Delta W / 6 \dots \dots \dots (5-3)$$

(a)

Figure 5-17 Shift lanes

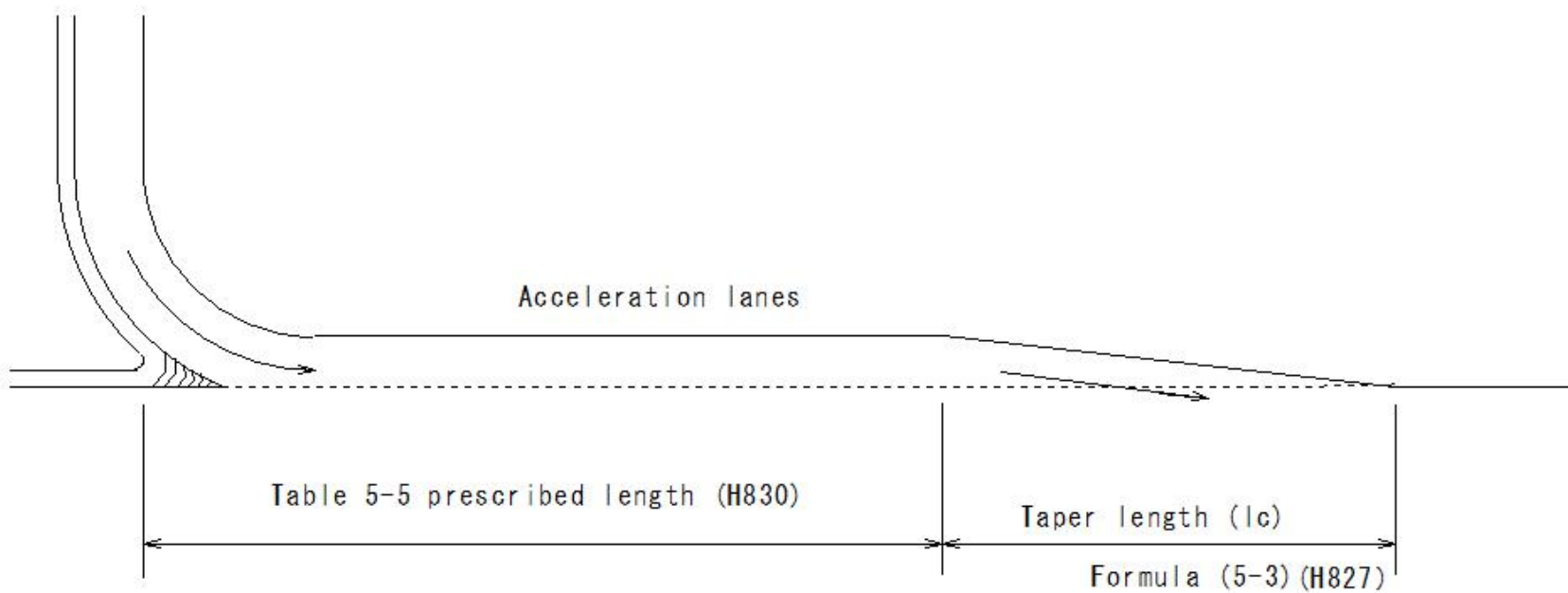
(H832)Road Structure Act(Shift lanes)

(H832) Road Structure Act(Shift lanes)

Road Structure Act

5-4 Crossing configuration near intersections

5-4 -5 Shift lanes



$$l_c = V \times \Delta W / 6 \dots \dots \dots (5-3)$$

(b)

Figure 5-17 Shift lanes

(H833)Road Structure Act(Guideway -Traffic island-Corner cut)

(H833)Road Structure Act(Guideway -Traffic island-Corner cut)

Road Structure Act

5-5 Guideway -Traffic island-Corner cut

5-5 -1 Guideway

Inner curve starts approximately 5m before

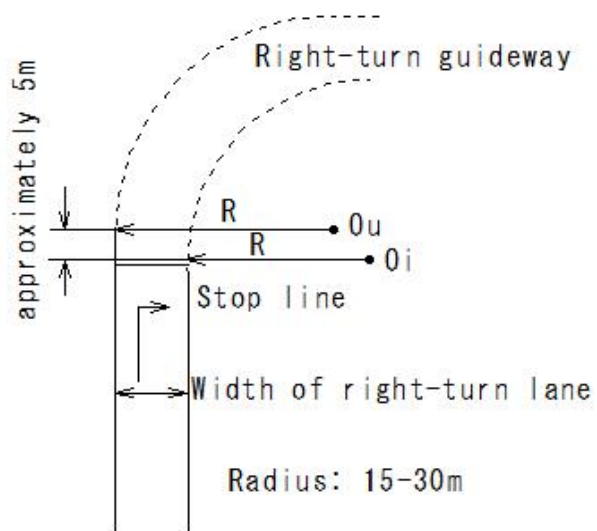


Table 5-6 Guideway width (unit: m)

Design vehicle	Semi-trailer combination vehicle			Ordinary vehicle (other roads)
	Type 1	Type 2	Type 3	
Outer radius of conduit	Class 1	Type 4	Class 1	
Over 13 below 14			8.5	5.5
14 15			8.0	
15 16			7.7	
16 17			7.0	5.0
17 19			6.5	
19 21			6.0	4.5
21 25			5.5	
25 30			5.0	4.0
30 40			4.5	
40 60			4.0	3.5
60			3.5	

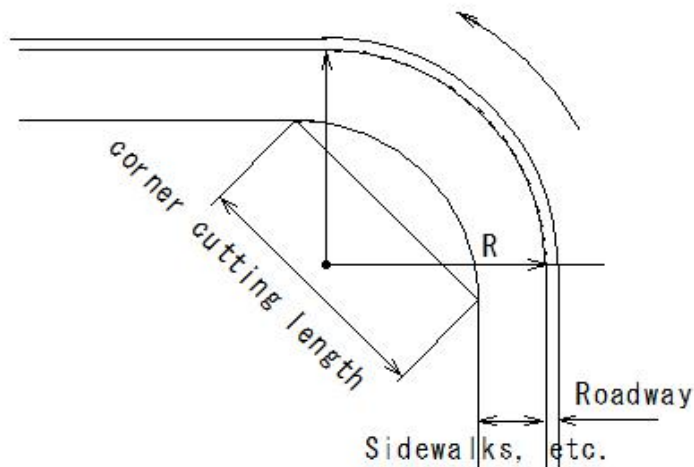


Figure 5-18 Design of right-turn guideway Figure 5-19 Corner radius and corner cutting length

(H834)Road Structure Act(Guideway Design Method)

(H834)Road Structure Act(Guideway Design Method)

Road Structure Act

5-5 Guideway -Traffic island-Corner cut

5-5 -1 Guideway

- ① Determine θ , XYX' , and APA' from the inflow and outflow flow lines and lane width W_o
- ② Determine the radius R_o of the outer circle EE' and draw a circle
- ③ Determine the guideway width w and the radius R_i of the inner circle DD' from Table 5-6 and draw a circle
- ④ Draw straight lines DQ and $D'Q$ that are parallel to AP and $A'P$ and tangent to R_i
- ⑤ Determine the relaxation circle $R_r (=nR_i)$ whose radius is n times R_i Typically n is 3 or 4
- ⑥ $f = S/(n-1)$ (S is the distance between AP and DQ) Find f , and draw NM and $N'M$ that are parallel to DQ and $D'Q$ and are f away from each other, and let the intersections of the circle R_r be B and B' .
- ⑦ Determine A and A' so that $AE = A'E' = (n-1)BF$.
- ⑧ A , A' , B , and B' are the tangent points of the relaxation circle R_r .

To calculate these points, use the following formula:

$$EP = (R_i + S) \cot \theta / 2$$

$$AE = \sqrt{2(R_r - R_i)S - S^2}$$

$$FB = (1/(n-1))AE$$

$$EF = S + f = S + (1/(n-1))S = S + (1/(n-1))S$$

Figure 5-20 Guideway Design Method

(H835)Road Structure Act(Guideway Design Method)

(H835)Road Structure Act(Guideway Design Method)

Road Structure Act

5-5 Guideway -Traffic island-Corner cut

5-5 -1 Guideway

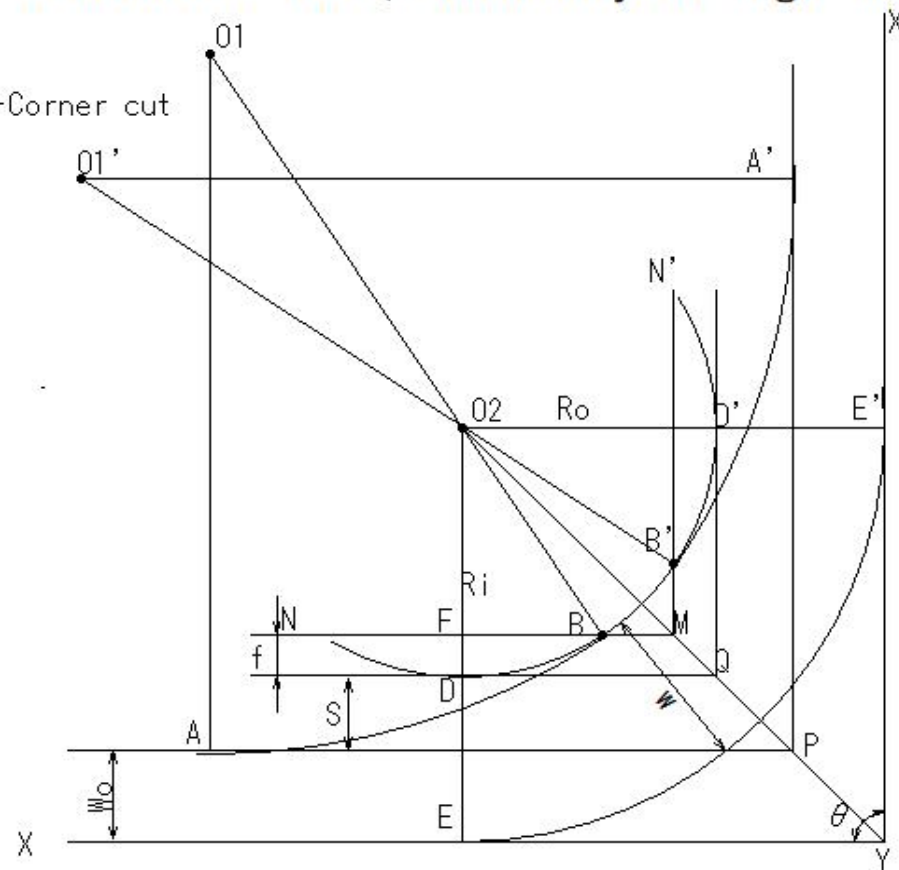


Figure 5-20 Guideway Design Method

(H836)Road Structure Act(Guideway Design Method)

(H836) Road Structure Act(Guideway Design Method)

Road Structure Act

5-5-1 How to handle wide Guideway

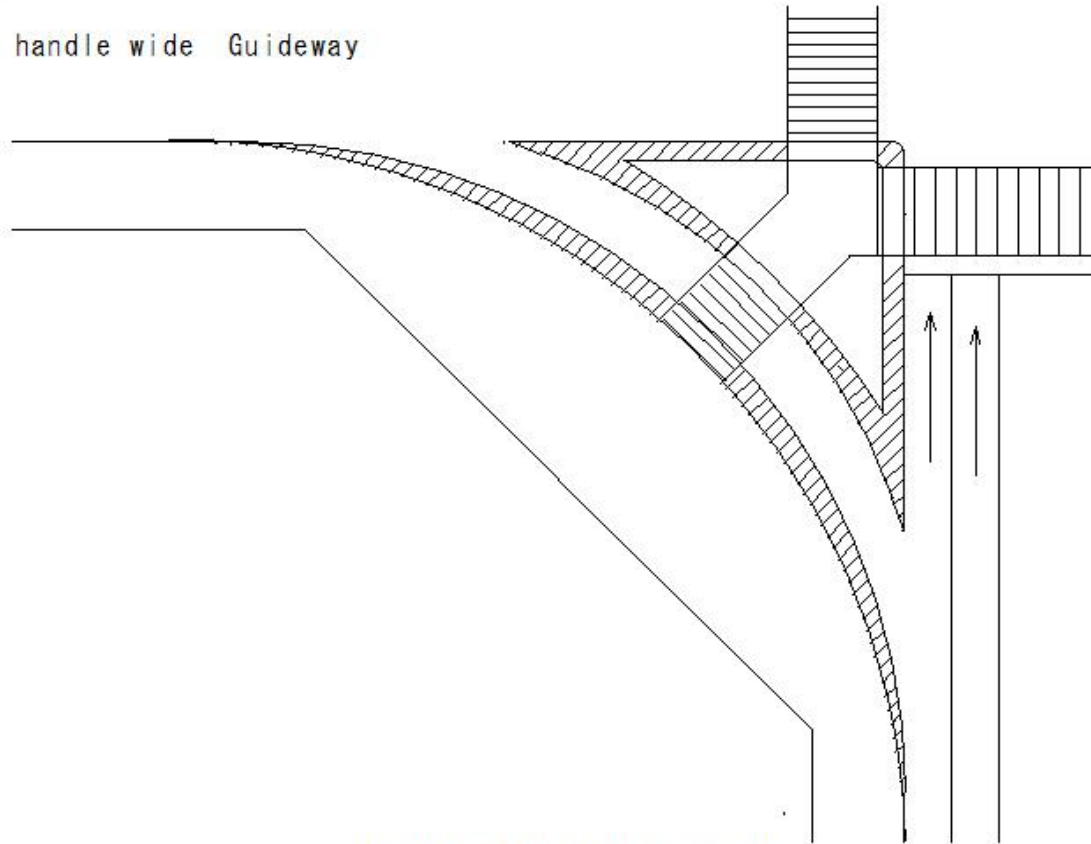


Figure 5-21 Wide Guideway

(H837)Road Structure Act(Traffic islands and medians)

(H837)Road Structure Act(Traffic islands and medians)

Road Structure Act

5-5 Guideway -Traffic island-Corner cut

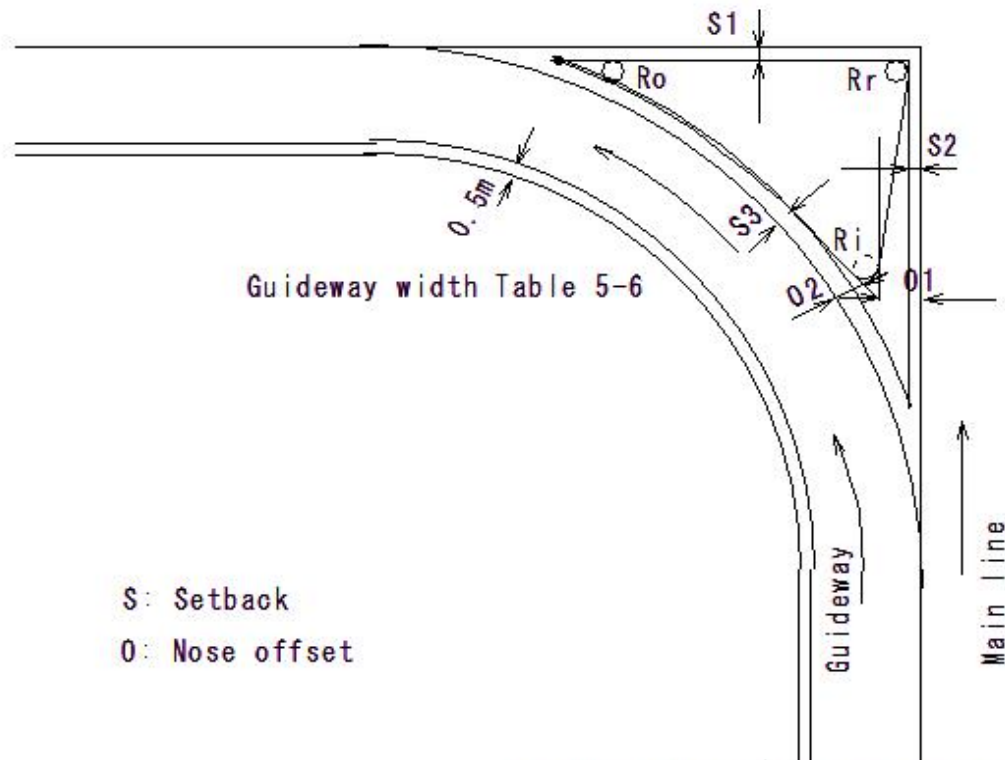


Figure 5-22 Setback and nose offset

(H838)Road Structure Act(Traffic islands and medians)

(H838)Road Structure Act(Traffic islands and medians)

Road Structure Act

5-5 Guideway -Traffic island-Corner cut

5-5-2 Traffic islands and medians

Table 5-7 Setback and nose offset

Category c (m) d (m)	S1,S2	S3	O1	O2
Design speed (km/h)				
80	1.00	0.50	1.50	1.00
60	0.75	0.50	1.00	0.75
50 or less	0.50	0.50	0.50	0.50

Table 5-8 Radius of traffic island tip

Ri	Ro	Rr
0.50~1.00	0.5	0.50~1.50

Unit: m

Table 5-9 Minimum specifications for traffic islands and medians

Category	Specifications	Urban area	Rural area
(a)	Wa	1.0m	1.5m
	la	3.0m	5.0m
	Rd	0.5m	0.5m
(b)	Wb	1.5m	2.0m
	lb	(Wp+1.0)m	(Wp+1.0)m
	Rb	0.5m	0.5m
	Area	5.0m ²	7.0m ²
(c)	Wc	(D+1.0)m	(D+1.5)m
	lc	5m	5m
(d)	Wd	1.0m	1.5m

D: Facility width (m)

Wa-d: See Figure 5-23

Wp: Width of pedestrian crossing (m)

(H839)Road Structure Act(Traffic islands and medians)

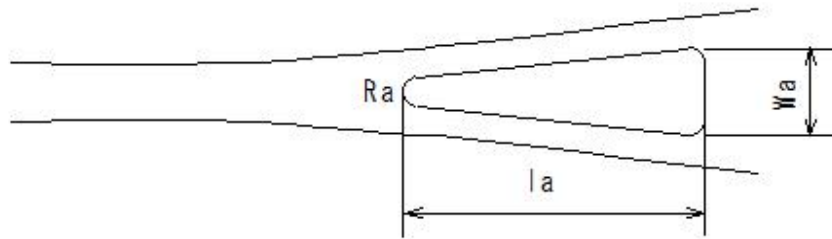
(H839)Road Structure Act(Traffic islands and medians)

Road Structure Act

5-5 Guideway -Traffic island-Corner cut

5-5-2 Traffic islands and medians

Table 5-9 Minimum specifications for traffic islands and medians



(a) Only diverging

Category	Specifications	Urban area	Rural area
(a)	Wa	1.0m	1.5m
	la	3.0m	5.0m
	Ra	0.5m	0.5m
(b)	Wb	1.5m	2.0m
	lb	(Wp+1.0)m	(Wp+1.0)m
	Rb	0.5m	0.5m
	Area	5.0m ²	7.0m ²
(c)	Wc	(D+1.0) m	(D+1.5) m
	lc	5.0m	5.0m
(d)	Wd	1.0m	1.5m

Figure 5-23 Traffic islands and medians

D: Facility width (m)

Wp: Width of pedestrian crossing (m)

Wa-d: See Figure 5-23

(H840)Road Structure Act(Traffic islands and medians)

(H840)Road Structure Act(Traffic islands and medians)

Road Structure Act

5-5 Guideway -Traffic island-Corner cut

5-5-2 Traffic islands and medians

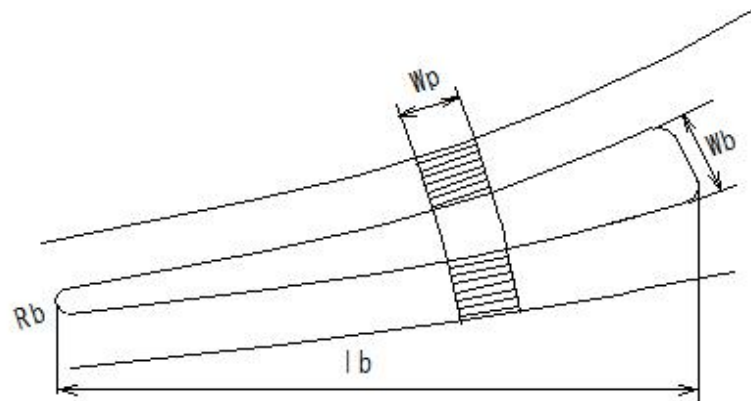


Table 5-9 Minimum specifications for traffic islands and medians

Category	Specifications	Urban area	Rural area
(a)	Wa	1.0m	1.5m
	la	3.0m	5.0m
	Ra	0.5m	0.5m
(b)	Wb	1.5m	2.0m
	lb	($W_p + 1.0$)m	($W_p + 1.0$)m
	Rb	0.5m	0.5m
	Area	5.0m ²	7.0m ²
(c)	Wc	($D + 1.0$) m	($D + 1.5$) m
	lc	5.0m	5.0m
(d)	Wd	1.0m	1.5m

(b) in case of a pedestrian crossing is provided

Figure 5-23 Traffic islands and medians

D: Facility width (m)

Wp: Width of pedestrian crossing (m)

Wa-d: See Figure 5-23

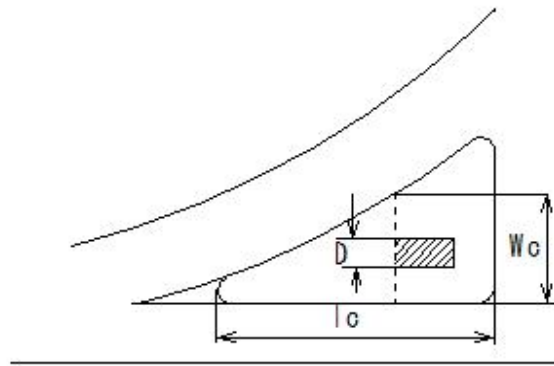
(H841)Road Structure Act(Traffic islands and medians)

(H841)Road Structure Act(Traffic islands and medians)

Road Structure Act

5-5 Guideway -Traffic island-Corner cut

5-5-2 Traffic islands and medians



(c) in case of facilities are constructed

Figure 5-23 Traffic islands and medians

Table 5-9 Minimum specifications for traffic islands and medians

Category	Specifications	Urban area	Rural area
(a)	Wa	1.0m	1.5m
	la	3.0m	5.0m
	Ra	0.5m	0.5m
(b)	Wb	1.5m	2.0m
	lb	$(W_p+1.0)$ m	$(W_p+1.0)$ m
	Rb	0.5m	0.5m
	Area	5.0m ²	7.0m ²
(c)	Wc	$(D+1.0)$ m	$(D+1.5)$ m
	lc	5.0m	5.0m
(d)	Wd	1.0m	1.5m

D: Facility width (m)

Wp: Width of pedestrian crossing (m)

Wa-d: See Figure 5-23

(H842)Road Structure Act(Traffic islands and medians)

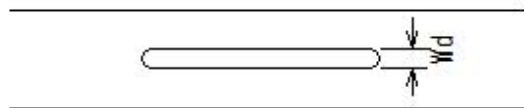
(H842)Road Structure Act(Traffic islands and medians)

Table 5-9 Minimum specifications for traffic islands and medians

Road Structure Act

5-5 Guideway -Traffic island-Corner out

5-5-2 Traffic islands and medians



(d) Medians without tapers

Category	Specifications	Urban area	Rural area
(a)	Wa	1.0m	1.5m
	la	3.0m	5.0m
	Ra	0.5m	0.5m
(b)	Wb	1.5m	2.0m
	lb	(Wp+1.0)m	(Wp+1.0)m
	Rb	0.5m	0.5m
	Area	5.0m ²	7.0m ²
(c)	Wc	(D + 1.0) m	(D + 1.5) m
	lc	5.0m	5.0m
(d)	Wd	1.0m	1.5m

D: Facility width (m)

Wp: Width of pedestrian crossing (m)

Wa-d: See Figure 5-23

Figure 5-23 Traffic islands and medians

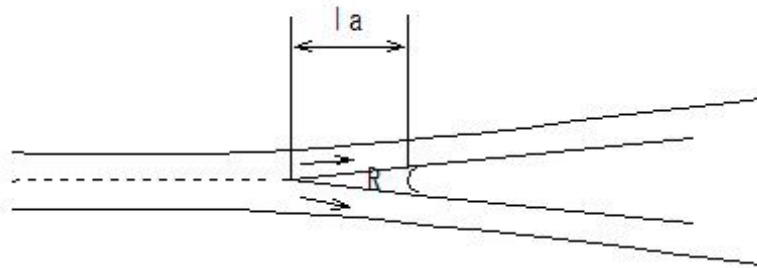
(H843)Road Structure Act(Traffic islands and medians)

(H843)Road Structure Act(Traffic islands and medians)

Road Structure Act

5-5 Guideway -Traffic island-Corner cut

5-5-2 Traffic islands and medians



(a) Allocation

Figure 5-24 Traffic island road markings' edge length

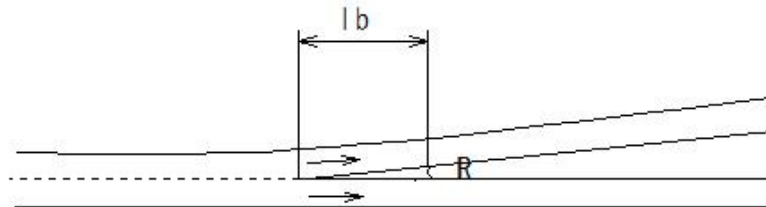
(H844)Road Structure Act(Traffic islands and medians)

(H844)Road Structure Act(Traffic islands and medians)

Road Structure Act

5-5 Guideway -Traffic island-Corner cut

5-5-2 Traffic islands and medians



(b) One-way traffic

$l_b = 2/3VR$ (b) One-way traffic

l_a, l_b : Road marking edge length (m)

V : Design speed (km/h)

R : Island tip radius (m)

Figure 5-24 Traffic island road markings' edge length

(H845)Road Structure Act(How to pass through intersections and corner cutting)

(H845)Road Structure Act(How to pass through intersections and corner cutting)

Road Structure Act

5-5 Guideway -Traffic island-Corner cut

5-5 -3 How to pass through intersections and corner cutting

Table 5-10 How to pass right/left turning vehicles at intersections

Road type		Type 1	Type 3					Type 4				
Conditions			Class 1	Class 2	Class 3	Class 4	Class 5	Class 1	Class 2	Class 3	Class 4	
In case of stop control	Inflow section		S4	S4	T4	T4	T3	T1	S4	T3	T2	T1
	Outflow section	Main road	S4	S4	T4	T3	T2	T1	S4	T3	T2	T1
		Secondary road			T3	T3	T2	T1		T2	T2	T1
In case of signal control	Inflow section			S4	T4	T4	T3	T1	S4	T3	T2	T1
	Outflow section			S3	T3	T2	T2	T1	S3	T2	T2	T1

1. Use the entire width of the road
2. Use the left side of the center of the road.
3. Use the turning lane or the rightmost lane (when turning right) or the leftmost lane (when turning left) and one other lane.
Do not use the opposing lane.
4. Use only the turning lane or the rightmost lane (when turning right) or the leftmost lane (when turning left)

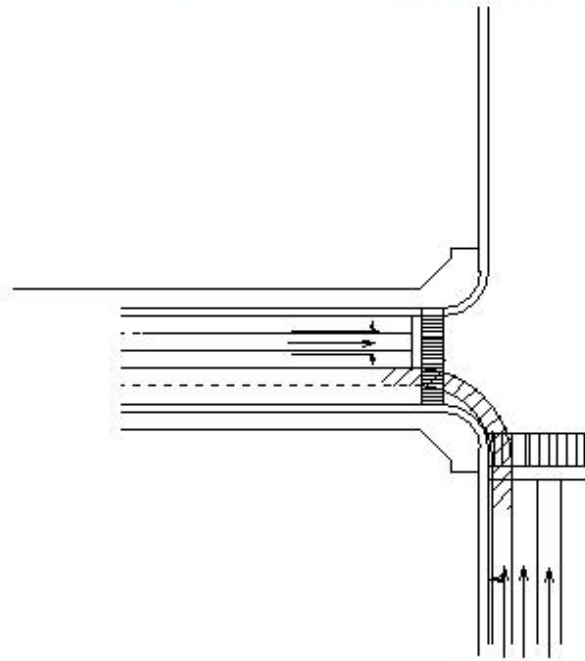
(H846)Road Structure Act(How to pass through intersections and corner cutting)

(H846)Road Structure Act(How to pass through intersections and corner cutting)

Road Structure Act

5-5 Guideway -Traffic island-Corner cut

5-5 -3 How to pass through intersections and corner cutting



(a) S4 → S3

Figure 5-25 How to pass through intersections

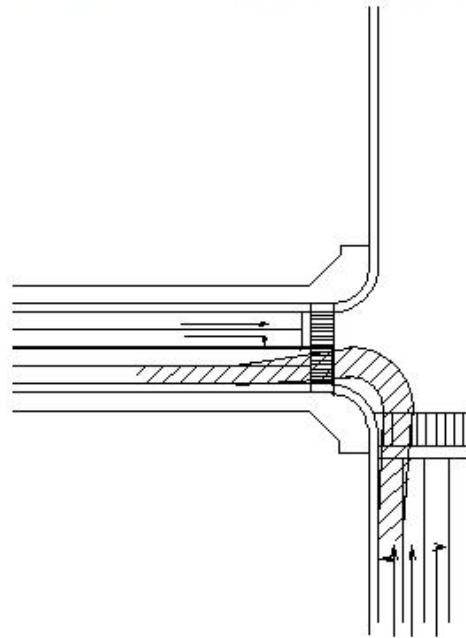
(H847)Road Structure Act(How to pass through intersections and corner cutting)

(H847)Road Structure Act(How to pass through intersections and corner cutting)

Road Structure Act

5-5 Guideway -Traffic island-Corner cut

5-5 -3 How to pass through intersections and corner cutting



(b) T3→T2

Figure 5-25 How to pass through intersections

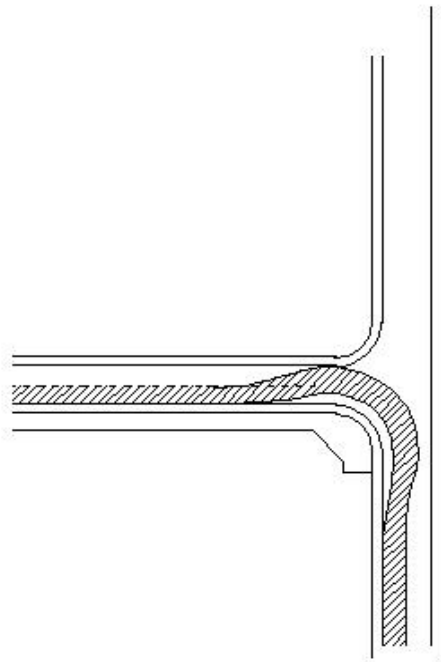
(H848)Road Structure Act(How to pass through intersections and corner cutting)

(H848)Road Structure Act(How to pass through intersections and corner cutting)

Road Structure Act

5-5 Guideway -Traffic island-Corner cut

5-5 -3 How to pass through intersections and corner cutting



(c) T1→T1

Figure 5-25 How to pass through intersections

(H849)Road Structure Act(How to pass through intersections and corner cutting)

(H849)Road Structure Act(How to pass through intersections and corner cutting)

Road Structure Act

5-5 Guideway -Traffic island-Corner cut

5-5 -3 How to pass through intersections and corner cutting

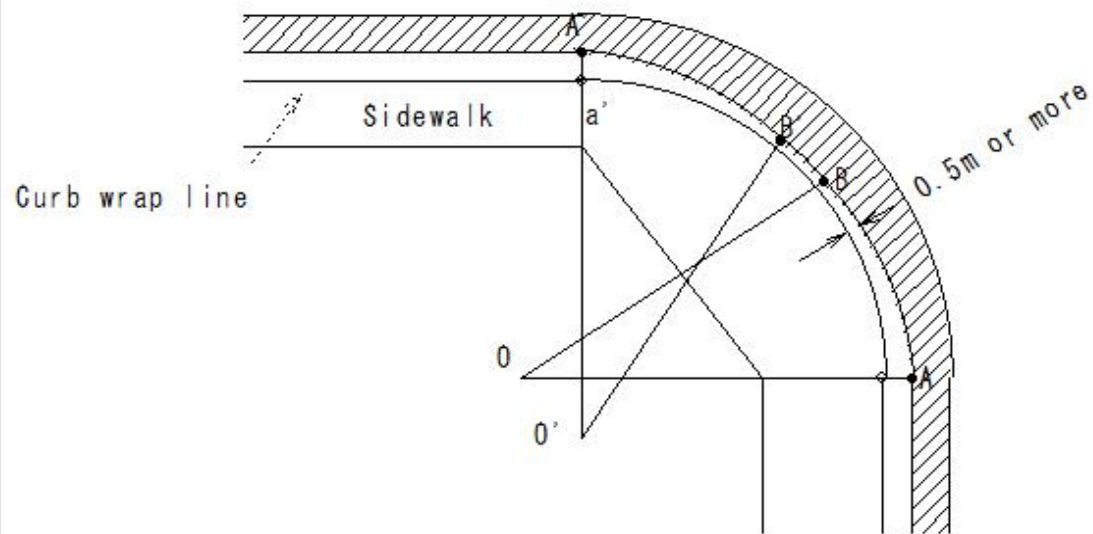


Figure 5-26 Vehicle width and curb wrap

(H850)Road Structure Act(How to pass through intersections and corner cutting)

(H850)Road Structure Act(How to pass through intersections and corner cutting)

Road Structure Act

5-5 Guideway -Traffic island-Corner cut

5-5 -3 How to pass through intersections and corner cutting

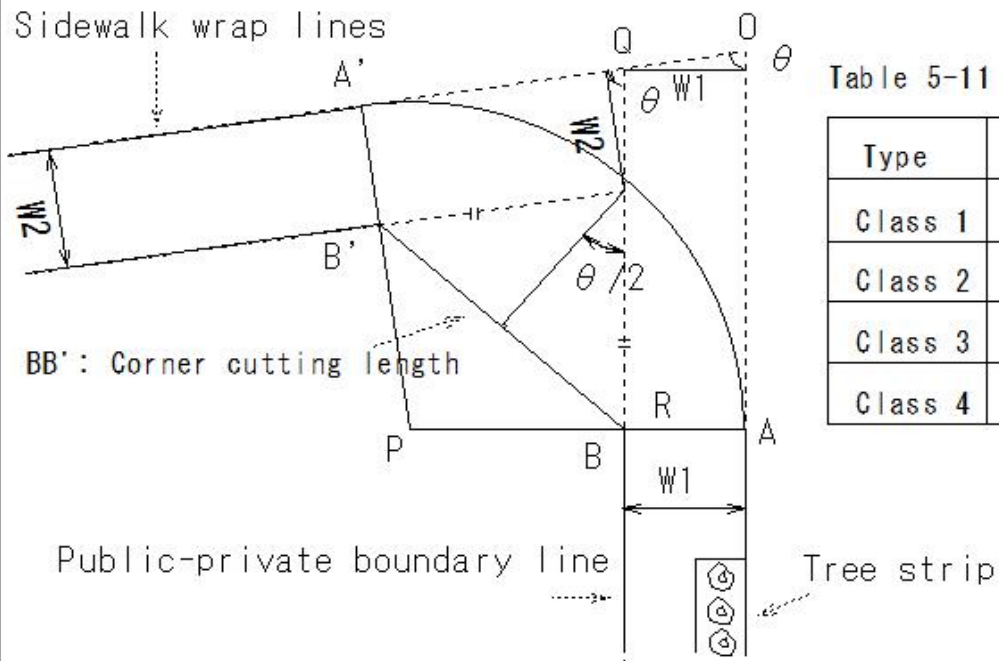


Table 5-11 Standard values for corner cutting length

Type	Class 1	Class 2	Class 3	Class 4
Class 1	12	10	5	3
Class 2		10	5	3
Class 3			5	3
Class 4				3

Figure 5-27 Wrapping of sidewalk curbs and corner cutting

(H851)Road Structure Act(How to pass through intersections and corner cutting)

(H851)Road Structure Act(Crosswalks and stop lines)

Road Structure Act

5-6 Crosswalks and stop lines

5-6-2 Stop lines

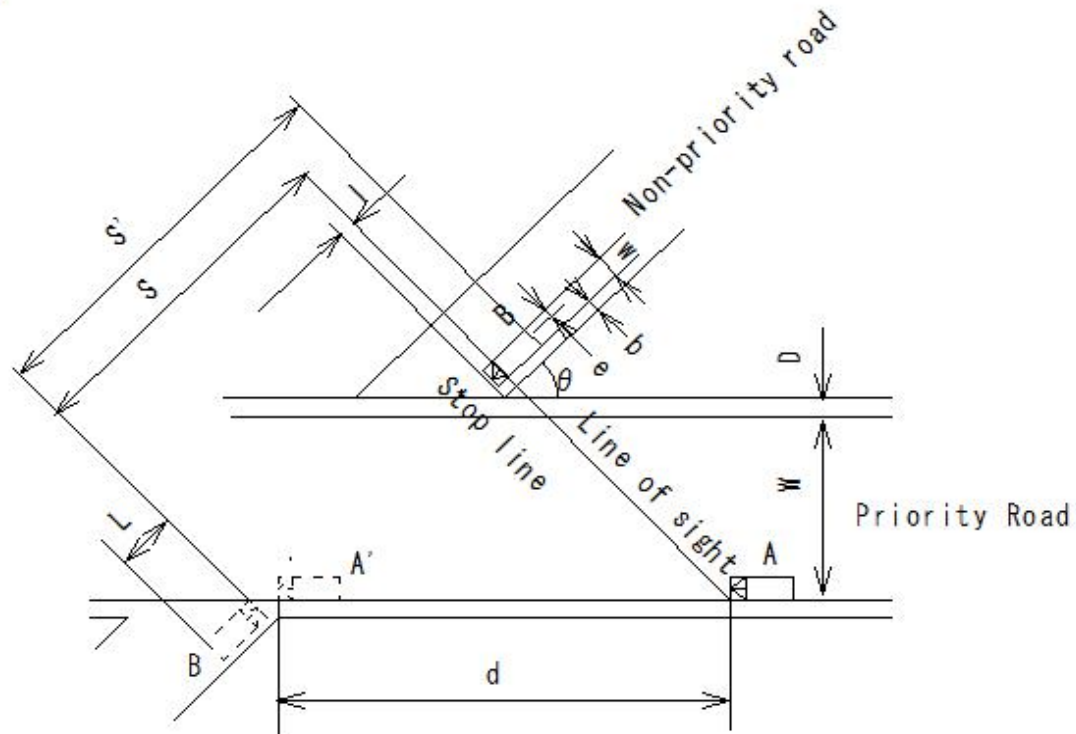


Figure 5-28 Stop line position and line of sight

(H852)Road Structure Act(Crosswalks and stop lines)

(H852)Road Structure Act(Crosswalks and stop lines)

Road Structure Act

5-6 Crosswalks and stop lines

5-6-2 Stop lines

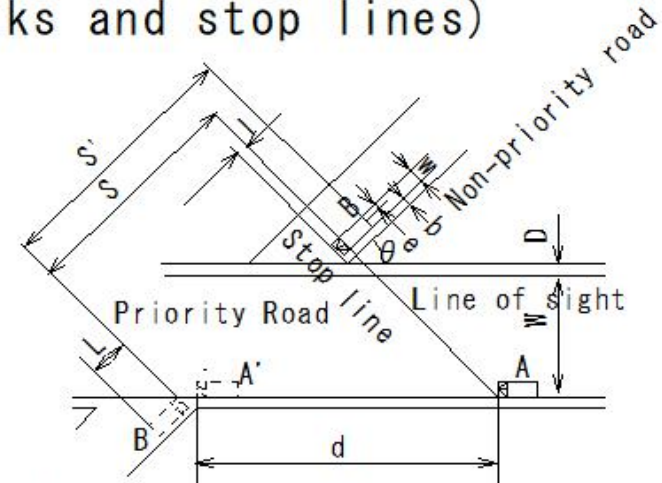


Figure 5-28 Stop line position and line of sight

d: Distance traveled by vehicle A on the main road (m)

W: Distance from the left lane of the main road to the edge of the lane on the other side (m)

D: Distance from the right lane edge of the main road to the stop line of the secondary road (m)

S': Distance traveled by vehicle B on the secondary road (m)

S: One side of the line of sight triangle ($= S' - L + l$) (m)

L: Length of vehicle B (m)

l: Distance from the head of vehicle B to the driver's eye position (m)

w: Width of vehicle B (m)

b: Distance from the road boundary of the secondary road to the left edge of vehicle B (m)

e: Distance from the left edge of vehicle B to the driver's eye position (m)

θ : Intersection angle between the main road and secondary road (degrees)

(H853)Road Structure Act(Intersections)

(H853)Road Structure Act(Intersections)

Road Structure Act

6. Intersections

6-2. Planning standards for intersections

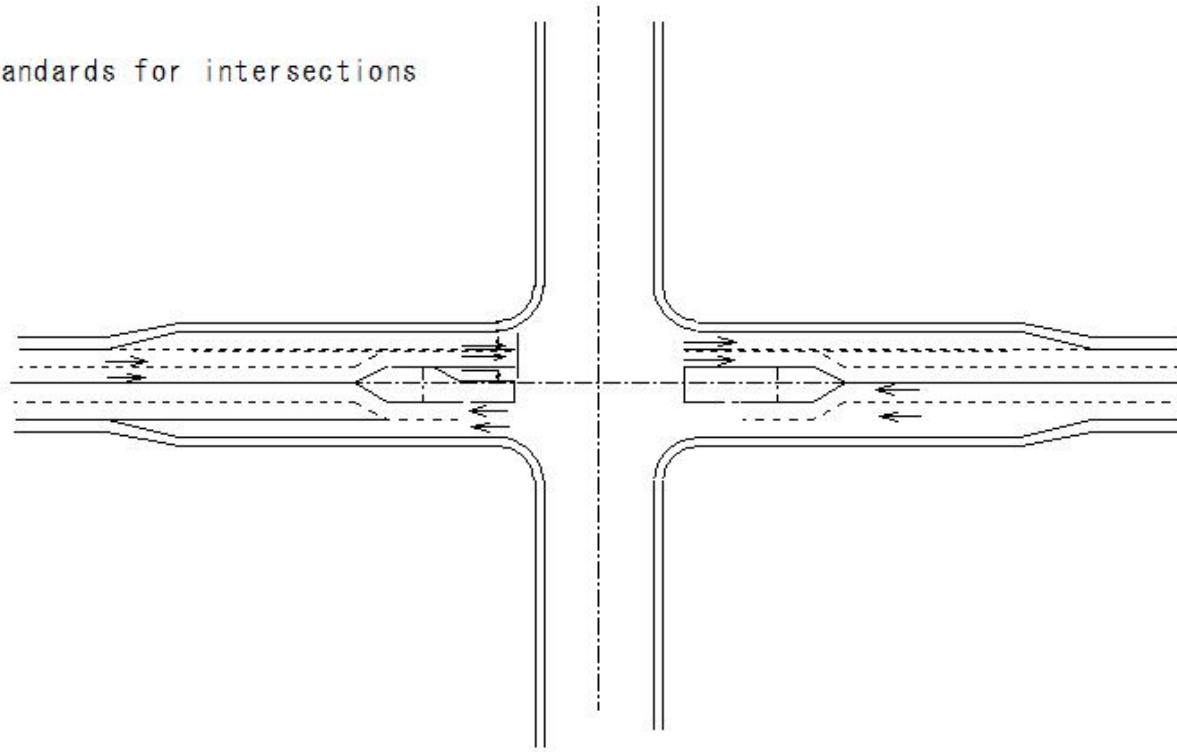


Figure 6-1. Temporary shared use of intersections

(H854)Road Structure Act(Intersections)

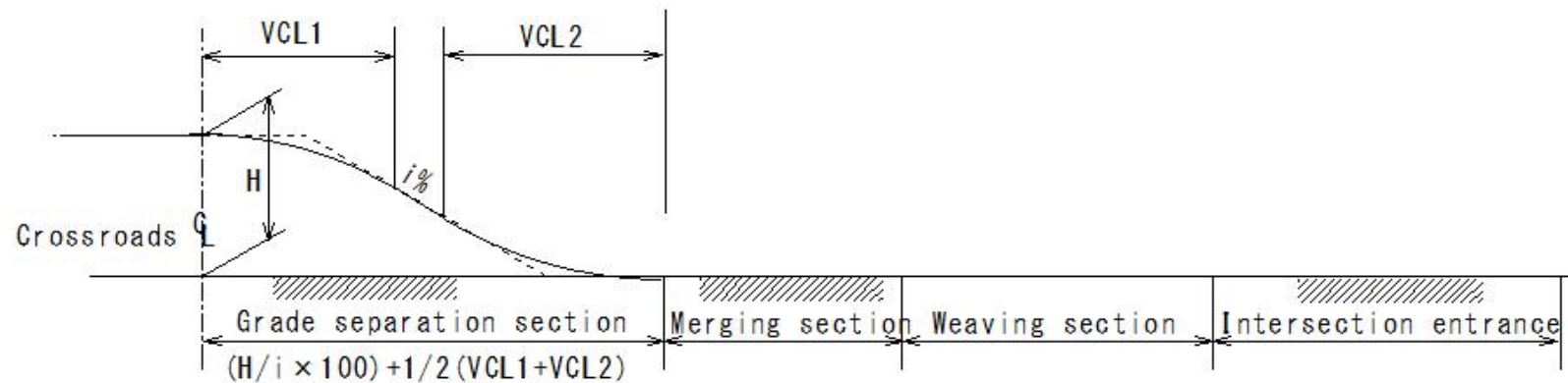
(H854)Road Structure Act(Intersections)

Road Structure Act

6. Intersections

6-2. Planning standards for intersections

6-2-2 Principles of grade separation structure



H: Height difference with intersecting road (m)

i: Gradient of approach section (%)

VCL1: Length of longitudinal curved surface line of crest section (m)

VCL2: Length of longitudinal curved surface line of sag section (m)

Figure 6-2 Required clearance from major intersections

(H855)Road Structure Act(Intersections)

(H855)Road Structure Act(Intersections)

Road Structure Act

6. Intersections

6-2. Planning standards for intersections

6-2-2 Principles of grade separation structure

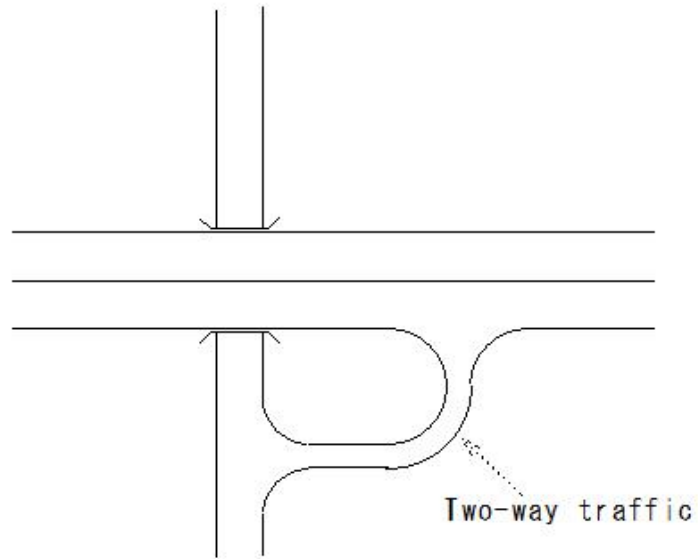


Figure 6-3. Interchange ramps

(H856)Road Structure Act(Intersections)

(H856)Road Structure Act(Intersections)

Road Structure Act

6. Intersections

6-2. Planning standards for intersections

6-2-2 Principles of grade separation structure

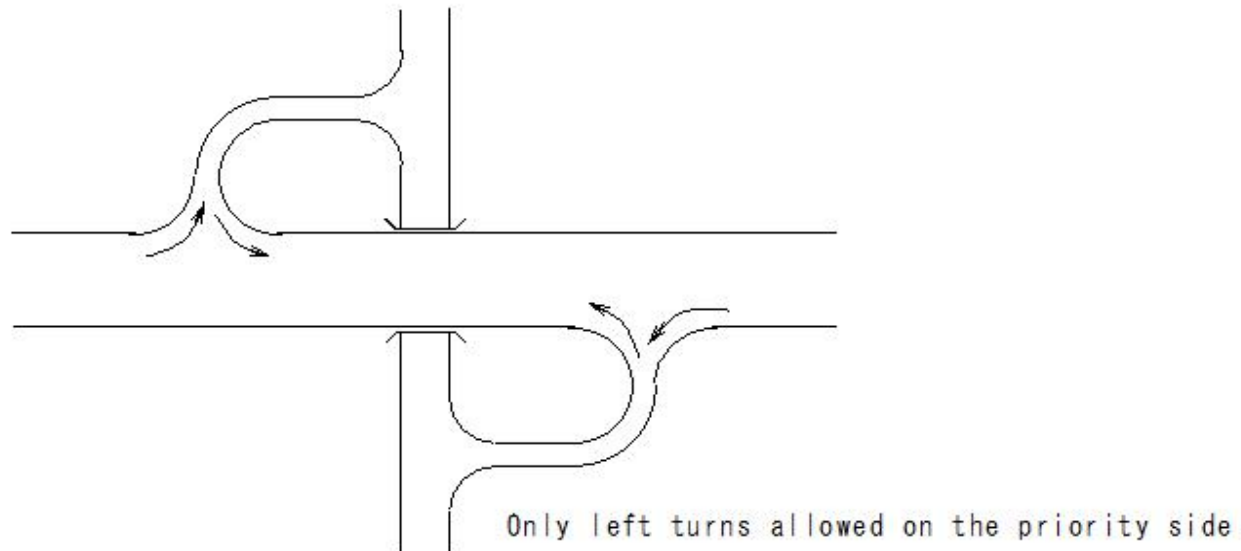


Figure 6-4. Two ramps at an interchange

(H857)Road Structure Act(Intersections)

(H857)Road Structure Act(Intersections)

Road Structure Act

6. Intersections

6-2. Planning standards for intersections

6-2-2 Principles of grade separation structure

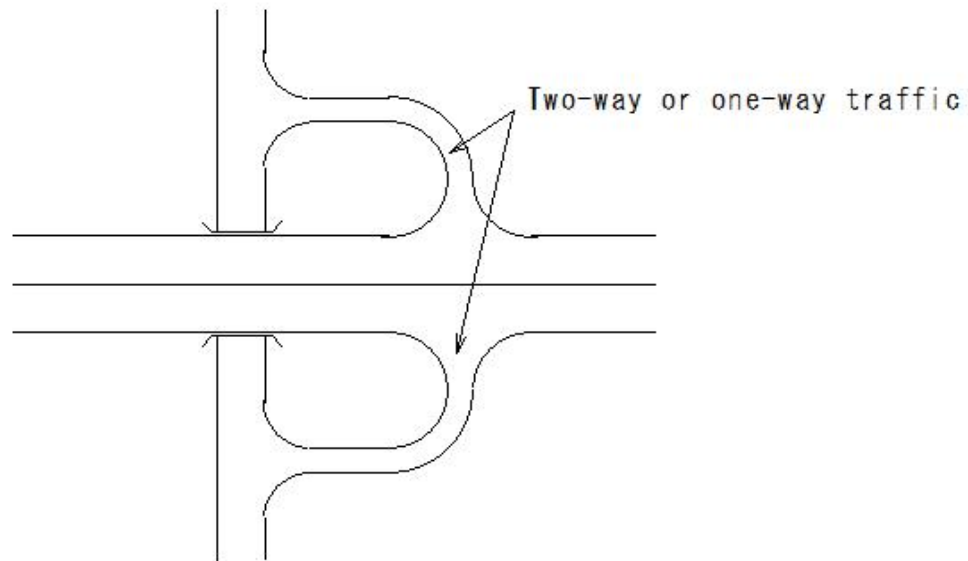


Figure 6-5. Two ramps at an interchange

(H858)Road Structure Act(Intersections)

(H858)Road Structure Act(Intersections)

Road Structure Act

6. Intersections

6-2. Planning standards for intersections

6-2-2 Principles of grade separation structure

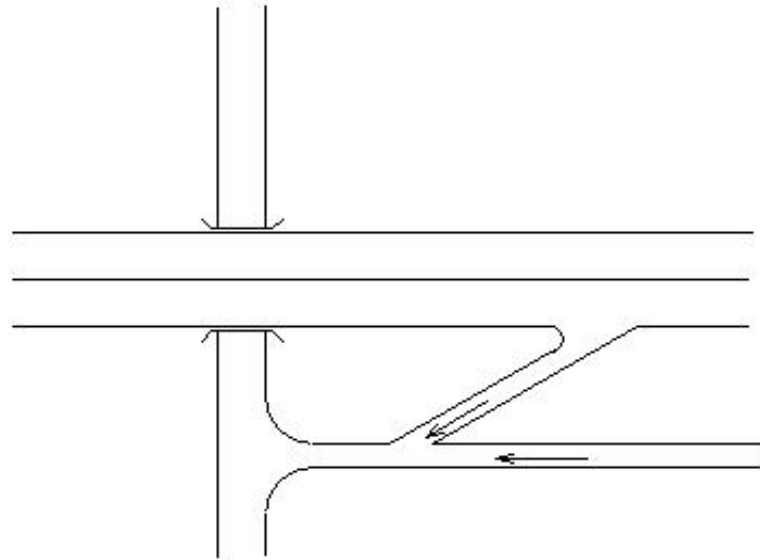


Figure 6-6 Interchange: Connecting a ramp to a side road

(H859)Road Structure Act(Intersections)

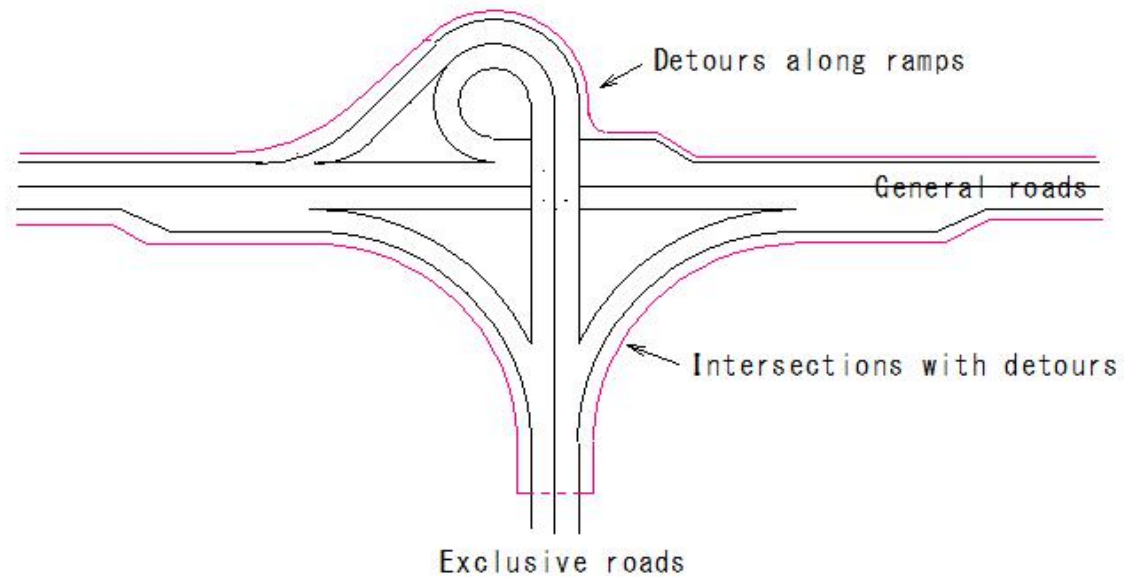
(H859)Road Structure Act(Intersections)

Road Structure Act

6. Intersections

6-2. Planning standards for intersections

6-2-2 Principles of grade separation structure



(a) Detours and Intersections

Figure 6-7 Interchange: Treatment of Sidewalks, etc.

(H860)Road Structure Act(Intersections)

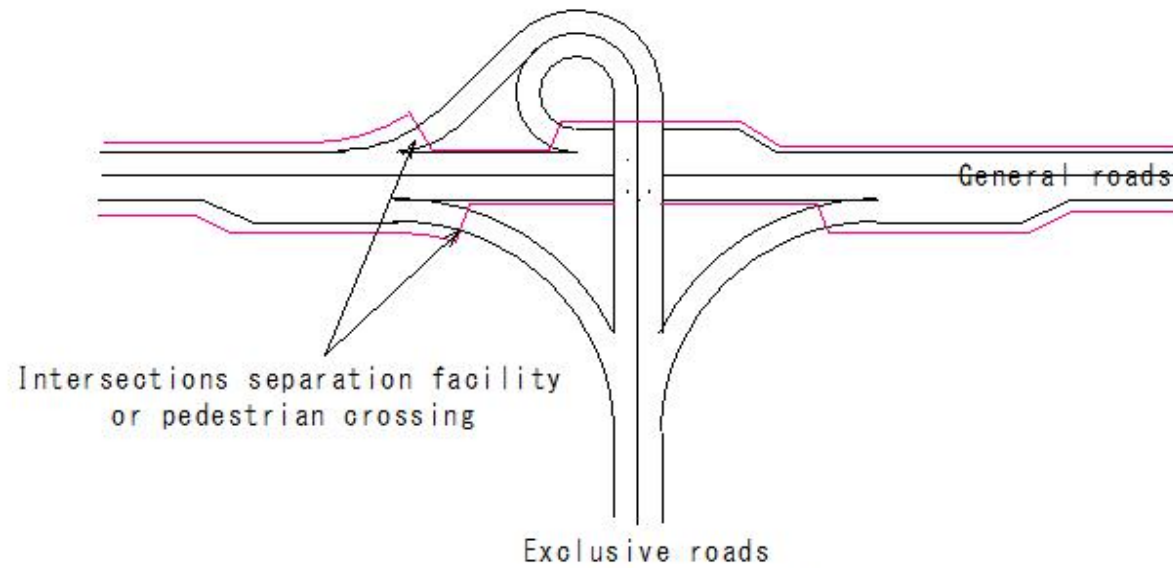
(H860)Road Structure Act(Intersections)

Road Structure Act

6. Intersections

6-2. Planning standards for intersections

6-2-2 Principles of grade separation structure



(b) Intersections separation

Figure 6-7 Interchange: Treatment of Sidewalks, etc.

(H861)Road Structure Act(Intersections)

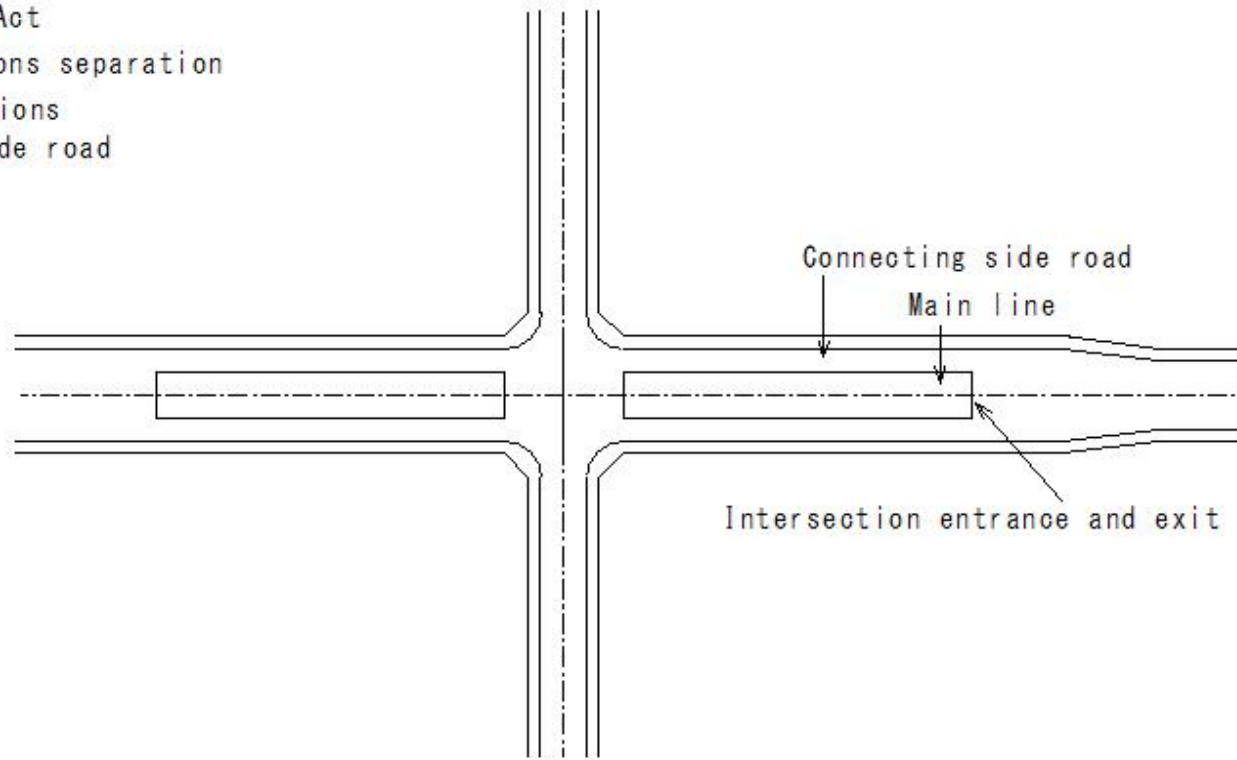
(H861)Road Structure Act(Intersections)

Road Structure Act

6. Intersections separation

6-3 Intersections

Connecting side road



(a) Cross intersection (part 1)

Figure 6-8 Intersections

(H862)Road Structure Act(Intersections)

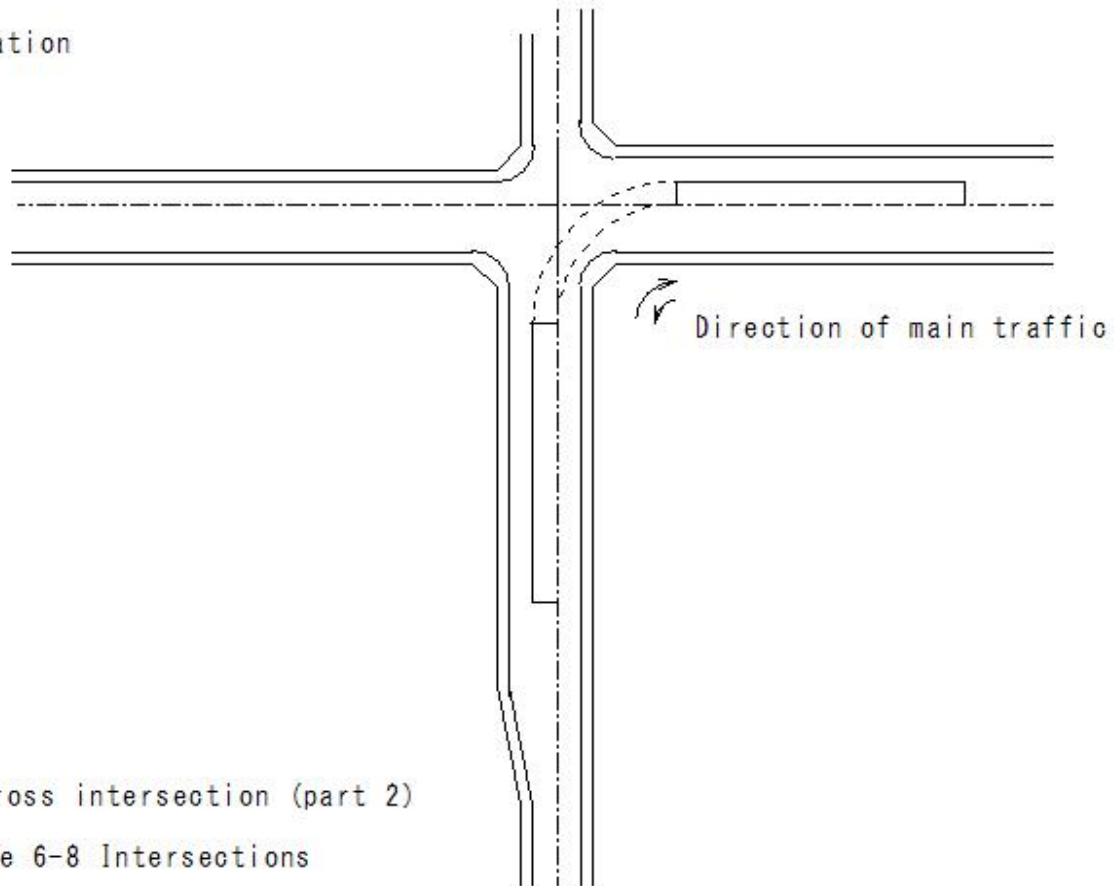
(H862)Road Structure Act(Intersections)

Road Structure Act

6. Intersections separation

6-3 Intersections

Connecting side road



(b) Cross intersection (part 2)

Figure 6-8 Intersections

(H863)Road Structure Act(Intersections)

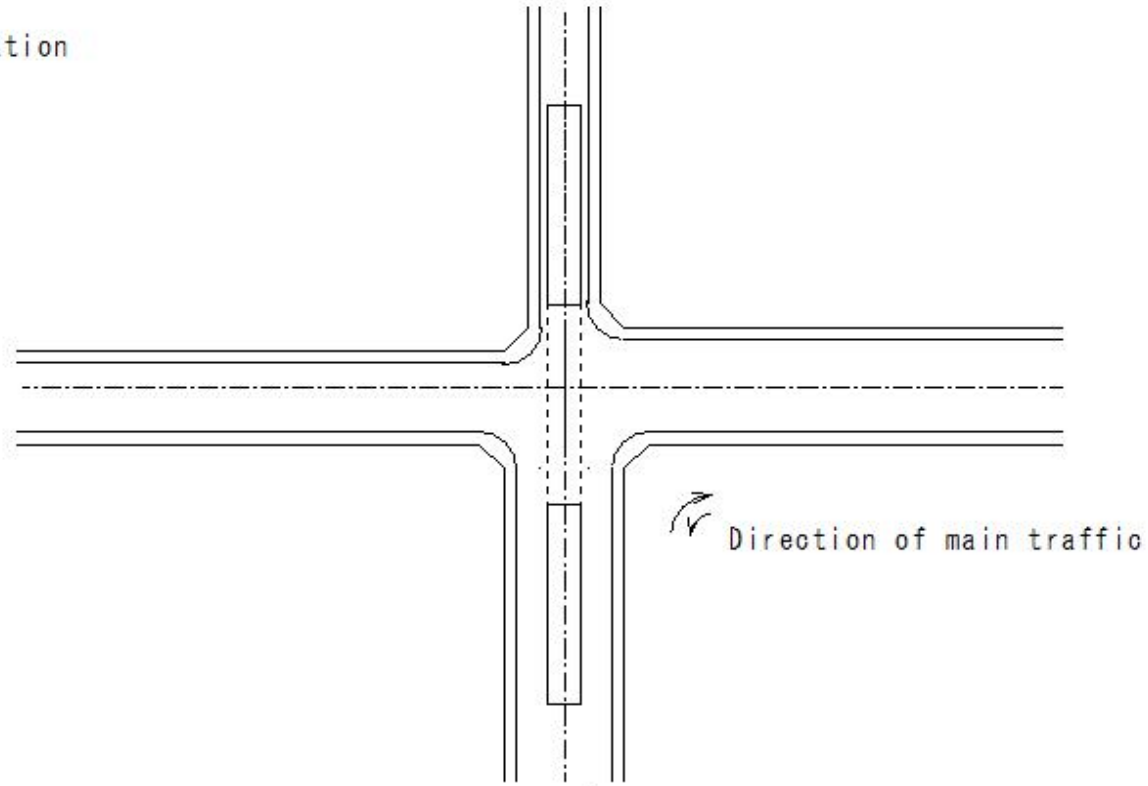
(H863)Road Structure Act(Intersections)

Road Structure Act

6. Intersections separation

6-3 Intersections

Connecting side road



(c) Cross intersection (part 3)

Figure 6-8 Intersections

(H864)Road Structure Act(Intersections)

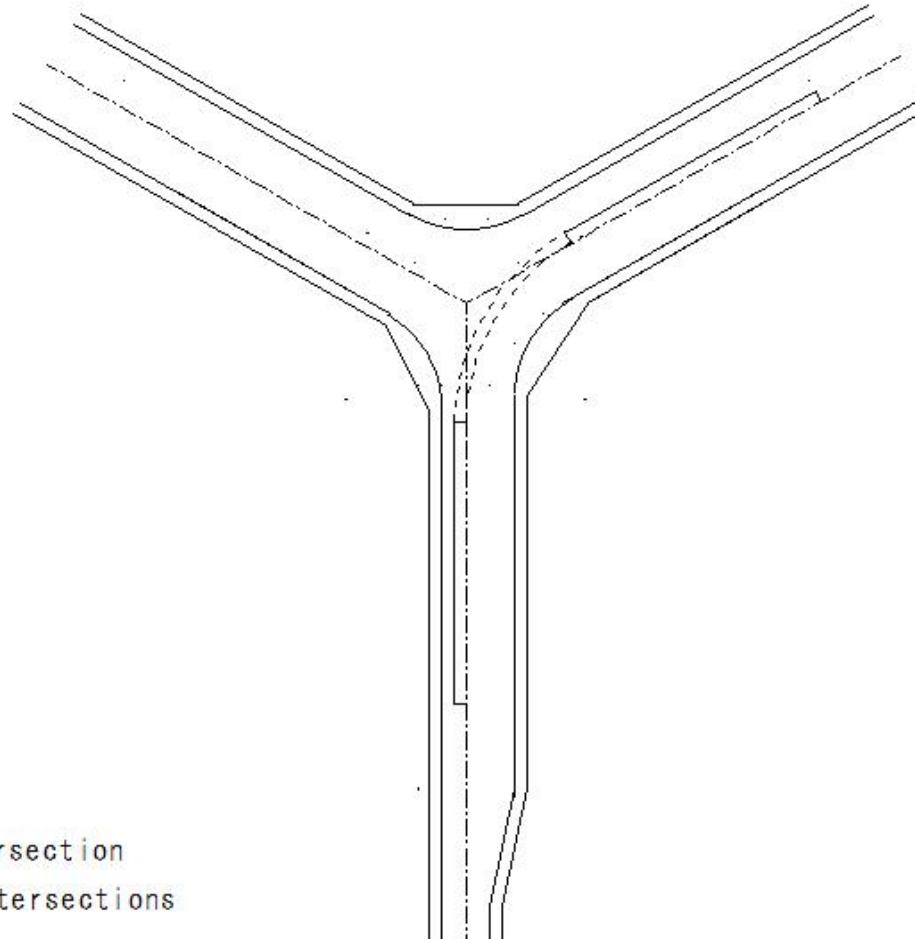
(H864)Road Structure Act(Intersections)

Road Structure Act

6. Intersections separation

6-3 Intersections

Connecting side road



(d) Y-intersection

Figure 6-8 Intersections

(H865)Road Structure Act(Intersections)

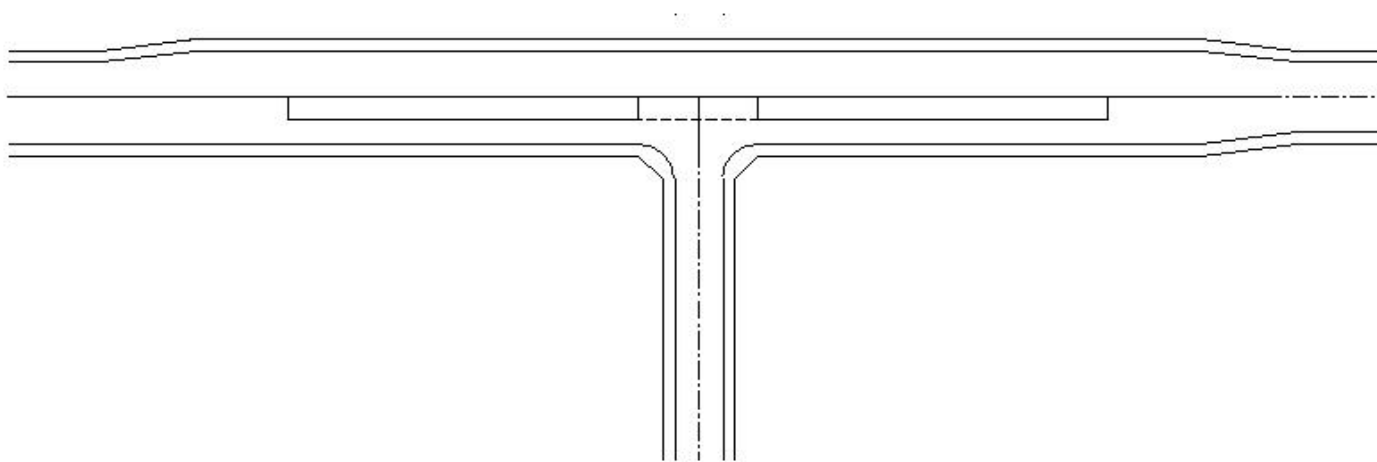
(H865) Road Structure Act(Intersections)

Road Structure Act

6. Intersections separation

6-3 Intersections

Connecting side road



(e) T-intersection (part 1)

Figure 6-8 Intersections

(H866)Road Structure Act(Intersections)

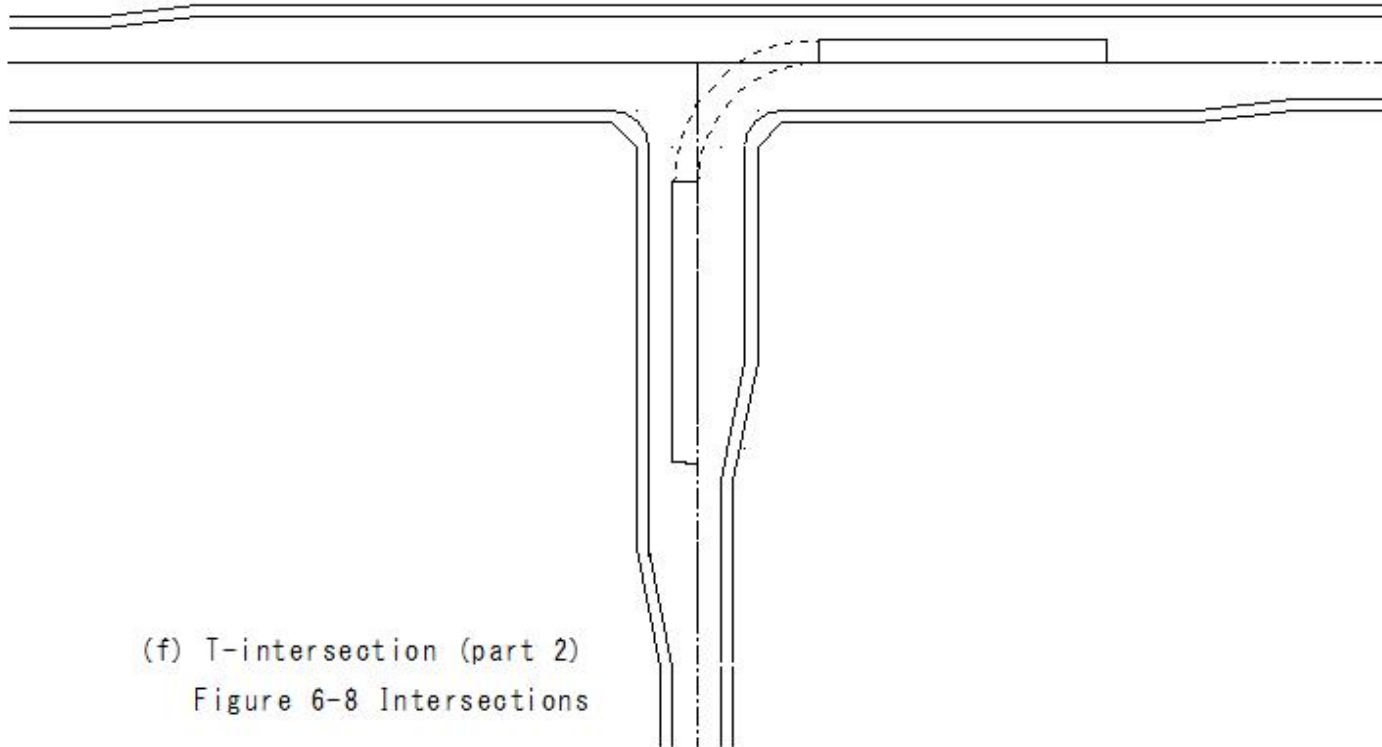
(H866)Road Structure Act(Intersections)

Road Structure Act

6. Intersections separation

6-3 Intersections

Connecting side road



(f) T-intersection (part 2)

Figure 6-8 Intersections

(H867)Road Structure Act(Intersections)

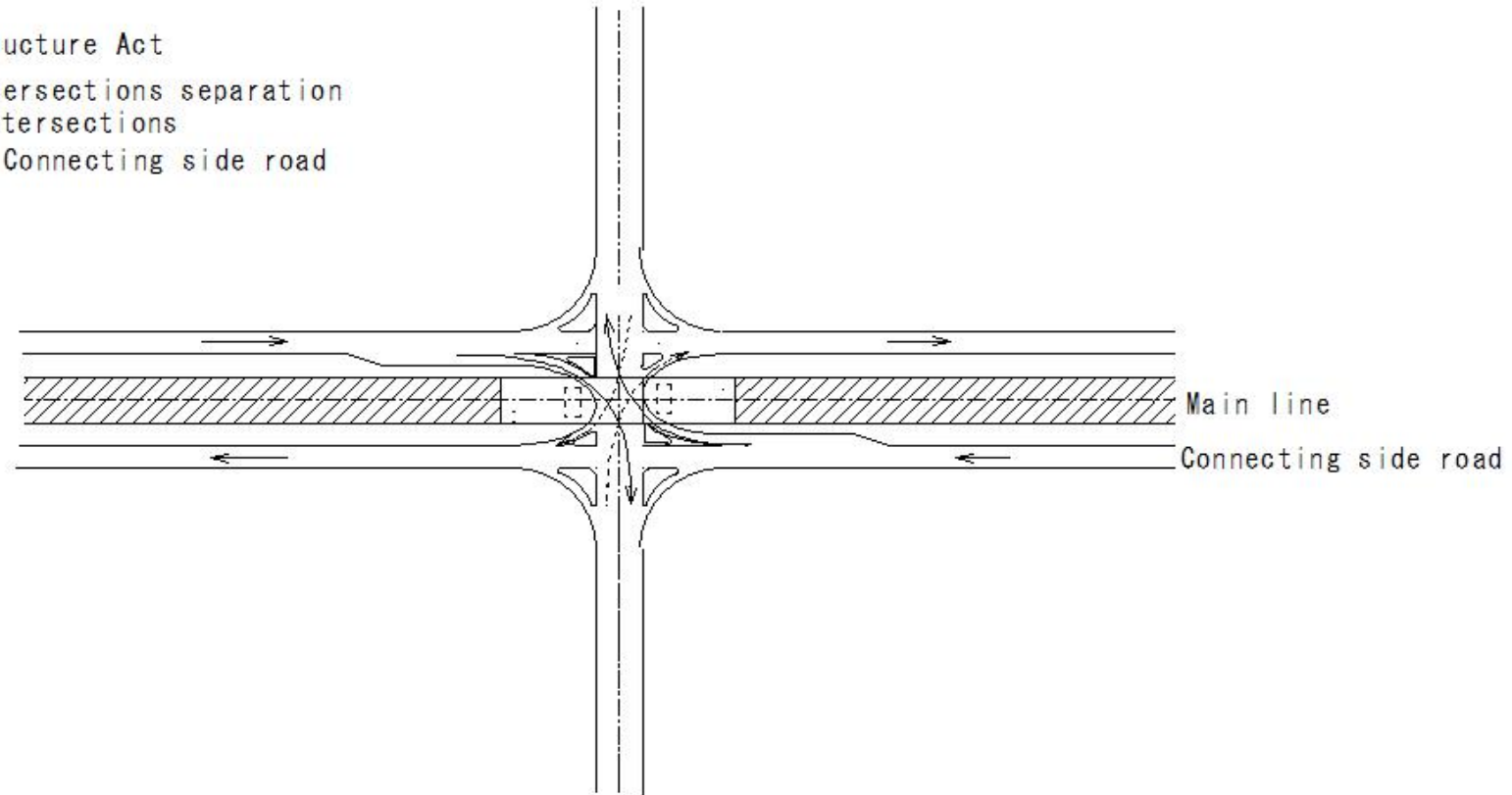
(H867)Road Structure Act(Intersections)

Road Structure Act

6. Intersections separation

6-3 Intersections

6-3-3 Connecting side road



(a) How to handle right-turn traffic on the inner loop

Figure 6-9 How to handle right-turn traffic

(H868)Road Structure Act(Intersections)

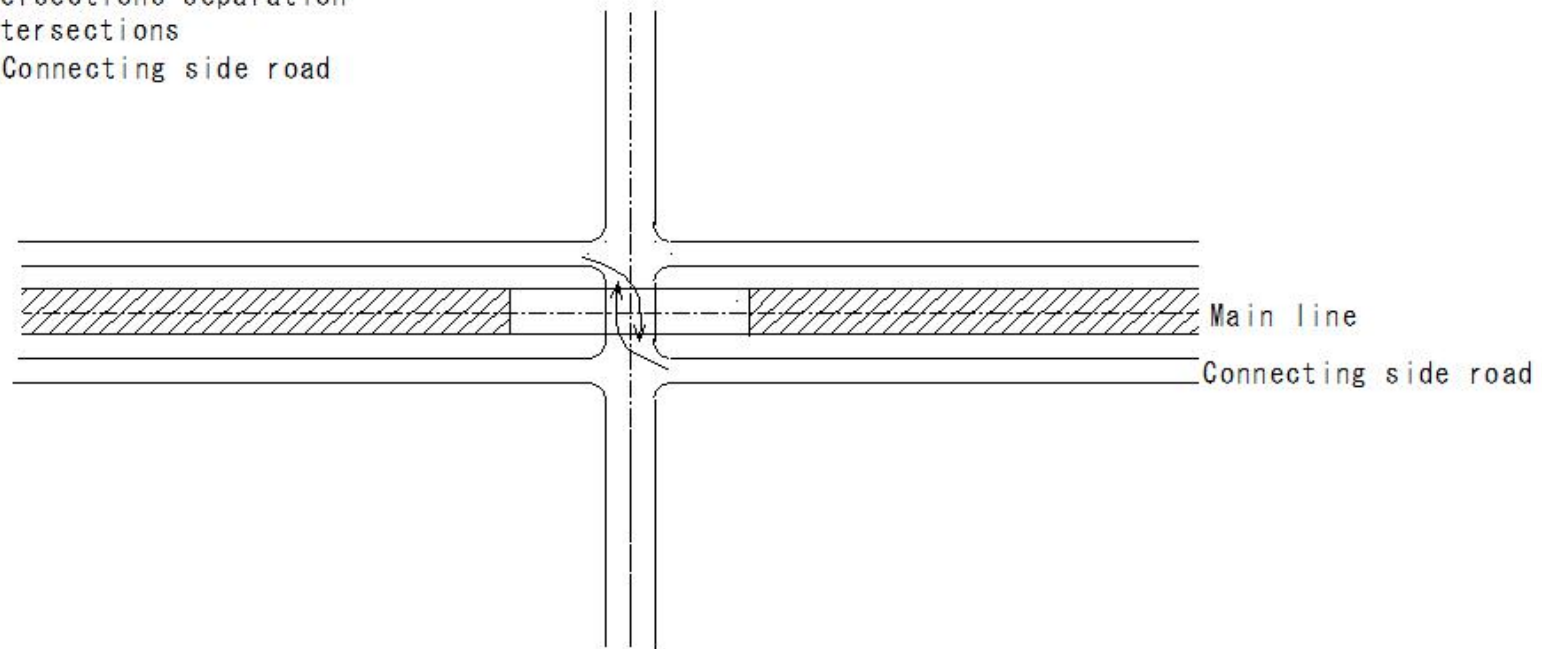
(H868)Road Structure Act(Intersections)

Road Structure Act

6. Intersections separation

6-3 Intersections

6-3-3 Connecting side road



(b) How to handle right-turn traffic by making a rough detour

Figure 6-9 How to handle right-turn traffic

(H869)Road Structure Act(Intersections)

(H869)Road Structure Act(Intersections)

Road Structure Act

6. Intersections separation

6-3 Intersections

6-3-4 Intersection entrance/exit

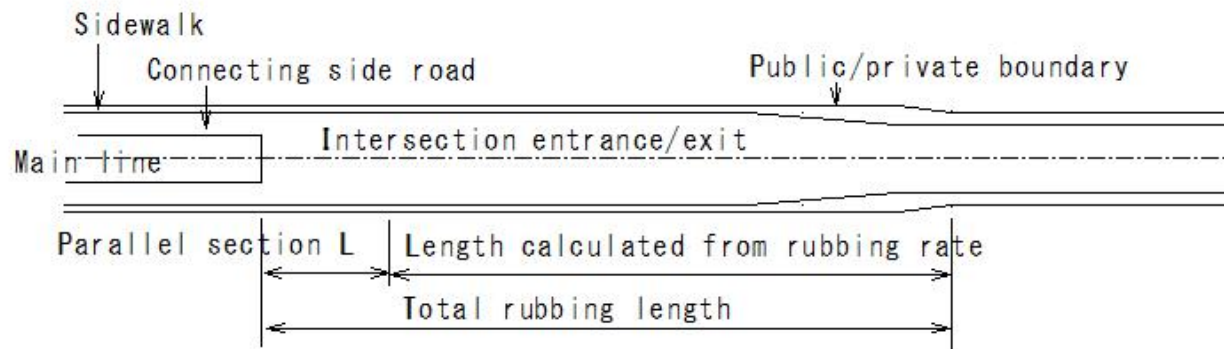


Figure 6-10 Intersection entrance/exit rubbing

(H870)Road Structure Act(Intersections)

(H870)Road Structure Act(Intersections)

Road Structure Act

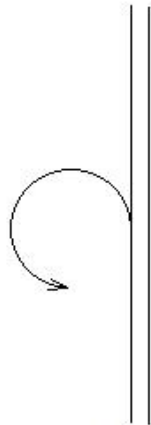
6. Intersections

6-4 Interchange planning and design standards

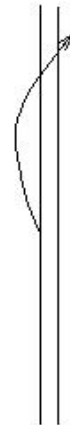
6-4-2. Interchange Types



(i) Left turn direct Ramp



(ii) Loop



(iii) Semi-direct Ramp



(iv) Right turn direct Ramp

Figure 6-11. Basic Types of Ramp

(H871)Road Structure Act(Intersections)

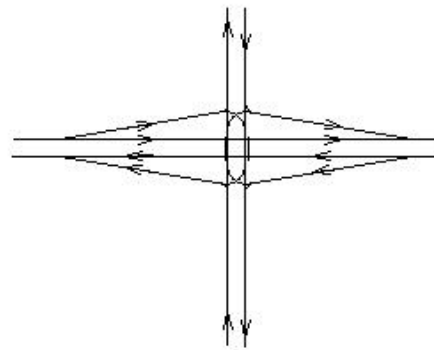
(H871)Road Structure Act(Intersections)

Road Structure Act

6. Intersections

6-4 Interchange planning and design standards

6-4-2. Interchange Types



(a) Normal type

Figure 6-12 Diamond type

(H872)Road Structure Act(Intersections)

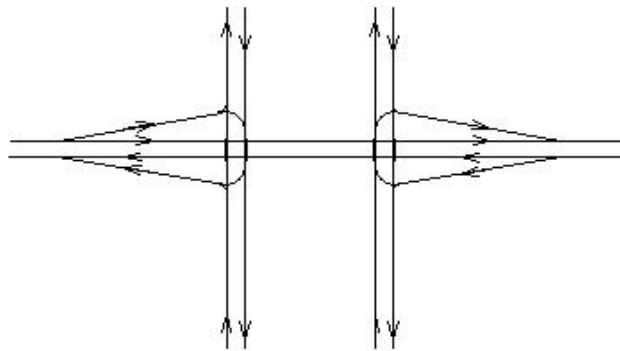
(H872)Road Structure Act(Intersections)

Road Structure Act

6. Intersections

6-4 Interchange planning and design standards

6-4-2. Interchange Types



(b) Separated type

Figure 6-12 Diamond type

(H873)Road Structure Act(Intersections)

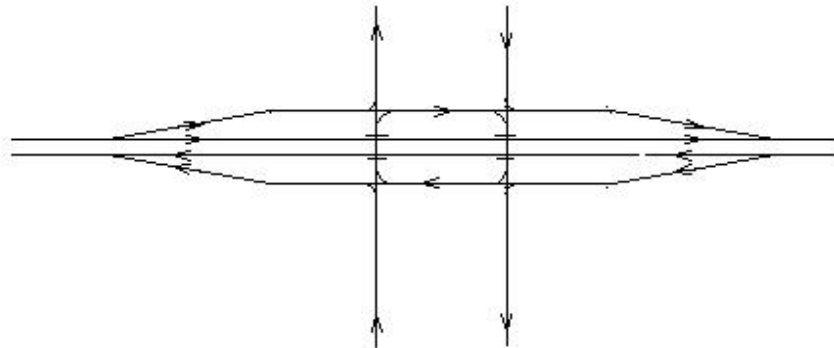
((H873)Road Structure Act(Intersections))

Road Structure Act

6. Intersections

6-4 Interchange planning and design standards

6-4-2. Interchange Types



(b) Separated type

Figure 6-12 Diamond type

(H874)Road Structure Act(Intersections)

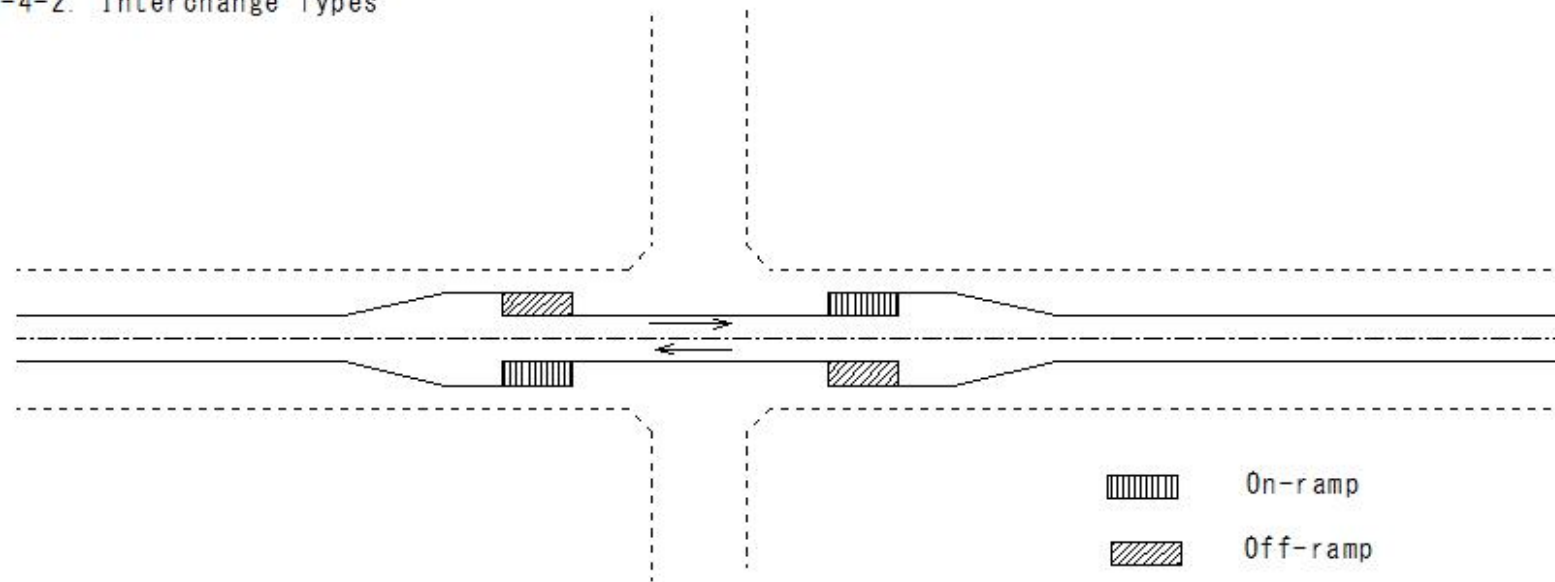
(H874)Road Structure Act(Intersections)

Road Structure Act

6. Intersections

6-4 Interchange planning and design standards

6-4-2. Interchange Types



(a) Parallel side Ramp

Figure 6-13. Type of street connection Ramps for second-class roads

(H875)Road Structure Act(Intersections)

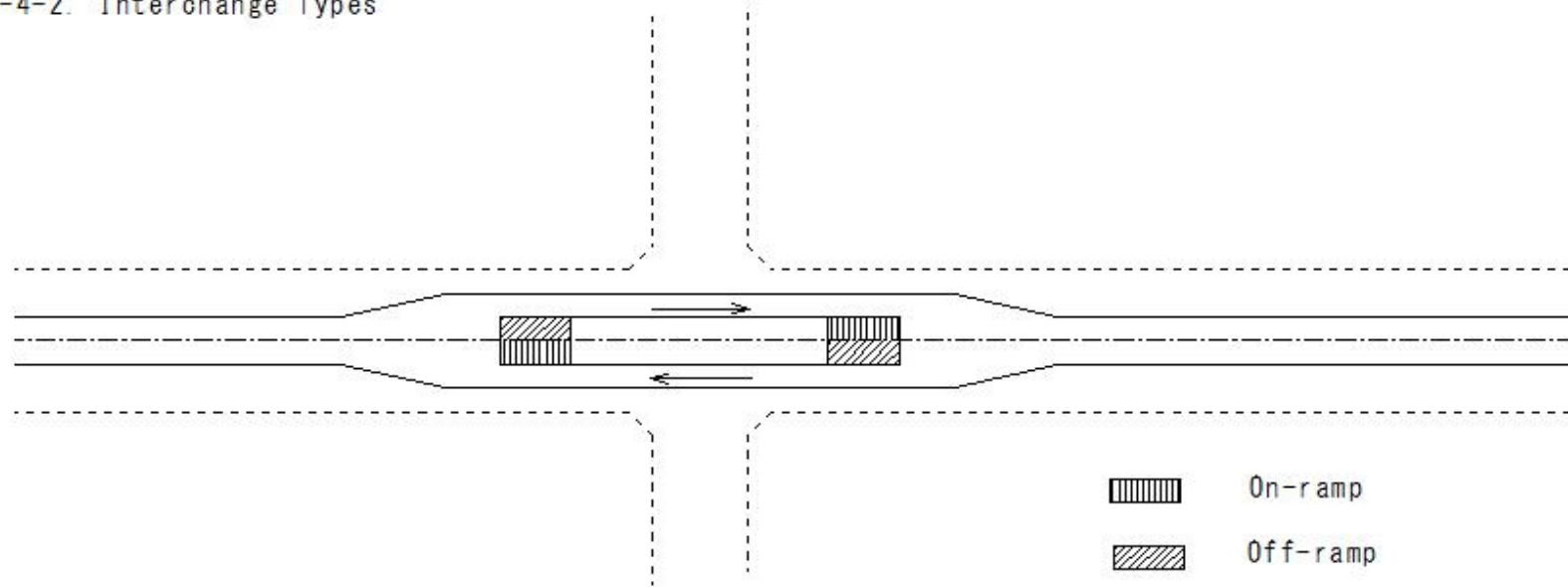
(H875)Road Structure Act(Intersections)

Road Structure Act

6. Intersections

6-4 Interchange planning and design standards

6-4-2. Interchange Types



(b) Parallel center Ramps

Figure 6-13. Type of street connection Ramps for second-class roads

(H876)Road Structure Act(Intersections)

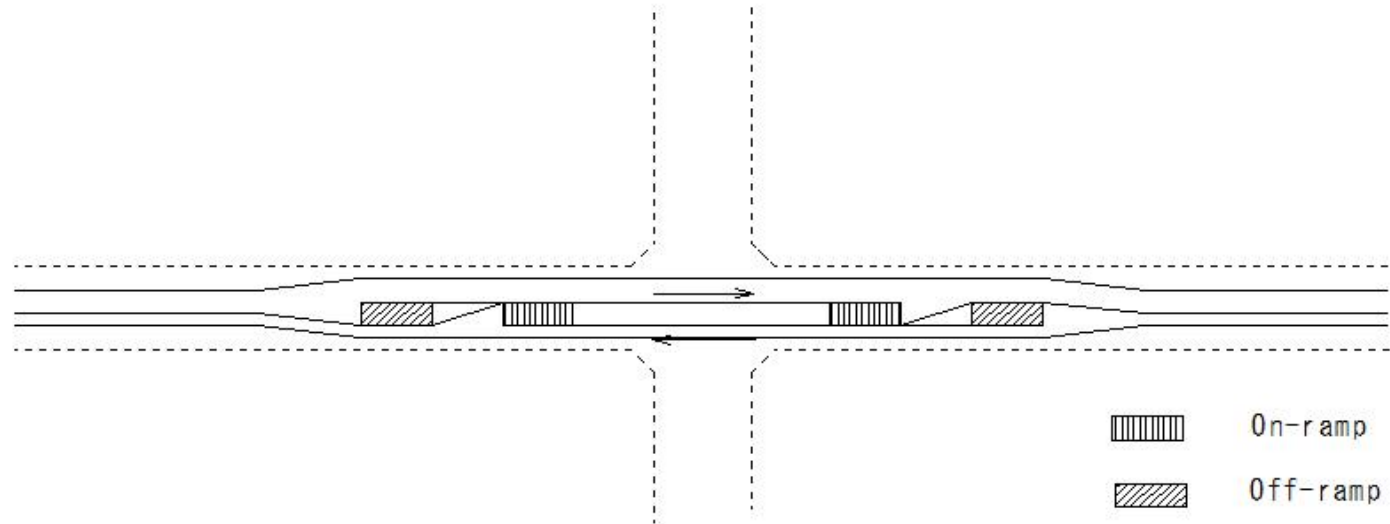
(H876)Road Structure Act(Intersections)

Road Structure Act

6. Intersections

6-4 Interchange planning and design standards

6-4-2. Interchange Types



(c) Staggered center Ramps

Figure 6-13. Type of street connection Ramps for second-class roads

(H877)Road Structure Act(Intersections)

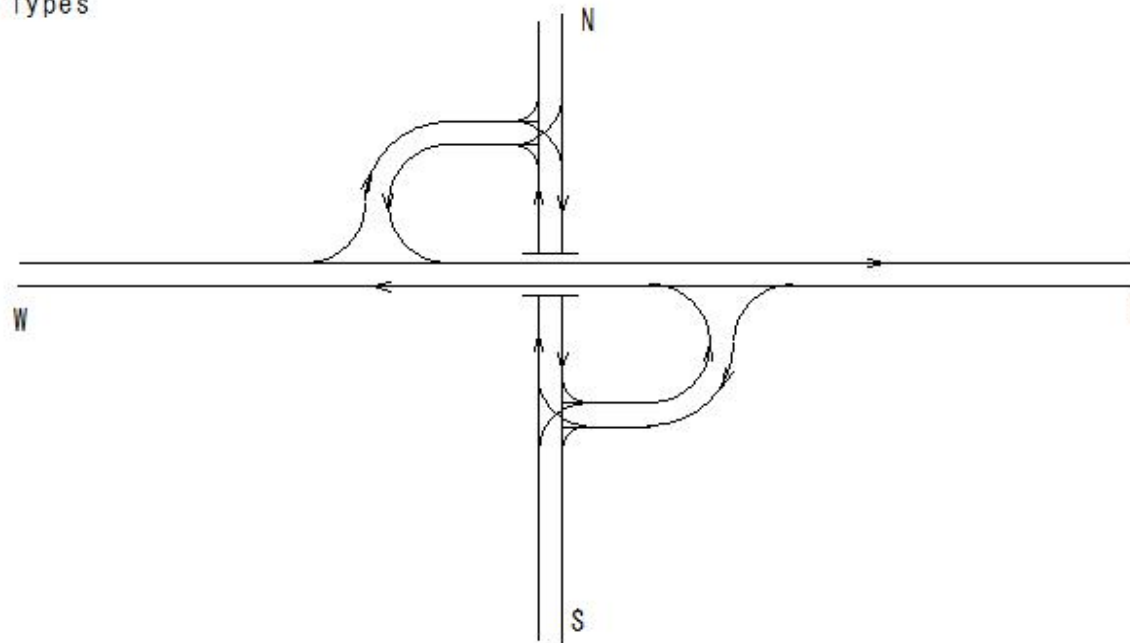
(H877)Road Structure Act(Intersections)

Road Structure Act

6. Intersections

6-4 Interchange planning and design standards

6-4-2. Interchange Types



(a) Type A

Figure 6-14 incomplete clover type

(H878)Road Structure Act(Intersections)

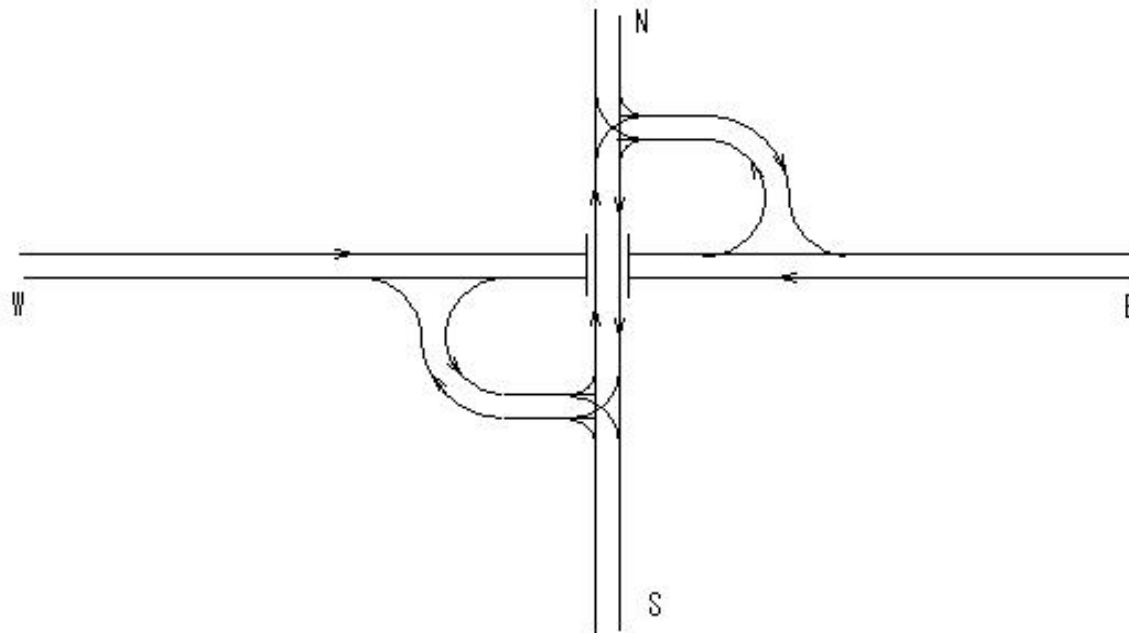
(H878)Road Structure Act(Intersections)

Road Structure Act

6. Intersections

6-4 Interchange planning and design standards

6-4-2. Interchange Types



(b) Type B

Figure 6-14 incomplete clover type

(H879)Road Structure Act(Intersections)

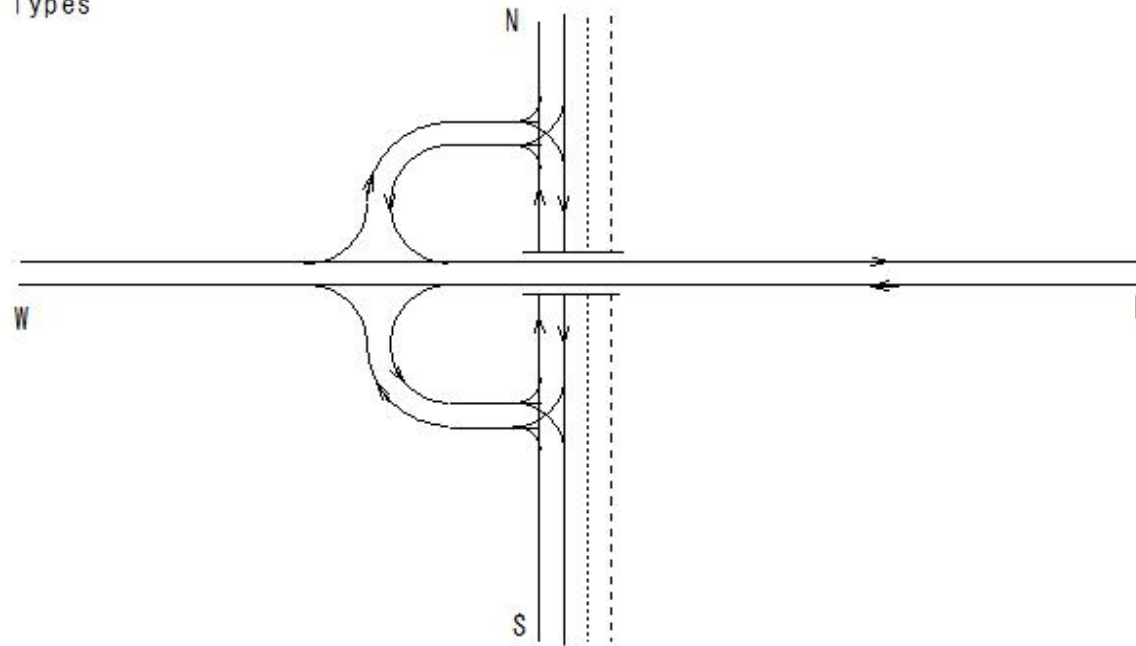
(H879)Road Structure Act(Intersections)

Road Structure Act

6. Intersections

6-4 Interchange planning and design standards

6-4-2. Interchange Types



(c) AB type

Figure 6-14 incomplete clover type

(H880)Road Structure Act(Intersections)

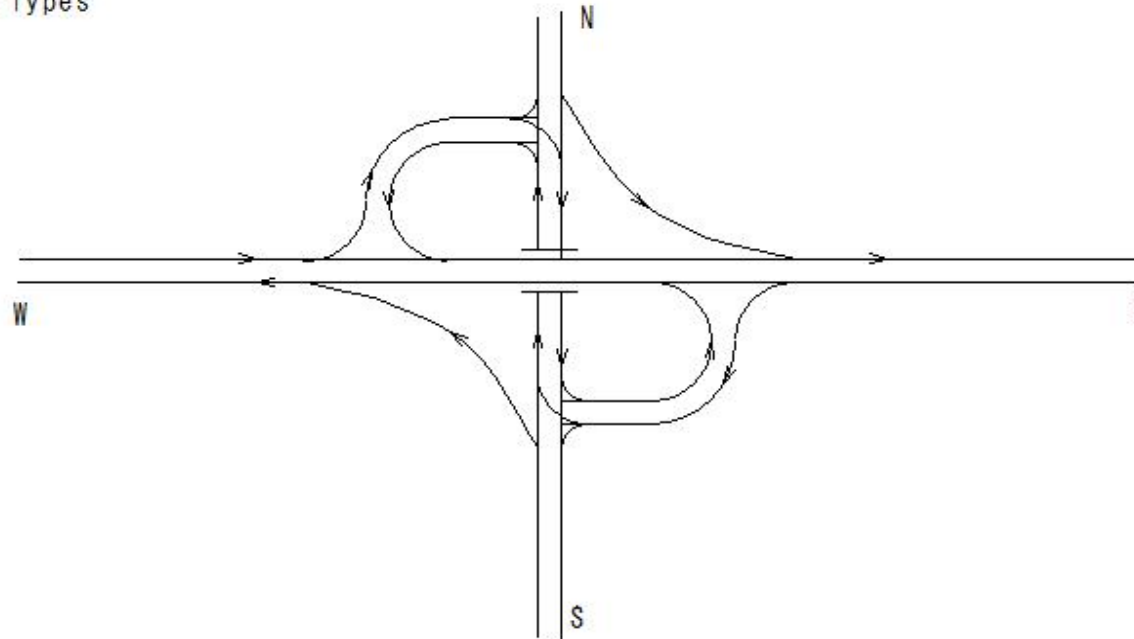
(H880)Road Structure Act(Intersections)

Road Structure Act

6. Intersections

6-4 Interchange planning and design standards

6-4-2. Interchange Types



(a) Type A (with direct connection road)

Figure 6-15 incomplete clover type(with direct connection)

(H881)Road Structure Act(Intersections)

(H881)Road Structure Act(Intersections)

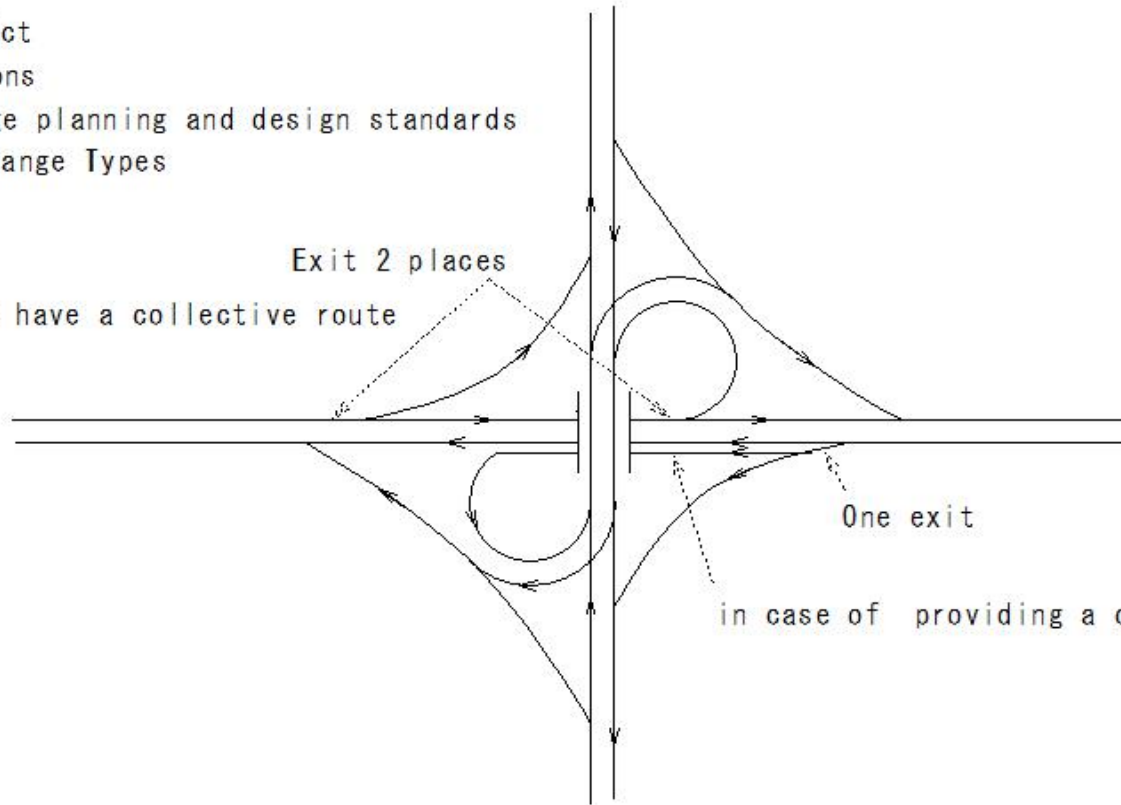
Road Structure Act

6. Intersections

6-4 Interchange planning and design standards

6-4-2. Interchange Types

Exit 2 places
in case of not have a collective route



One exit
in case of providing a collective route

(b) Type B (with direct connection road)

Figure 6-15 incomplete clover type(with direct connection)

(H882)Road Structure Act(Intersections)

(H882)Road Structure Act(Intersections)

Road Structure Act

6. Intersections

6-4 Interchange planning and design standards

6-4-2. Interchange Types

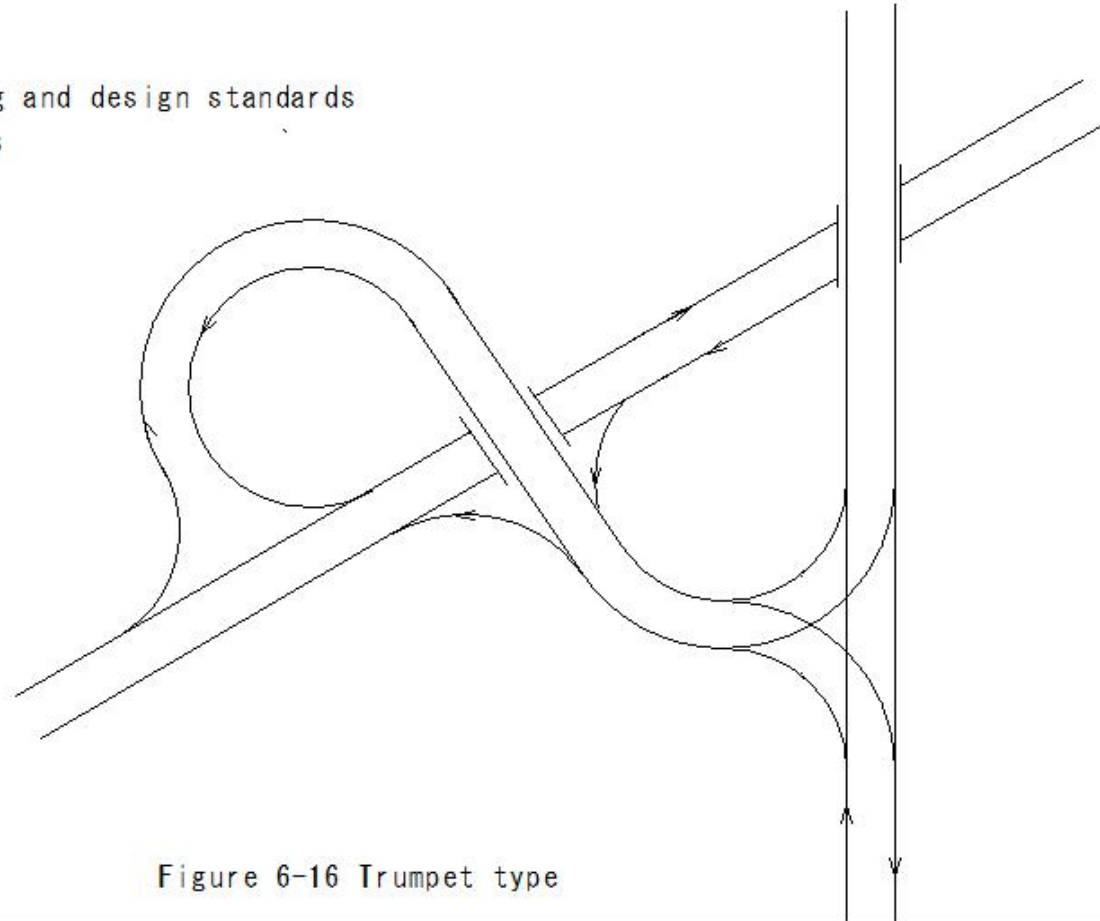


Figure 6-16 Trumpet type

(H883)Road Structure Act(Intersections)

(H883)Road Structure Act(Intersections)

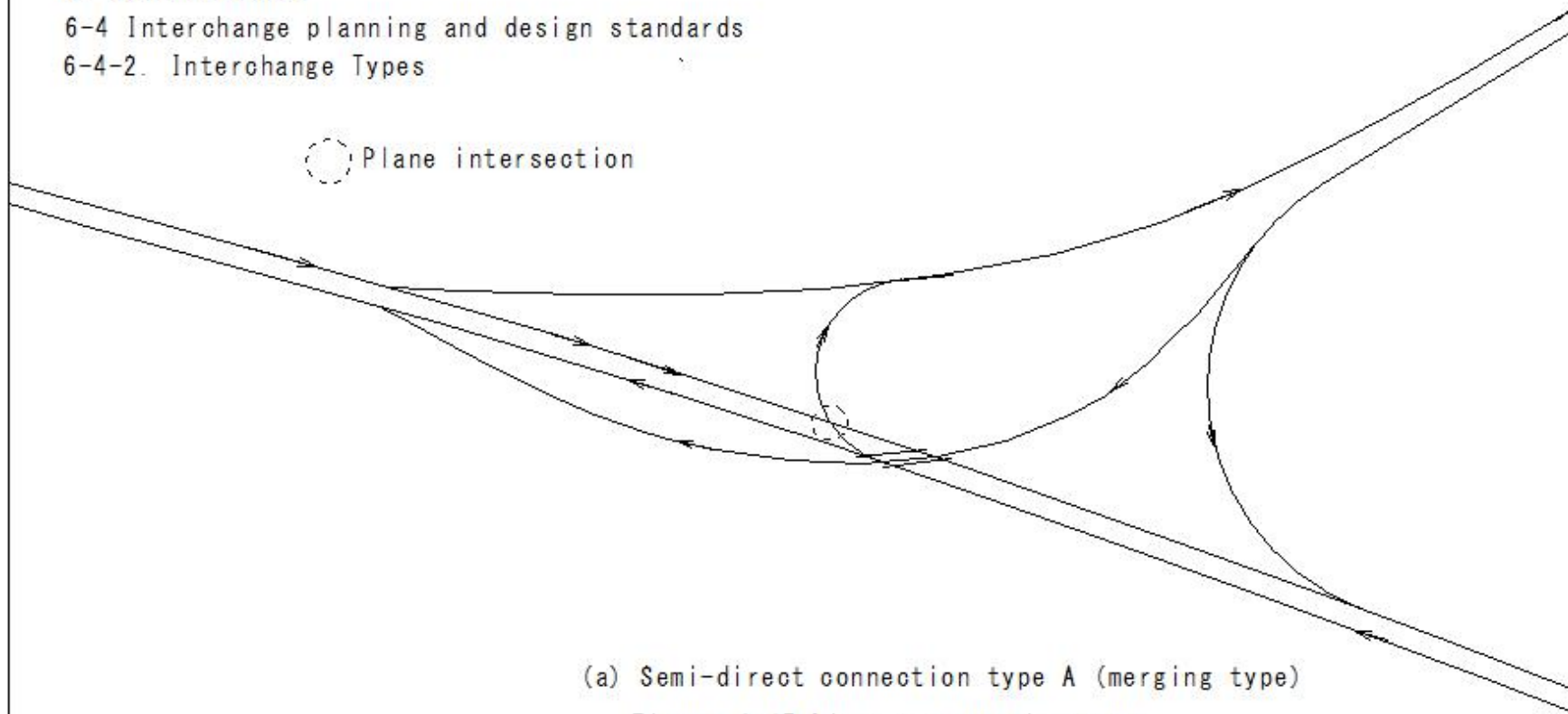
Road Structure Act

6. Intersections

6-4 Interchange planning and design standards

6-4-2. Interchange Types

○ Plane intersection



(a) Semi-direct connection type A (merging type)

Figure 6-17 Direct connection type

(H884)Road Structure Act(Intersections)

(H884) Road Structure Act(Intersections)

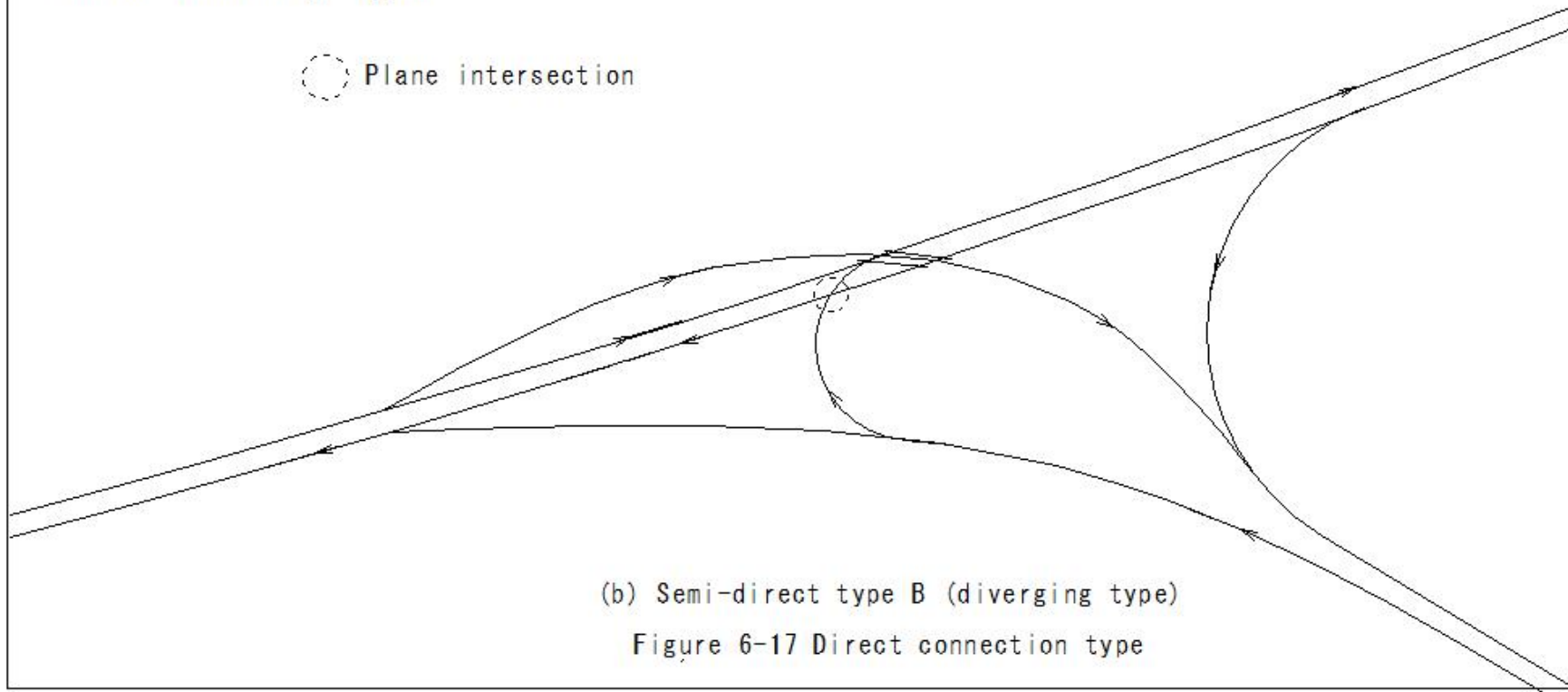
Road Structure Act

6. Intersections

6-4 Interchange planning and design standards

6-4-2. Interchange Types

○ Plane intersection



(b) Semi-direct type B (diverging type)

Figure 6-17 Direct connection type

(H885)Road Structure Act(Intersections)

(H885)Road Structure Act(Intersections)

Road Structure Act

6. Intersections

6-4 Interchange planning and design standards

6-4-2. Interchange Types

○ Plane intersection

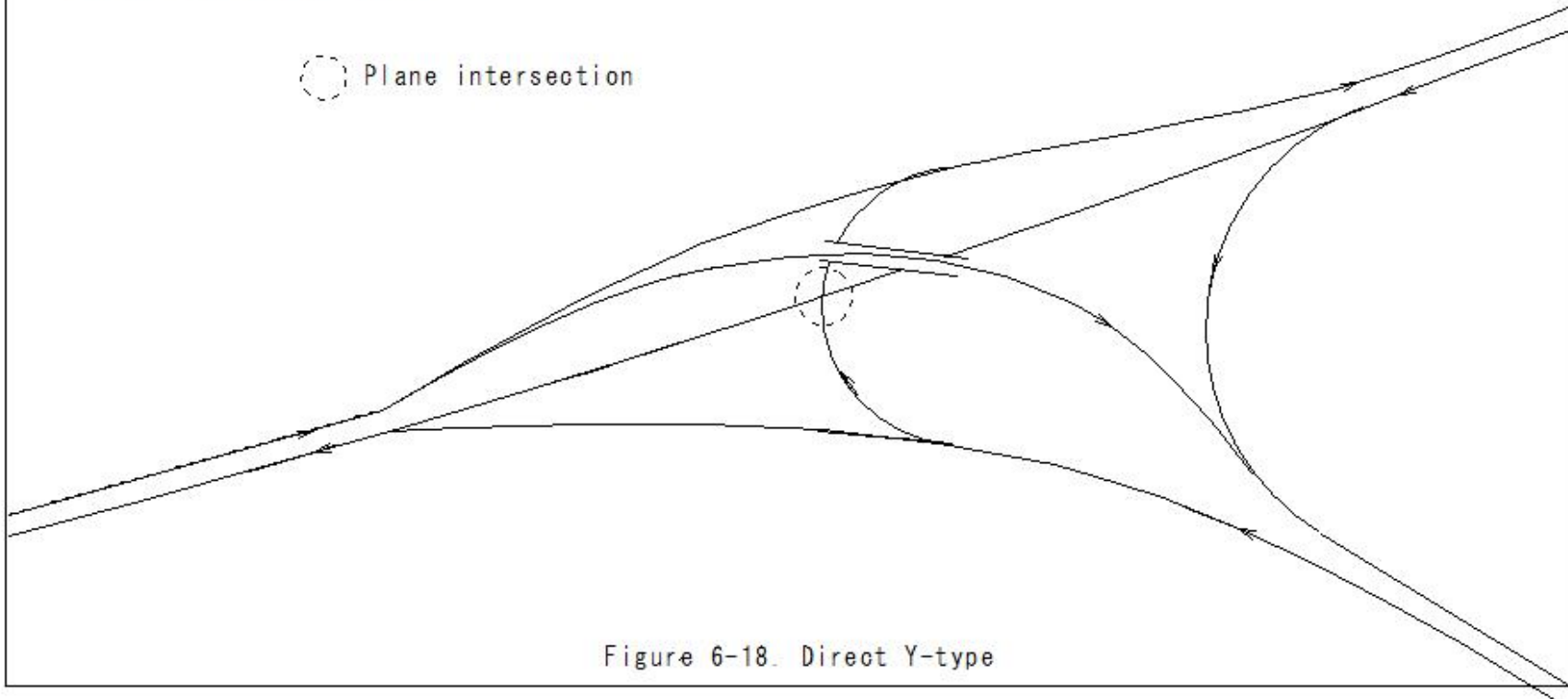


Figure 6-18. Direct Y-type

(H886)Road Structure Act(Intersections)


(H886)Road Structure Act(Intersections)

Road Structure Act

6. Intersections

6-4 Interchange planning and design standards

6-4-2. Interchange Types

 Plane intersection

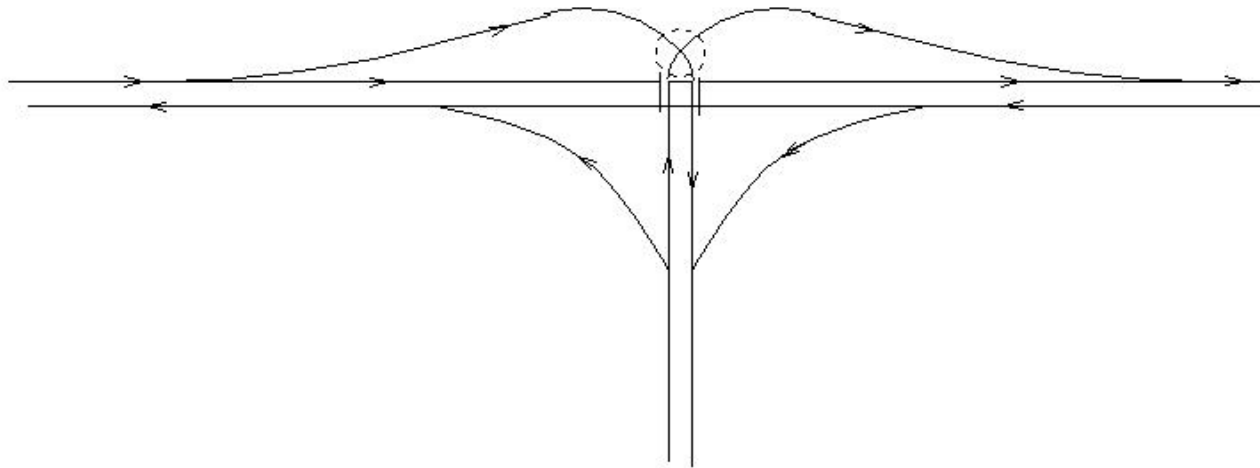


Figure 6-19. Y-type at-grade

(H887)Road Structure Act(Intersections)

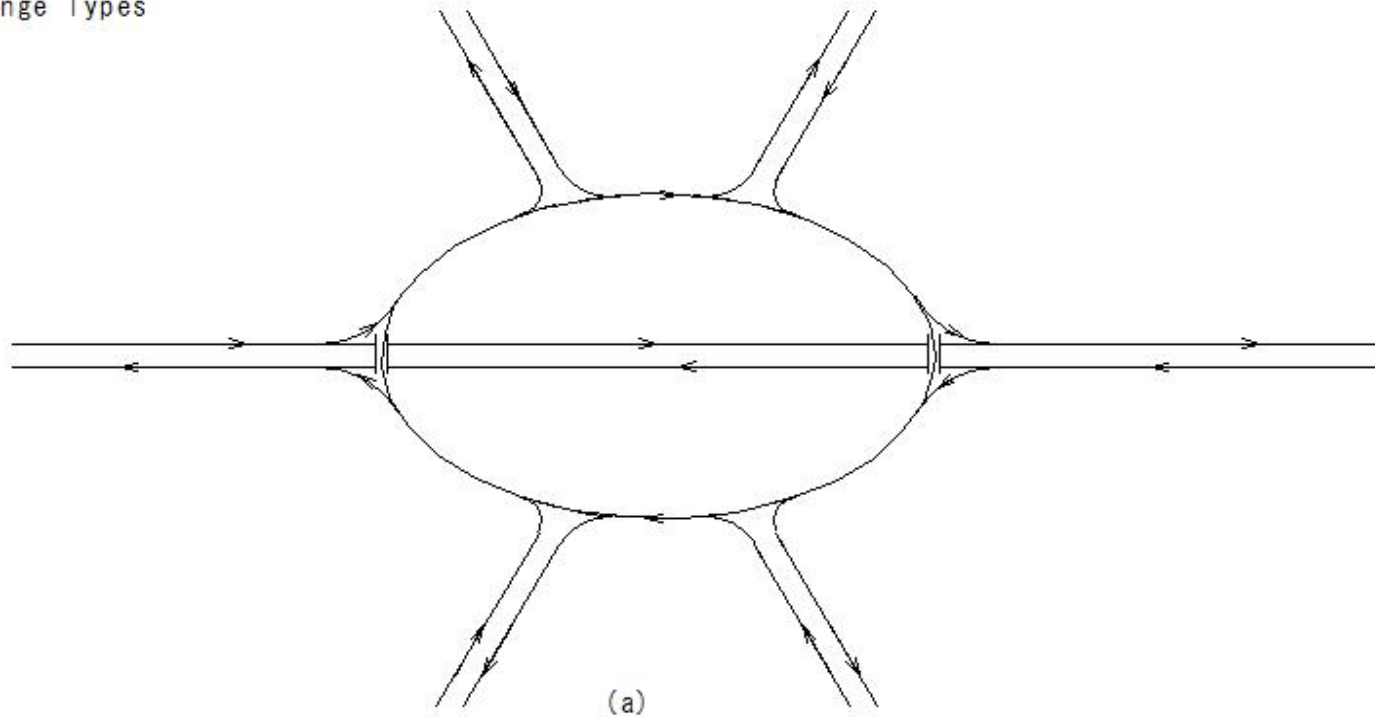
(H887)Road Structure Act(Intersections)

Road Structure Act

6. Intersections

6-4 Interchange planning and design standards

6-4-2. Interchange Types



(a)

Figure 6-20. Rotary type

(H888)Road Structure Act(Intersections)

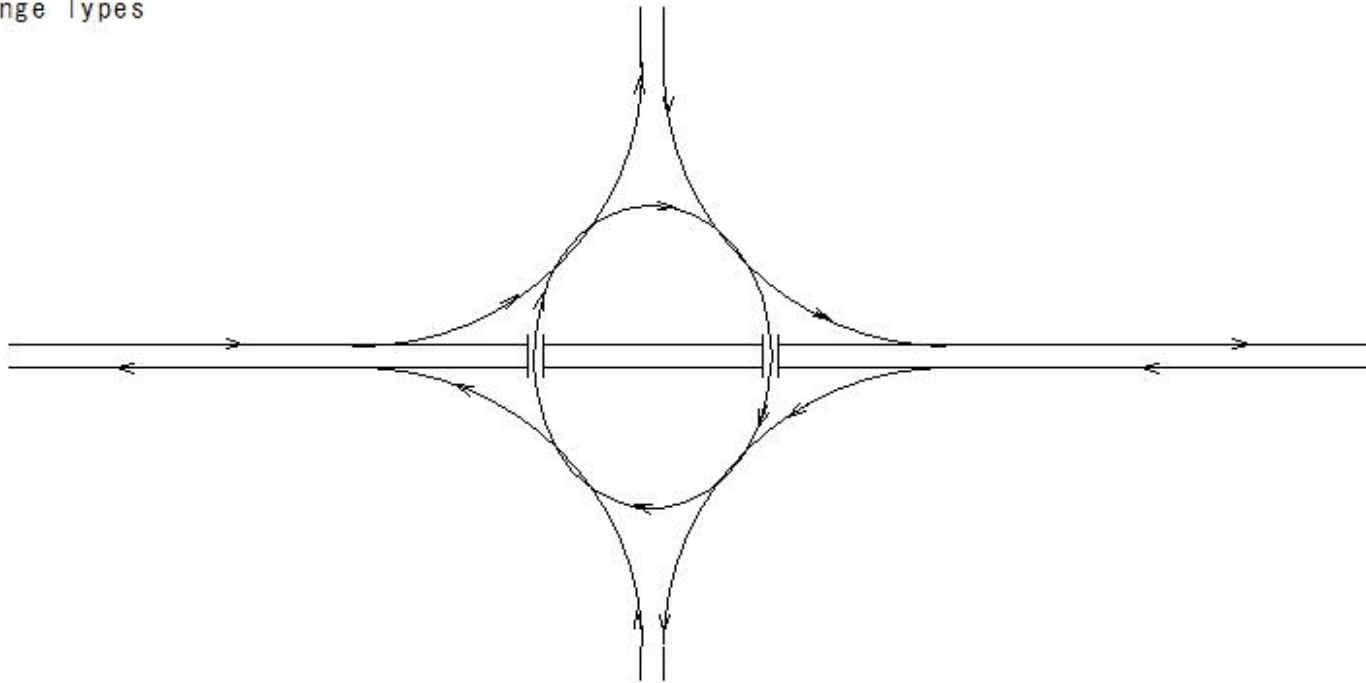
(H888)Road Structure Act(Intersections)

Road Structure Act

6. Intersections

6-4 Interchange planning and design standards

6-4-2. Interchange Types



(b)

Figure 6-20. Rotary type

(H889)Road Structure Act(Intersections)

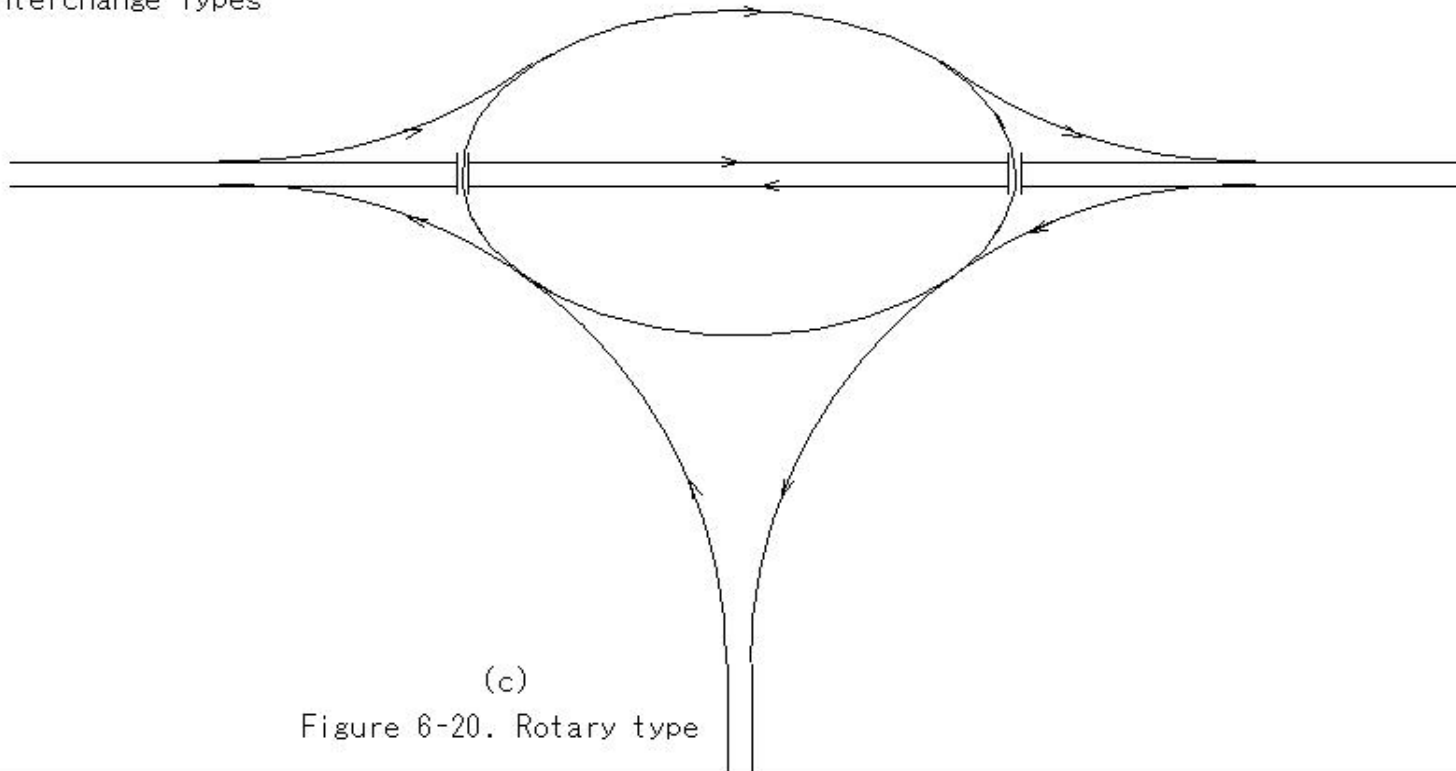
(H889)Road Structure Act(Intersections)

Road Structure Act

6. Intersections

6-4 Interchange planning and design standards

6-4-2. Interchange Types



(c)

Figure 6-20. Rotary type

(H890)Road Structure Act(Intersections)

(H890)Road Structure Act(Intersections)

Road Structure Act

6. Intersections

6-4 Interchange planning and design standards

6-4-2. Interchange Types

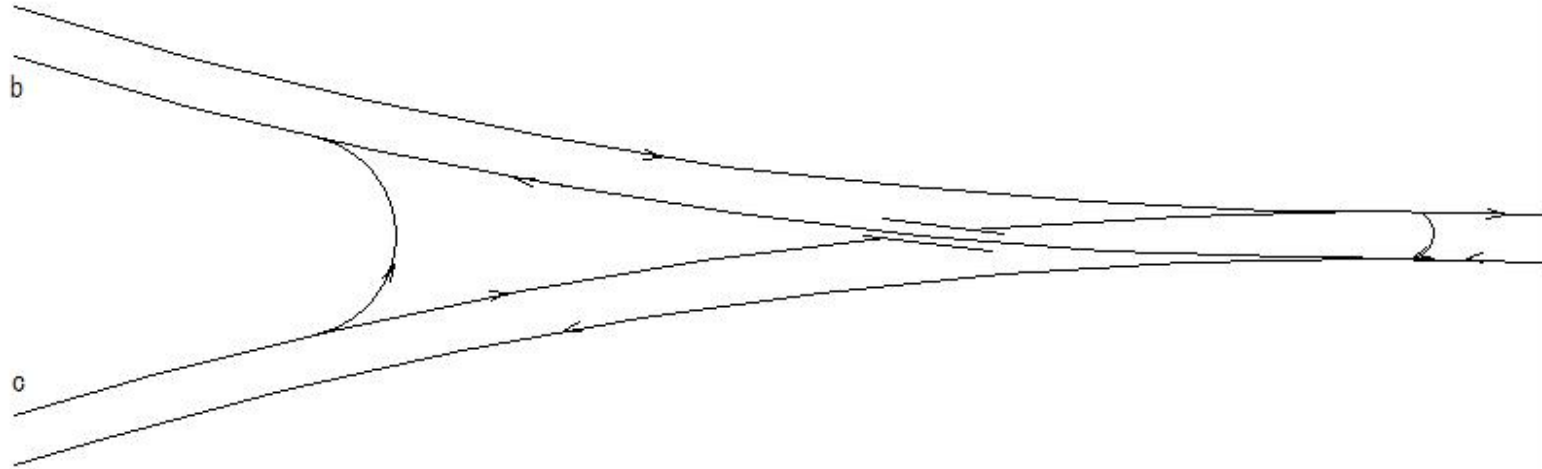


Figure 6-21. Direct Y-shaped variant.

(H891)Road Structure Act(Intersections)

(H891)Road Structure Act(Intersections)

Road Structure Act

6. Intersections

6-4 Interchange planning and design standards

6-4-2. Interchange Types

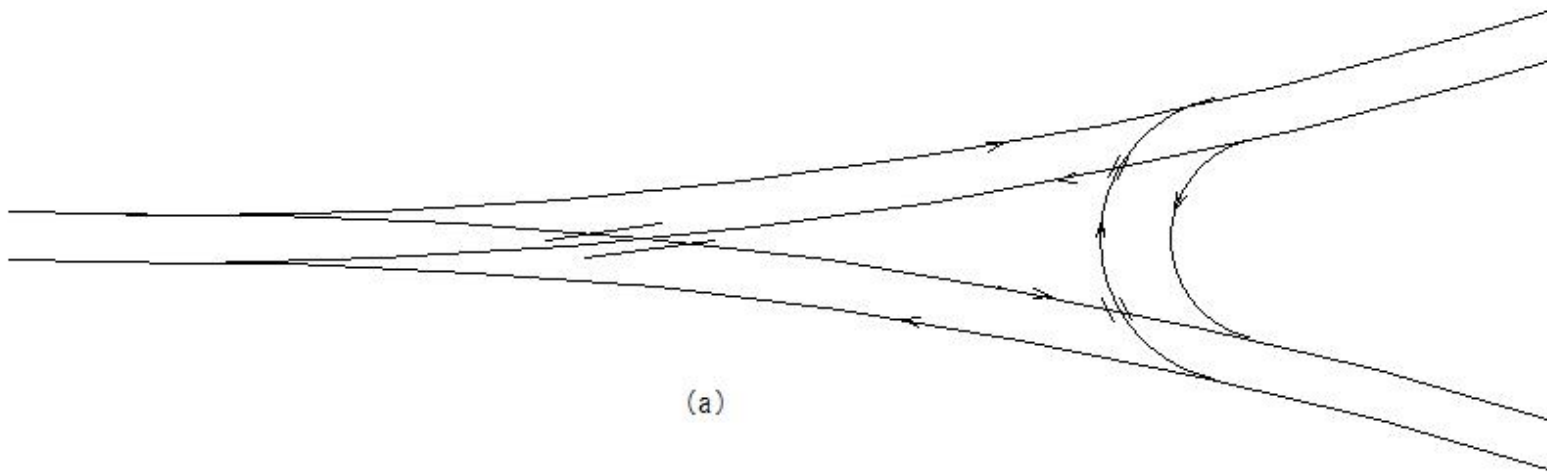


Figure 6-22. Direct Y-type

(H892)Road Structure Act(Intersections)

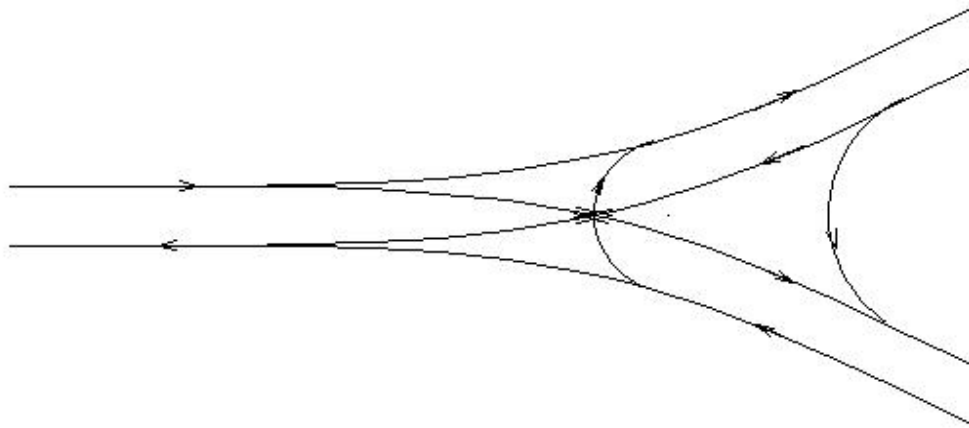
(H892)Road Structure Act(Intersections)

Road Structure Act

6. Intersections

6-4 Interchange planning and design standards

6-4-2. Interchange Types



(b)

Figure 6-22. Direct Y-type

(H893)Road Structure Act(Intersections)

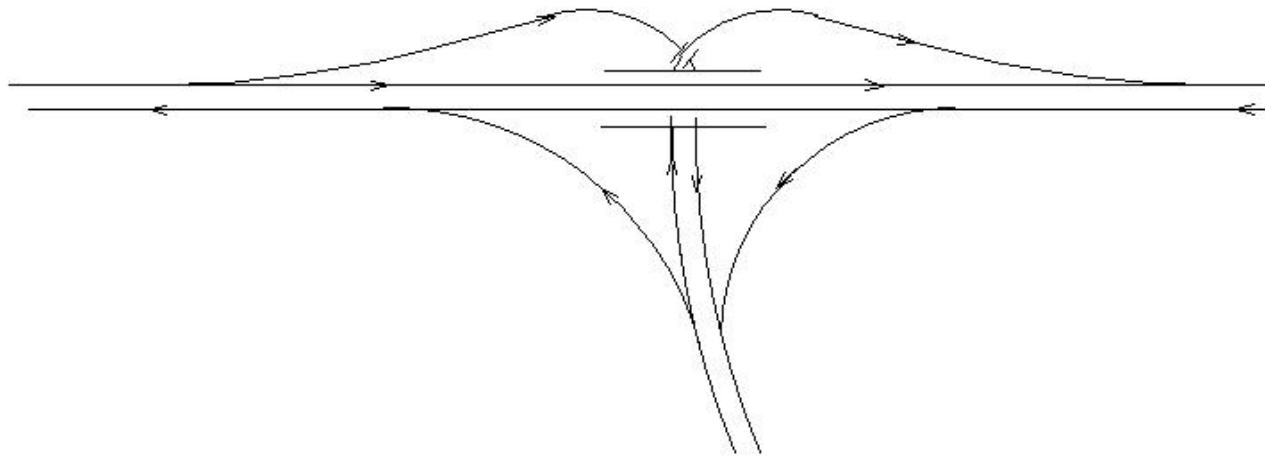
(H893)Road Structure Act(Intersections)

Road Structure Act

6. Intersections

6-4 Interchange planning and design standards

6-4-2. Interchange Types



(a)

Figure 6-23. Semi-direct Y-type

(H894)Road Structure Act(Intersections)

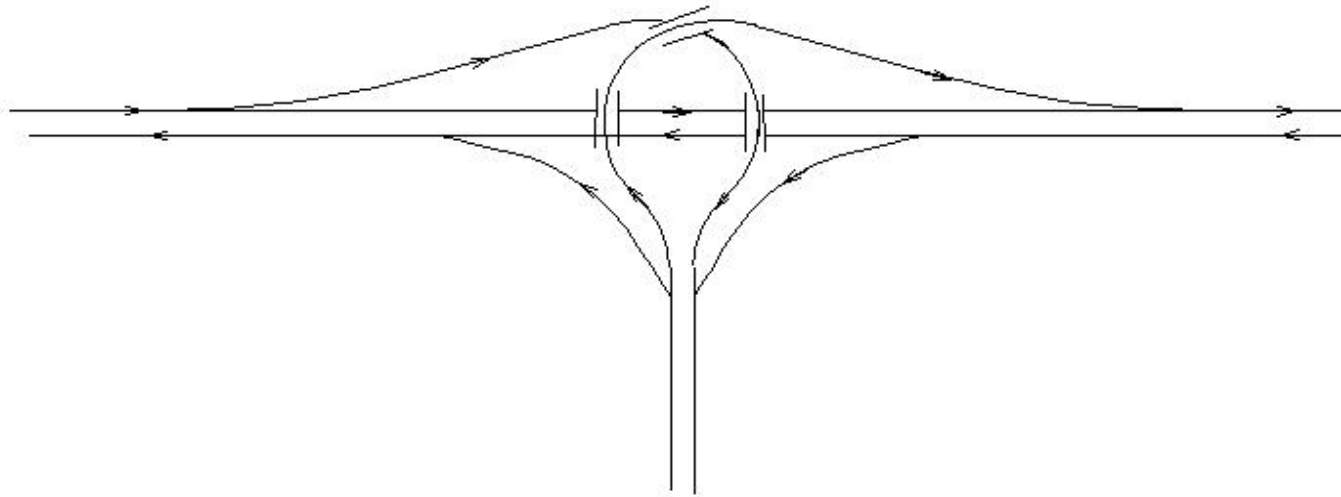
(H894)Road Structure Act(Intersections)

Road Structure Act

6. Intersections

6-4 Interchange planning and design standards

6-4-2. Interchange Types



(b)

Figure 6-23. Semi-direct Y-type

(H895)Road Structure Act(Intersections)

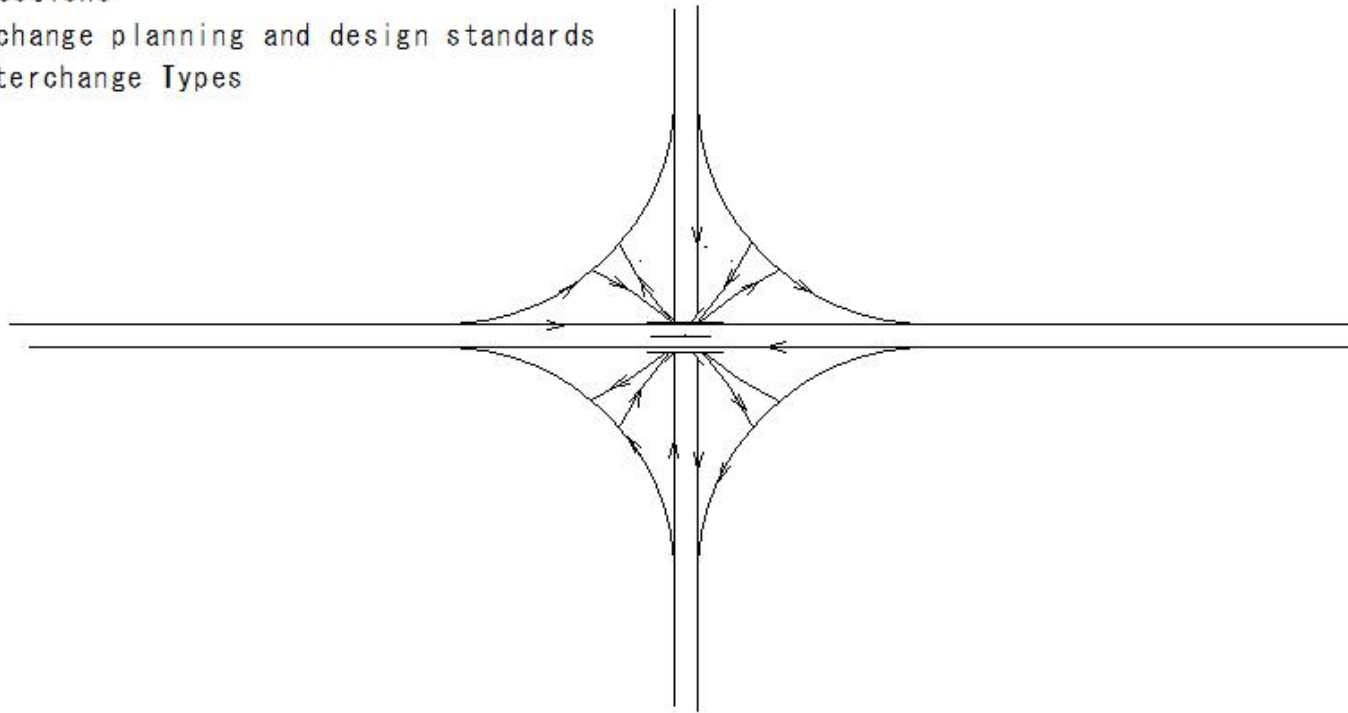
(H895)Road Structure Act(Intersections)

Road Structure Act

6. Intersections

6-4 Interchange planning and design standards

6-4-2. Interchange Types



(a)

Figure 6-24. Example of direct connection type (four-way intersection)

(H896)Road Structure Act(Intersections)

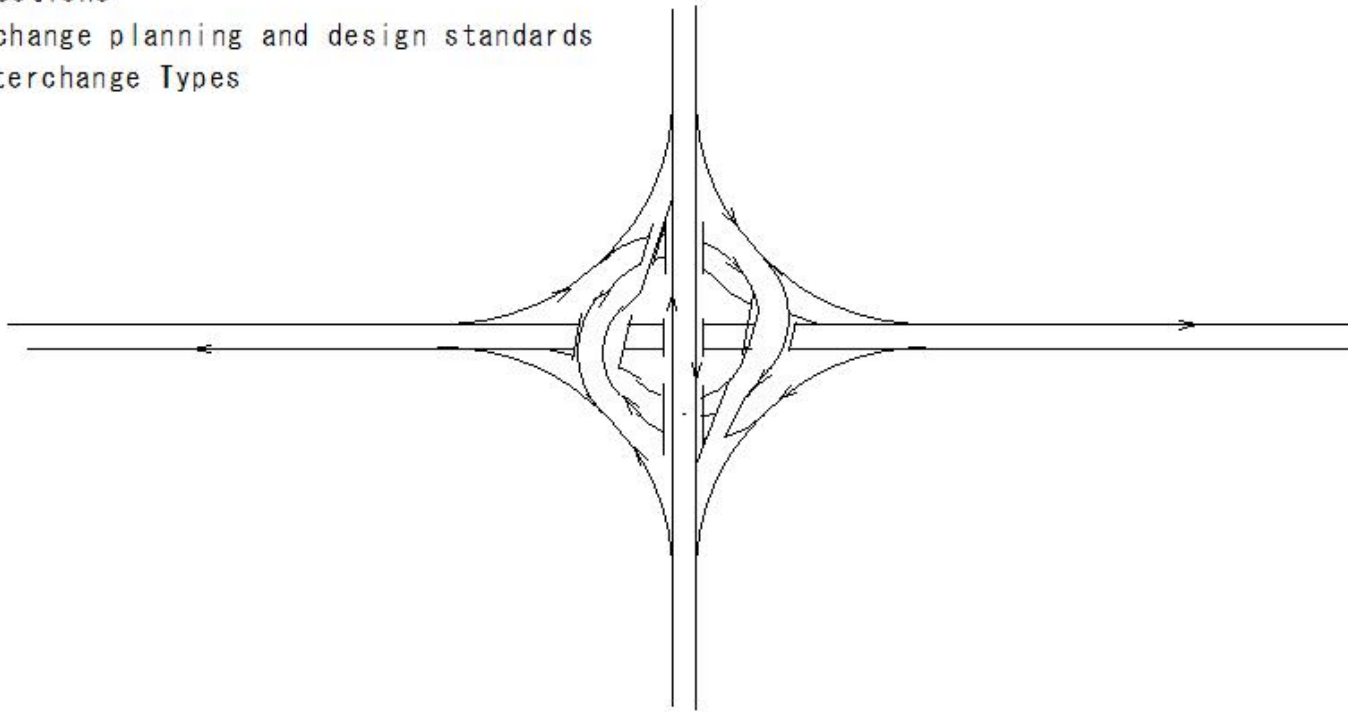
(H896)Road Structure Act(Intersections)

Road Structure Act

6. Intersections

6-4 Interchange planning and design standards

6-4-2. Interchange Types



(b) Turbine type

Figure 6-24. Example of direct connection type (four-way intersection)

(H897)Road Structure Act(Intersections)

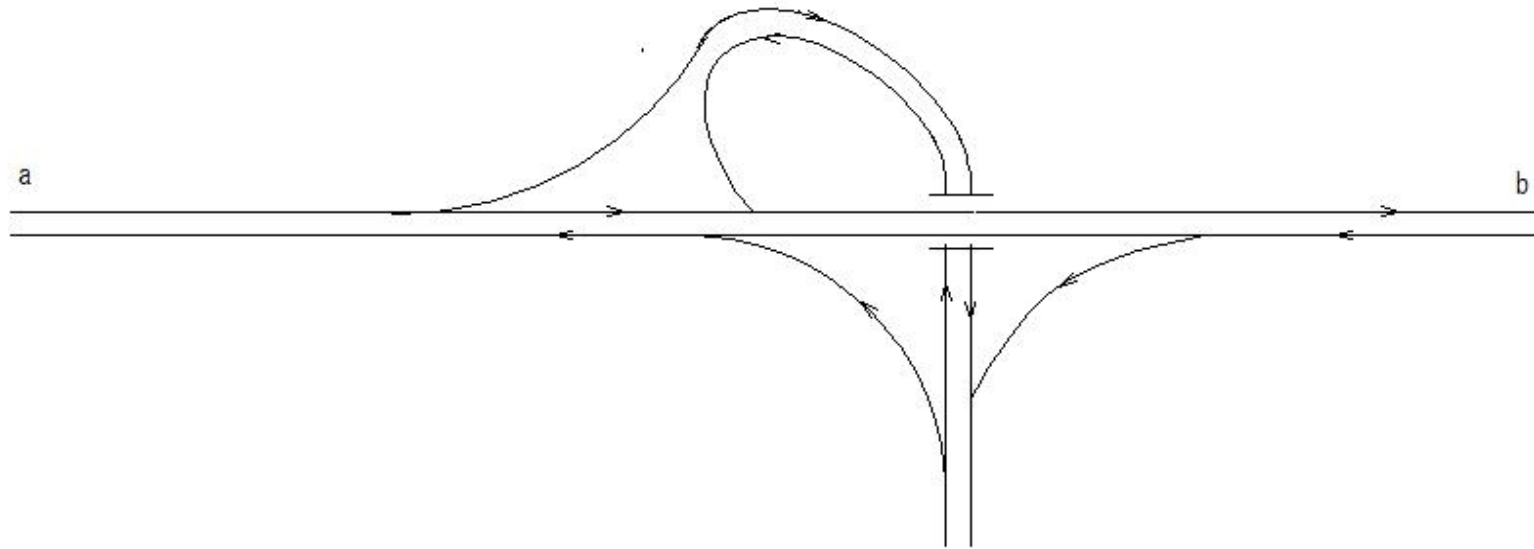
(H897)Road Structure Act(Intersections)

Road Structure Act

6. Intersections

6-4 Interchange planning and design standards

6-4-2. Interchange Types



(a) Type A

Figure 6-25. Trumpet type

(H898)Road Structure Act(Intersections)

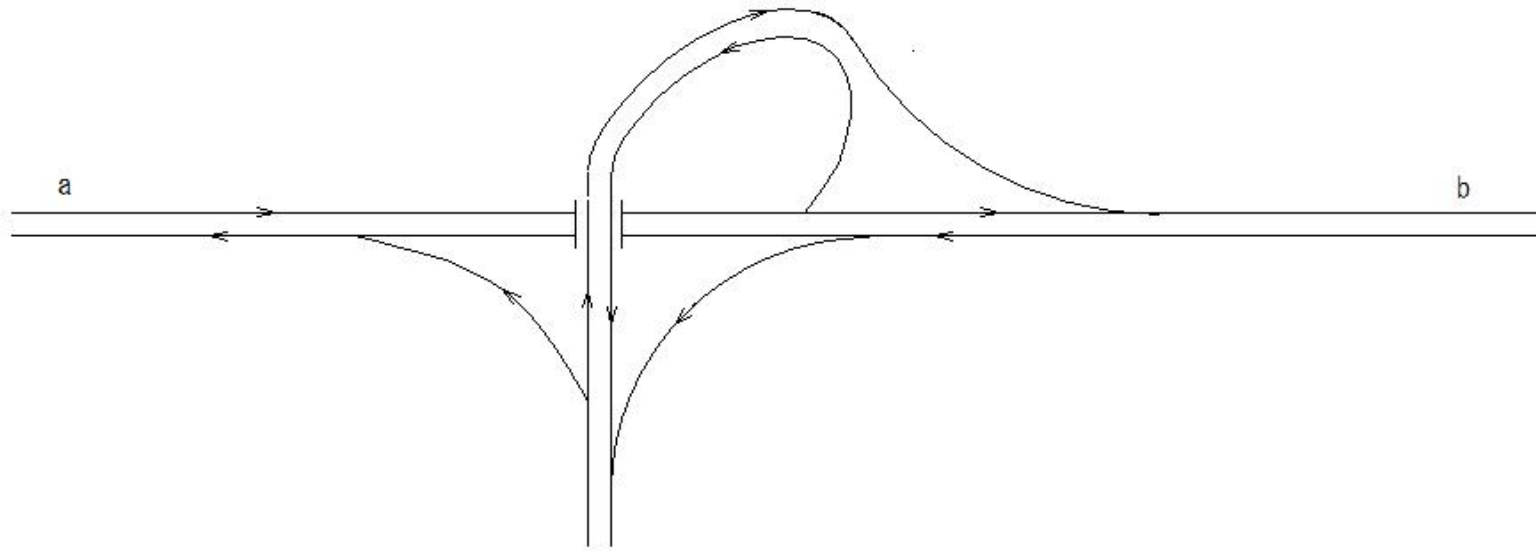
(H898)Road Structure Act(Intersections)

Road Structure Act

6. Intersections

6-4 Interchange planning and design standards

6-4-2. Interchange Types



(a) Type A

Figure 6-25. Trumpet type

(H899)Road Structure Act(Intersections)

(H899)Road Structure Act(Intersections)

Road Structure Act

6. Intersections

6-4 Interchange planning and design standards

6-4-2. Interchange Types

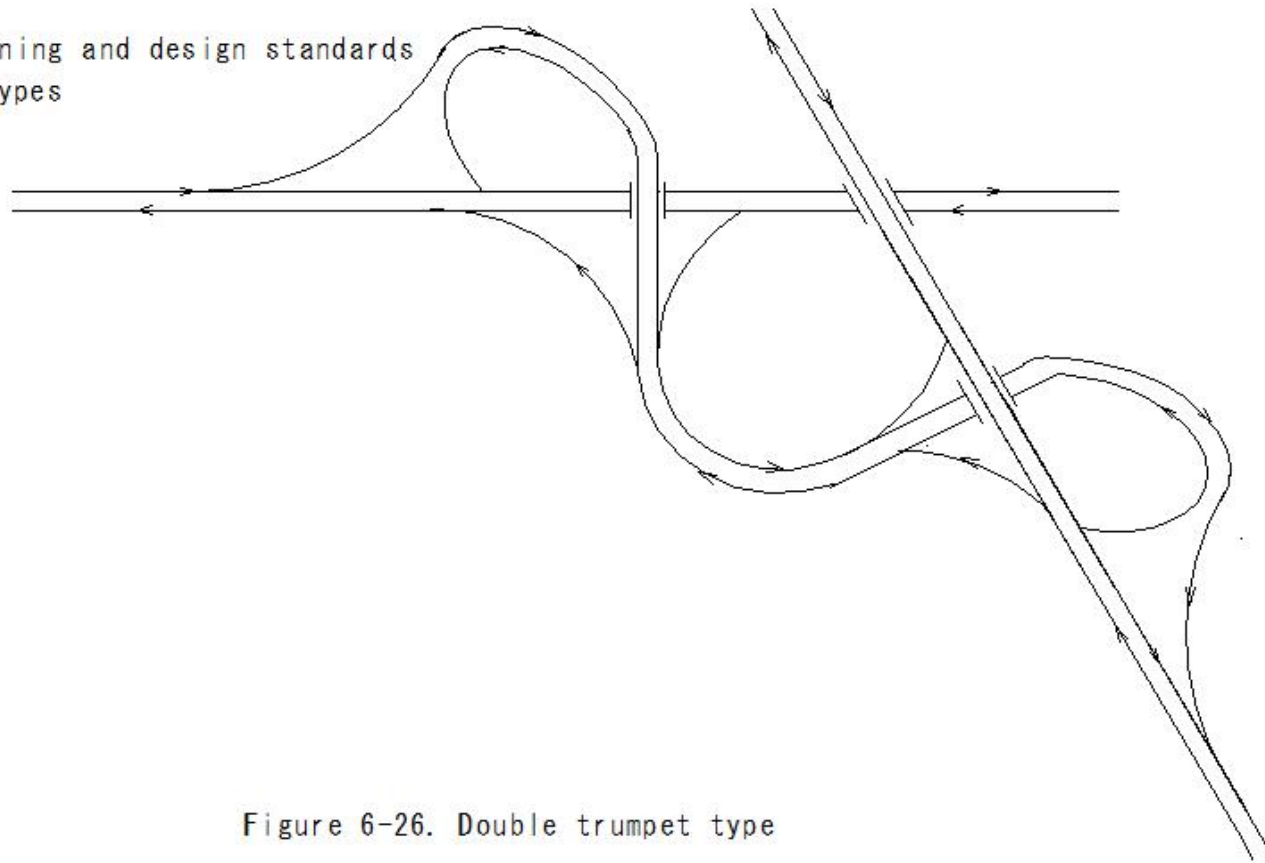


Figure 6-26. Double trumpet type

(H900)Road Structure Act(Intersections)

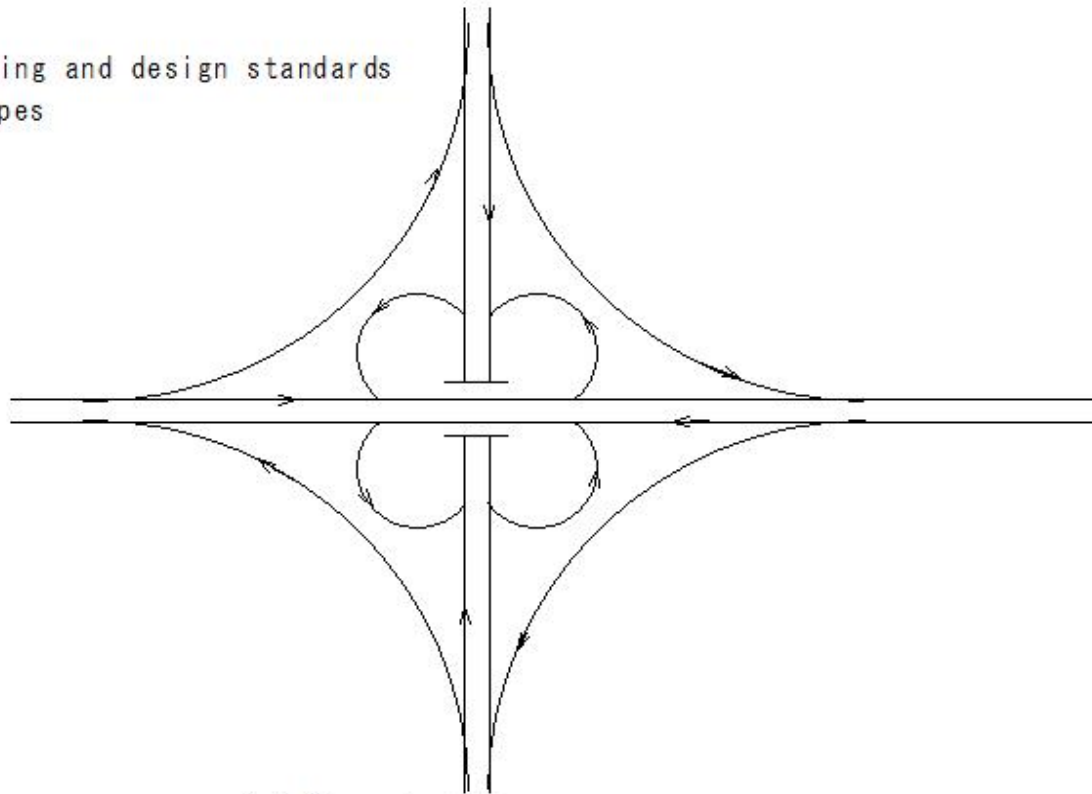
(H900)Road Structure Act(Intersections)

Road Structure Act

6. Intersections

6-4 Interchange planning and design standards

6-4-2. Interchange Types



(a) Cloverleaf type

Figure 6-27. Cloverleaf type interchange

(H901)Road Structure Act(Intersections)

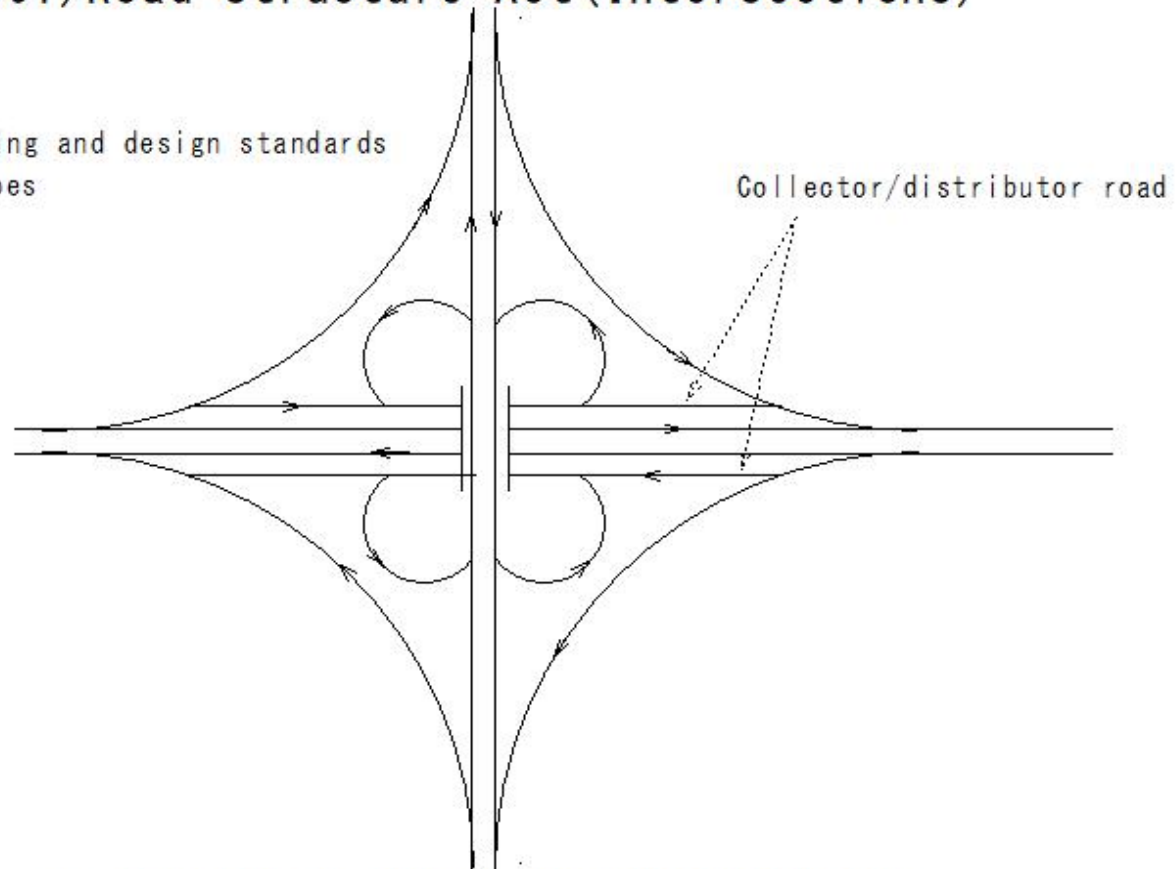
(H901)Road Structure Act(Intersections)

Road Structure Act

6. Intersections

6-4 Interchange planning and design standards

6-4-2. Interchange Types



(b) Cloverleaf type (with collector/distributor road)

Figure 6-27. Cloverleaf type interchange

(H902)Road Structure Act(Intersections)

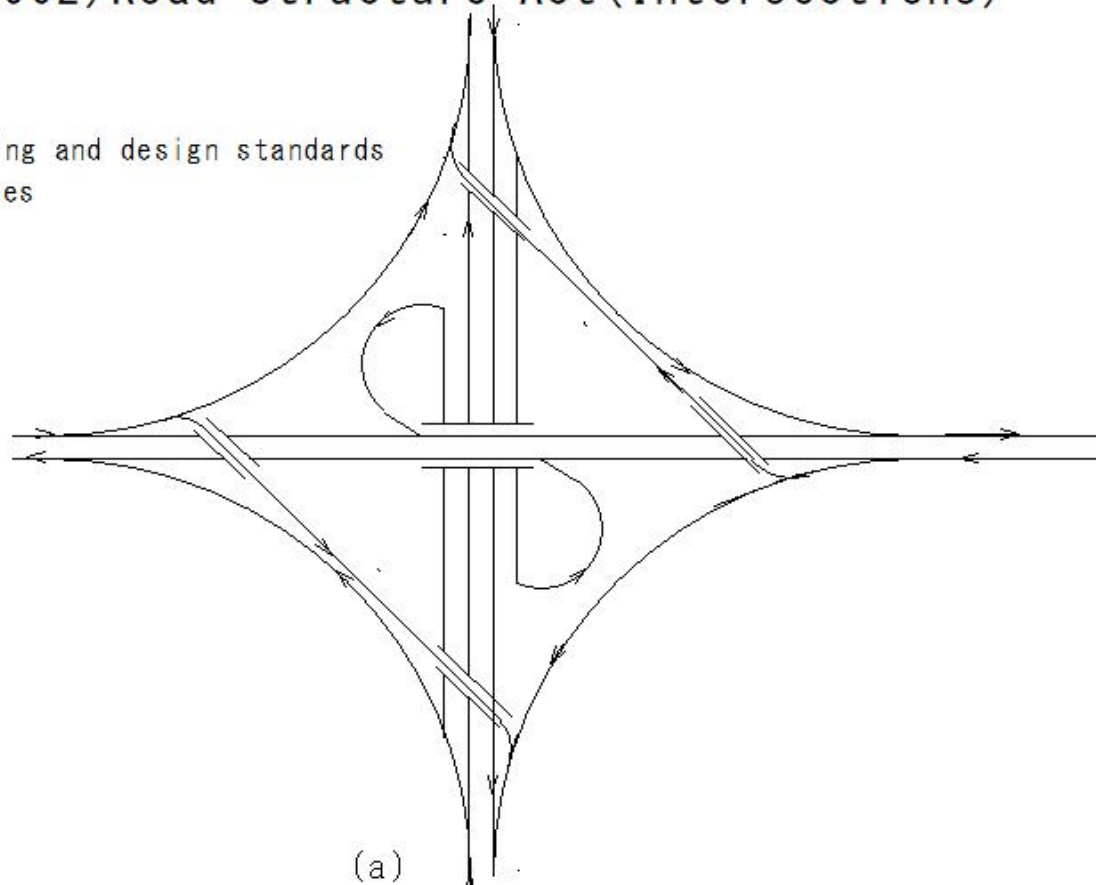
(H902)Road Structure Act(Intersections)

Road Structure Act

6. Intersections

6-4 Interchange planning and design standards

6-4-2. Interchange Types



(a)

Figure 6-28. Cloverleaf-type variation

(H903)Road Structure Act(Intersections)

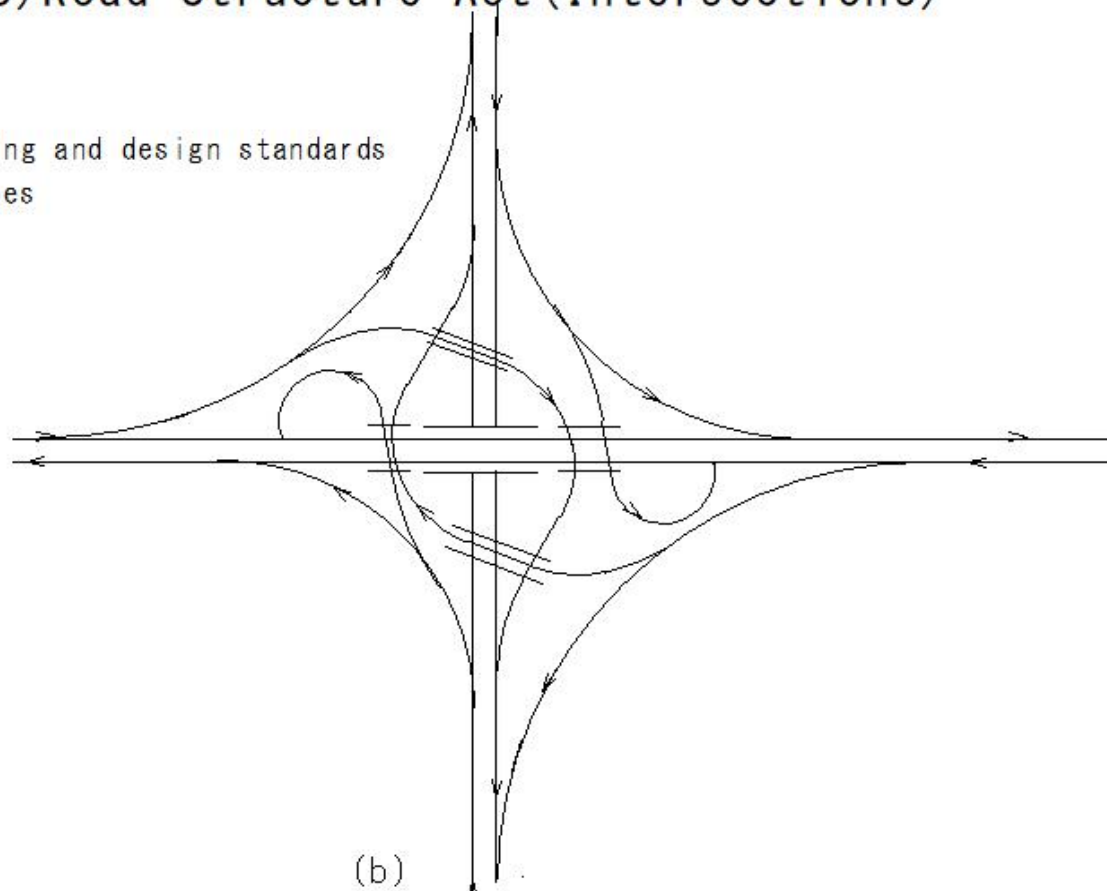
(H903)Road Structure Act(Intersections)

Road Structure Act

6. Intersections

6-4 Interchange planning and design standards

6-4-2. Interchange Types



(b)

Figure 6-28. Clover leaf-type variation

(H904)Road Structure Act(Intersections)

(H904)Road Structure Act(Intersections)

Road Structure Act

6. Intersections

6-4 Interchange planning and design standards

6-4-2. Interchange Types

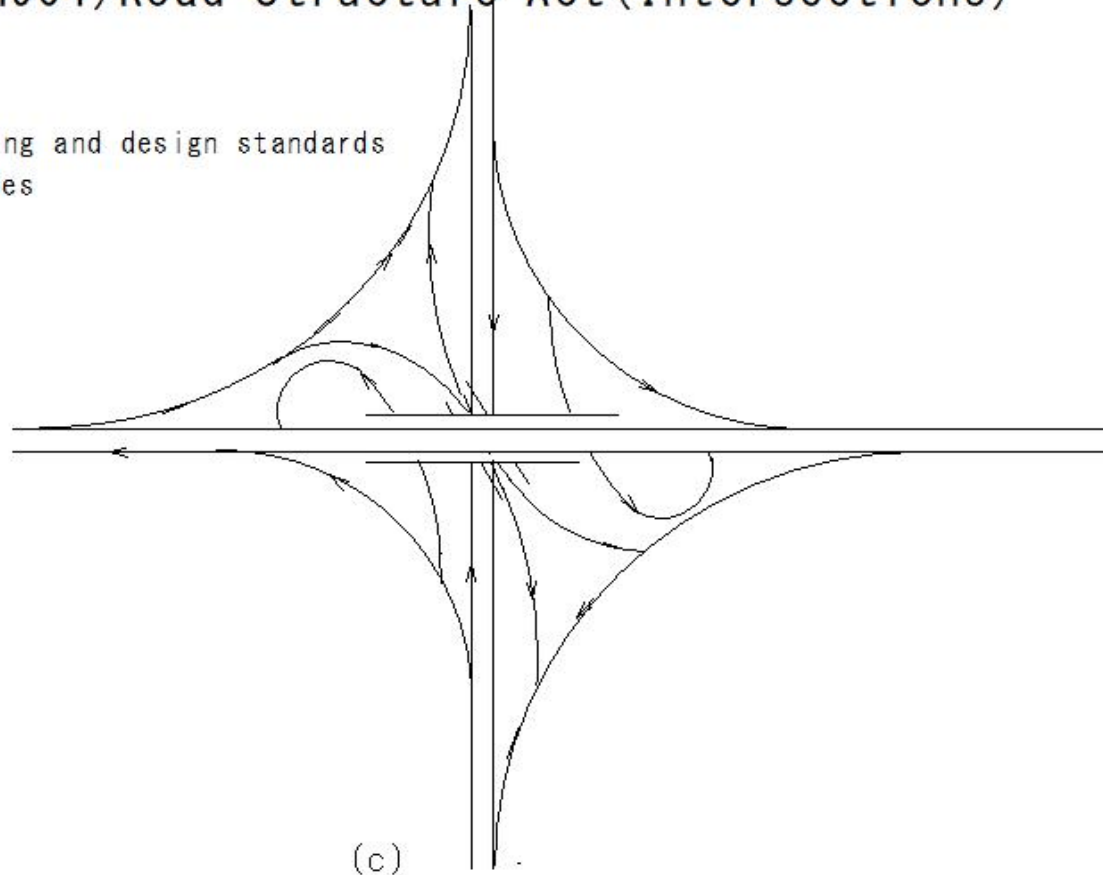


Figure 6-28. Cloverleaf-type variation

(H905)Road Structure Act(Intersections)

(H905)Road Structure Act(Intersections)

Road Structure Act

6. Grade separation

6-4-3. Design standards for interchanges

Unit: km/h

(Standard case)

Road classification		Type 1					Type 2			
Design speed (km/h)		120	100	80	60	50	80	60	50	40
Alignment elements										
Horizontal curve radius (m or more)		2,000	1,500	1,100	500	300	900	450	250	200
Maximum longitudinal gradient (% or less)		2.0	2.0	3.0	4.5	5.0	4.0	5.0	5.5	6.0
Minimum longitudinal curve radius (m or more)	凸type	45,000	25,000	12,000	6,000	4,000	9,000	4,500	2,500	1,400
	凹type	16,000	12,000	8,000	4,000	3,000	6,000	3,000	2,000	1,400

(H906)Road Structure Act(Intersections)

(H906)Road Structure Act(Intersections)

Road Structure Act

6. Intersections

6-4-3. Design standards for interchanges

Unit: km/h

Special case

Road classification		Type 1					Type 2			
Design speed (km/h)		120	100	80	60	50	80	60	50	40
Alignment elements		1,500	1,000	700	350	200	500	200	150	100
Horizontal curve radius (m or more)		2.0	3.0	4.0	5.5	6.0	5.0	6.0	6.5	7.0
Maximum longitudinal gradient (% or less)	凸type	23,000	15,000	6,000	3,000	2,000	4,500	2,500	1,200	700
Minimum longitudinal curve radius (m or more)	凹type	12,000	8,000	4,000	2,000	1,500	3,000	1,500	1,000	700

(H907)Road Structure Act(Intersections)
 Road Structure Act
 6 Intersections
 6-4-3 Interchange design standards

Unit: km/h

Design speed (km/h)			Ramp design speed										
			Type 1 and 2 roads				Superior road		Type 3 roads				
			120	100	80	60	50	40	80	60	50	40	
Lower-class roads	Type 1 and 2 roads	120	80 60 50 (40)										
		100	80 60 50 (40)	80 60 50 (40)									
		80	80 60 50 40	60 50 40	60 50 40								
		60	60 50 40	60 50 40	60 50 40	60 50 40							
		50	50 40	50 40	50 40	50 40	50 40						
		40	40	40	40	40	40	40					
	Type 3 roads	80	60 50 40	60 50 40	50 40 35	40 35 30	40 35 30	40 35 30	40 35 30	50 40 35			
		60	50 40	50 40	50 40 35	40 35 30	40 35 30	40 35 30	40 35	50 40 35			
		50	50 40	50 40	50 40 35	40 35 30	40 35 30	40 35 30	40 35	40 35 30	40 35 30		
		40	40	40	40 35 30	40 35 30	40 35 30	40 35 30	40 35	40 35 30	40 35 30	40 35 30	35 30
	Type 4 roads or stop signs		40 35 30	40 35 30	40 35 30 25	40 35 30 25	40 35 30 25	40 35 30 25	40 35 30 25	40 35 30 25	30 25	30 25	30 25

(H908)Road Structure Act(Intersections)

(H908)Road Structure Act(Intersections)

Road Structure Act

6. Intersections

6-4-3. Design standards for interchanges

Ramp geometry

Ramp types

Classification of higher-level roads	Type of lamp
Type 1 roads	A standard or B standard (D standard in special cases)
Type 2 roads	C standard (A standard in special cases)
Type 3 and 4 roads	B standard (D standard in special cases)

(H909)Road Structure Act(Intersections)

(H909)Road Structure Act(Intersections)

Road Structure Act

6. Intersections

6-4-3 Interchange design standards

Ramp geometric structure

Ramp type and width

Crossing components	Lane width	Shoulder width			Total width of 1 lane ramp in one direction	2 lanes in one direction
		1 lane in one direction		2 lanes in one direction 2 lanes in two directions, both left and right		Total width of 2 lanes ramp in two directions
		Left side	Right side			
Standard A	3.50	2.50	1.00	0.75	7.00	8.50
Standard B	3.25	1.50	0.75	0.75	5.50	8.00
Standard C	3.25	1.25	0.75	0.50	5.25	7.50
Standard D	3.25	1.00	0.50	0.50	4.75	7.50

(H910)Road Structure Act(Intersections)

(H910)Road Structure Act(Intersections)

Road Structure Act

6. Intersections

6-4-3 Interchange design standards

Ramp geometric str Ramp

Central strip

Unit: m

Ramp type	Width of center strip	
	Standard	Minimum
Standard A	2.50	2.00
Standard B · C	2.00	1.50
Standard D	1.50	1.00

(H911)Road Structure Act(Intersections)

(H911)Road Structure Act(Intersections)

Road Structure Act

6. Intersections

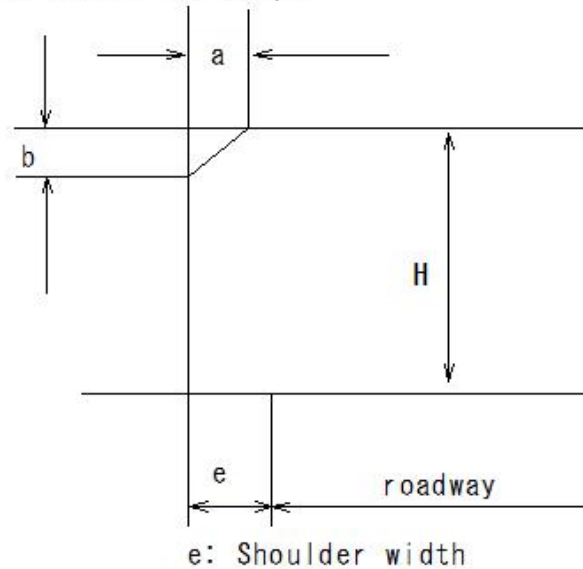
6-4-3. Design standards for interchanges

Construction limits for ramps

(1) Ramp roadway

Roadway other than tunnels, bridges or elevated roads with a length of 50m or more

Construction limits for ramps



- H: 4.5m
- b: 0.70m
- c: 0.25m
- d: 0.50m
- a: 1.0m

(H912)Road Structure Act(Intersections)

(H912)Road Structure Act(Intersections)

Road Structure Act

6. Grade separation

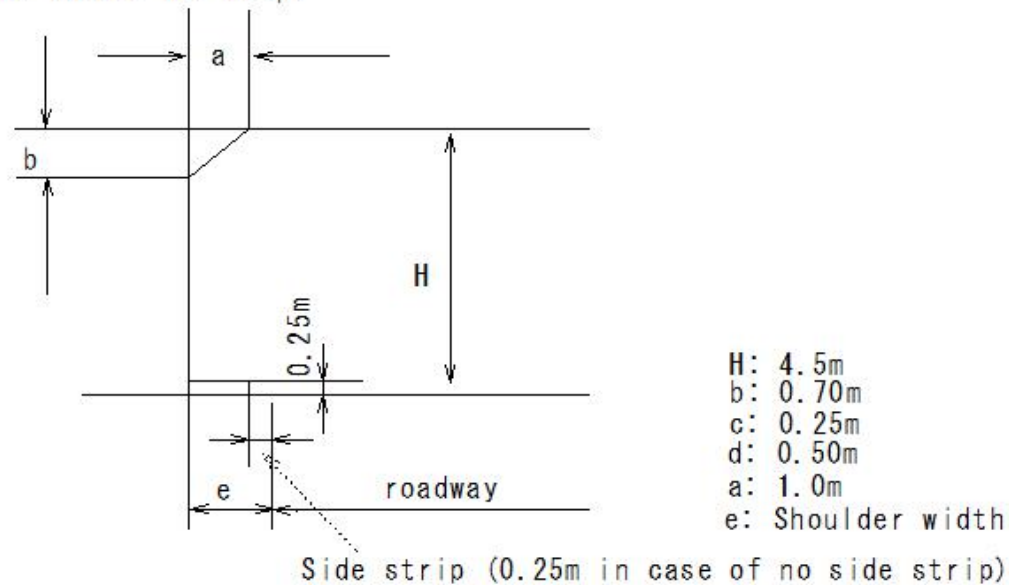
6-4-3. Design standards for interchanges

Construction limits for ramps

(1) Ramp roadway

Roadway of tunnels, bridges or elevated roads with a length of 50m or more

Construction limits for ramps



(H913)Road Structure Act(Intersections)

(H913)Road Structure Act(Intersections)

Road Structure Act

6. Grade separation

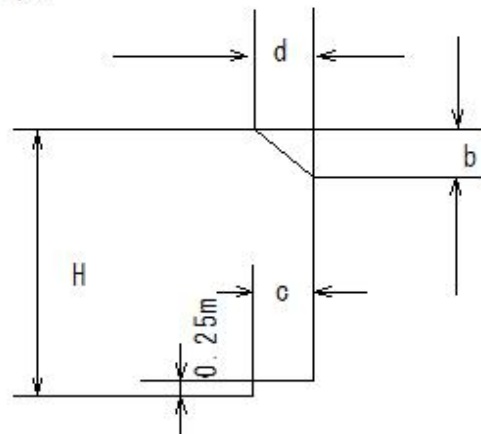
6-4-3. Design standards for interchanges

Construction limits for ramps

(2) Ramp roadway

Part of the roadway that is part of a median strip or a traffic island

Construction limits for ramps



H: 4.5m
b: 0.70m
c: 0.25m
d: 0.50m

(H914)Road Structure Act(Intersections)

(H914)Road Structure Act(Intersections)

Road Structure Act

6. Intersections

6-4-3 Design standards for interchanges

Curved sections of ramps

Minimum curve radius

Design speed (km/h)	Minimum curve radius (m)			
	Standard cases	Special cases		
		Snowy and cold regions		Other regions
		Severely snowy and cold regions	Other regions	
80	280	280	250	230
60	140	130	120	110
50	90	80	70	70
40	50	45	40	40
35	40	35	30	30
30	30	25	25	20
25	20	20	15	15

(H915)Road Structure Act(Intersections)

(H915)Road Structure Act(Intersections)

Road Structure Act

6. Intersections

6-4-3. Design standards for interchanges

Curved sections of ramps

One-way grade(superelevation) of curved sections

Areas where interchanges exist

Areas where interchanges exist		Maximum One-way grade (superelevation) (%)
Snowy and cold regions	Areas with severe snow and cold	6
	Other regions	8
Other regions		10

(H916)Road Structure Act(Intersections)

(H916)Road Structure Act(Intersections)

Road Structure Act

6. Intersections

6-4-3 Design standards for interchanges

Curved sections of ramps

One-way grade(superelevation)(%)				
Curve radius (m)				One-way grade(superelevation)(%)
80km/h	60	50	40,35,30,25	
Less than 280	Less than 140	Less than 90	Less than 50	10
280~330	140~180	90~120	50~70	9
330~380	180~220	120~160	70~90	8
380~450	220~270	160~200	90~130	7
450~540	270~330	200~240	130~160	6
540~670	330~420	240~310	160~210	5
670~870	420~560	310~410	210~280	4
870~1240	560~800	410~590	280~400	3
1240~3500	800~2000	590~1300	400~800	2

(H917)Road Structure Act(Intersections)

(H917)Road Structure Act(Intersections)

Road Structure Act

6. Intersections

6-4-3 Design standards for interchanges

Curved sections of ramps

in case of Cross slope is 1.5%

One-way grade(superelevation)(%)

Curve radius (m)				One-way grade(superelevati on)(%)
80km/h	60	50	40,35,30,25	
1240~2100	800~1370	590~1000	400~600	2
2100~2500	1370~1500	1000~1300	600~800	1.5

(H918)Road Structure Act(Intersections)

(H918)Road Structure Act(Intersections)

Road Structure Act

6. Intersections

6-4-3 Design standards for interchanges

Curved sections of ramps

Widening amount (m)

i) 1 lane per direction

Curve radius (m)				Widening amount (m)
A-class ramp (7.0m)	B-class ramp (5.5m)	C-class ramp (5.25m)	D standard ramp (4.75 m.)	
		15 or more, less than 21		3.00
15 or more, less than 21	15 or more, less than 21	21 or more, less than 23		2.75
21 or more, less than 23	21 or more, less than 23	23 or more, less than 25		2.50
23 or more, less than 25	23 or more, less than 25	25 or more, less than 28	15 or more, less than 16	2.25
25 or more, less than 27	25 or more, less than 28	28 or more, less than 32		2.00
27 or more, less than 29	28 or more, less than 32	32 or more, less than 37	16 or more Less than 17	1.75
29 or more, less than 32	32 or more, less than 36	37 or more, less than 44	17 or more but less than 18	1.50
32 or more, less than 36	36 or more, less than 44	44 or more, less than 54	18 or more, less than 20	1.25
36 or more, less than 42	44 or more, less than 54	54 or more, less than 72	20 or more Less than 22	1.00
42 or more, less than 48	54 or more, less than 72	72 or more, less than 104	22 or more Less than 24	0.75
48 or more, less than 58	72 or more, less than 100	104 or more, less than 200	24 or more Less than 27	0.50
58 or more, less than 72	100 or more, less than 190	200 or more, less than 700	27 or more, less than 31	0.25
72 or more	190 or more	700 or more	31 or more	0.00

(H919)Road Structure Act(Intersections)

(H919)Road Structure Act(Intersections)

Road Structure Act

6. Intersections

6-4-3 Design standards for interchanges

Curved sections of ramps

Widening amount (m)

ii)2 lanes in 1 direction 2 lanes in 2 directions (if the road classification of the upper main line is type 1 or type 2)

Curve radius (m)			Widening amount (m)
A-standard lamp (8.50m)	B-standard lamp (8.0m)	C-class lamp (7.5m)	
		15 or more, less than 21	5.00
			4.75
		21 or more, less than 22	4.50
	15 or more, less than 21		4.25
		22 or more, less than 23	4.00
15 or more, less than 21	21 or more, less than 22	23 or more, less than 24	3.75
	22 or more, less than 23	24 or more, less than 25	3.50
21 or more, less than 22	23 or more, less than 24	25 or more, less than 26	3.25
22 or more, less than 23	24 or more, less than 25	26 or more, less than 28	3.00
23 or more, less than 24	25 or more, less than 26	28 or more, less than 30	2.75
24 or more, less than 25	26 or more, less than 27	30 or more, less than 32	2.50
25 or more, less than 26	27 or more, less than 29	32 or more, less than 34	2.25
26 or more, less than 27	29 or more, less than 31	34 or more, less than 36	2.00
27 or more, less than 29	31 or more, less than 33	36 or more, less than 39	1.75
29 or more, less than 31	33 or more, less than 36	39 or more, less than 43	1.50
31 or more, less than 33	36 or more, less than 39	43 or more, less than 48	1.25
33 or more, less than 36	39 or more, less than 42	48 or more, less than 53	1.00
36 or more, less than 39	42 or more, less than 47	53 or more, less than 60	0.75
39 or more, less than 43	47 or more, less than 52	60 or more, less than 70	0.50
43 or more, less than 47	52 or more, less than 60	70 or more, less than 84	0.25
47 or more	60 or more	84 or more	0.00

(H920)Road Structure Act(Intersections)

(H920)Road Structure Act(Intersections)

Road Structure Act

6. Intersections

6-4-3 Design standards for interchanges

Curved sections of ramps

Widening amount (m)

iii) 2 lanes in 1 direction 2 lanes in 2 directions (D-class lamps in case of the road classification of the main road on the upper side is Type 3 or Type 4, and when the road classification of the main road on the upper side is Type 1)

Curve radius (m)			Amount of width (m)
A-standard lamp	B-standard lamp	C-Dclass lamp 7.5m	
		15 or more, less than 21	3.50
		21 or more, less than 22	3.25
	15 or more, less than 21	22 or more, less than 23	3.00
	21 or more, less than 22	23 or more, less than 24	2.75
	22 or more, less than 23	24 or more, less than 25	2.50
15 or more, but less than 21	23 or more, less than 24	25 or more, less than 27	2.25
21 or more, but less than 22	24 or more, less than 25	27 or more, less than 29	2.00
22 or more, but less than 23	25 or more, less than 27	29 or more, less than 31	1.75
23 or more, but less than 25	27 or more, less than 29	31 or more, less than 34	1.50
25 or more, but less than 27	29 or more, less than 31	34 or more, less than 38	1.25
27 or more, but less than 29	31 or more, less than 34	38 or more, less than 42	1.00
29 or more, but less than 31	34 or more, less than 38	42 or more, less than 48	0.75
31 or more, but less than 34	38 or more, less than 42	48 or more, less than 56	0.50
34 or more, but less than 38	42 or more, less than 48	56 or more, less than 66	0.25
38 or more	48 or more	66 or more	0.00

(H921)Road Structure Act(Intersections)

(H921)Road Structure Act(Intersections)

Road Structure Act

6. Intersections

6-4-3 Design standards for interchanges

Transition curves

Clothoid curves

Design speed (km/h)	80	60	50	40	35	30	25
Minimum parameters	140	70	50	35	30	20	15

Minimum curve radius at which transition curves can be omitted

Design speed (km/h)	80	60	50	40	35	30	25
Minimum curve radius	800	350	220	140	140	140	140

(H922)Road Structure Act(Intersections)

(H922)Road Structure Act(Intersections)

Road Structure Act

6. Intersections

6-4-3 Design standards for interchanges

Minimum sight distance for ramps

Design speed (km/h)	80	60	50	40	35	30	25
Sight distance (m)	110	75	55	40	35	30	25

(H923)Road Structure Act(Intersections)

(H923)Road Structure Act(Intersections)

Road Structure Act

6. Intersections

6-4-3 Design standards for interchanges

Steepest longitudinal gradient of ramps

Design speed (km/h)	Steepest longitudinal gradient (%)			
	Type 1		Type 2, 3, 4	
	Standard value	Special area	Standard value	Special area
80	4.0	6.0	-	
60	5.0	7.0	6.0	8.0
50	5.5	7.5	7.0	9.0
40	6.0	8.0	8.0	10.0
35	6.5	8.5	8.5	10.0
30	7.0	9.0	9.0	10.0
25	7.5	9.5	9.5	10.0

(H924)Road Structure Act(Intersections)

(H924)Road Structure Act(Intersections)

Road Structure Act

6. Intersections

6-4-3 Design standards for interchanges

Points where the longitudinal gradient of the ramp changes - provide a longitudinal curve							
Design speed (km/h)	80	60	50	40	35	30	25
Radius of convex longitudinal curve (m)	3,000	1,400	800	450	350	250	200
Radius of concave longitudinal curve (m)	2,000	1,000	700	450	350	250	200
Minimum curve radius (m)	70	50	40	35	30	25	15

(H925)Road Structure Act(Intersections)

(H925)Road Structure Act(Intersections)

Road Structure Act

6. Intersections

6-4-3 Design standards for interchanges

Maximum combined gradient of ramps

Design speed (km/h)	80	60	50	40	35	30	25
Maximum combined gradient(%)	11.0	11.0	11.5	11.5	12.0	12.0	12.0

(H926)Road Structure Act(Intersections)

(H926)Road Structure Act(Intersections)

Road Structure Act

6. Intersections

6-4-3. Design standards for interchanges

Ramp cross section

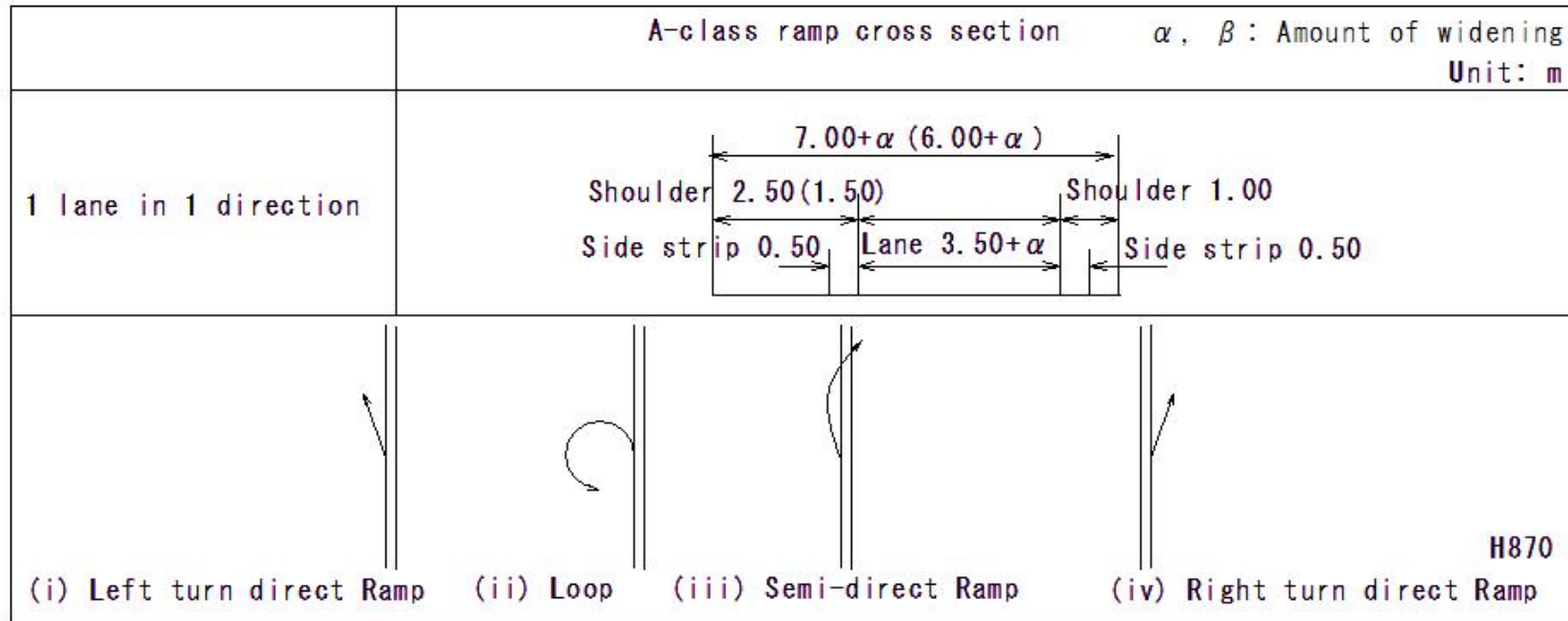


Figure 6-29. A-class ramp cross section

(H927)Road Structure Act(Intersections)

(H927)Road Structure Act(Intersections)

Road Structure Act

6. Intersections

6-4-3. Design standards for interchanges

Ramp cross section

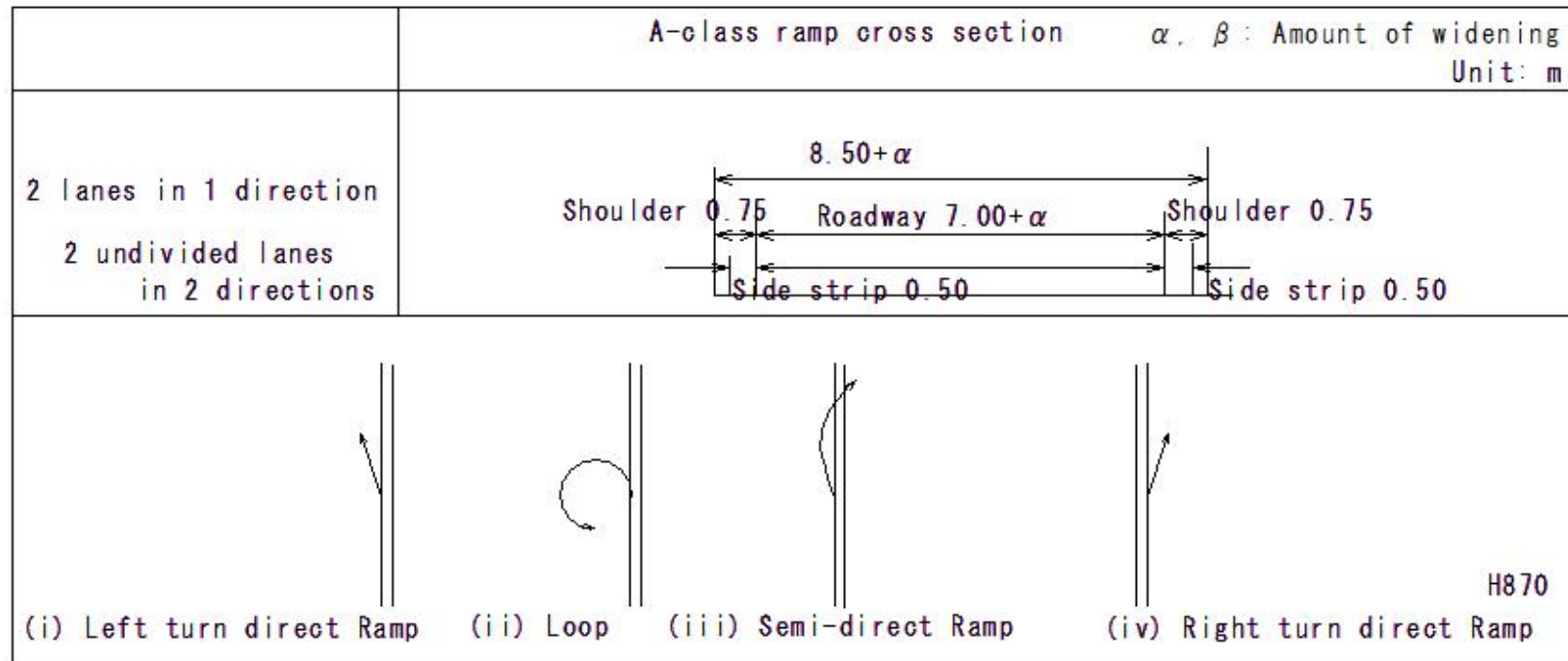


Figure 6-29. A-class ramp cross section

(H928)Road Structure Act(Intersections)

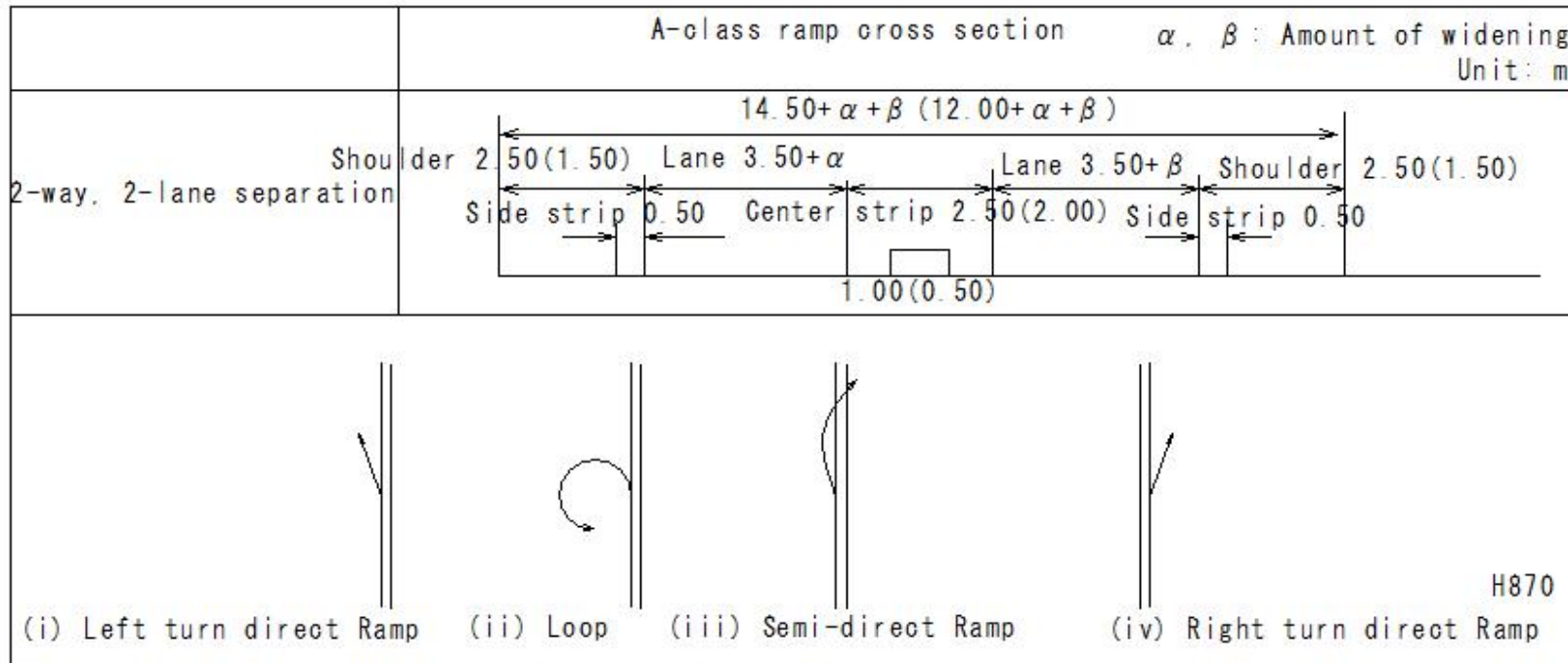
(H928)Road Structure Act(Intersections)

Road Structure Act

6. Intersections

6-4-3. Design standards for interchanges

Ramp cross section



H870

Figure 6-29. A-class ramp cross section

(H929)Road Structure Act(Intersections)

(H929)Road Structure Act(Intersections)

Road Structure Act

6. Intersections

6-4-3. Design standards for interchanges

Ramp cross section

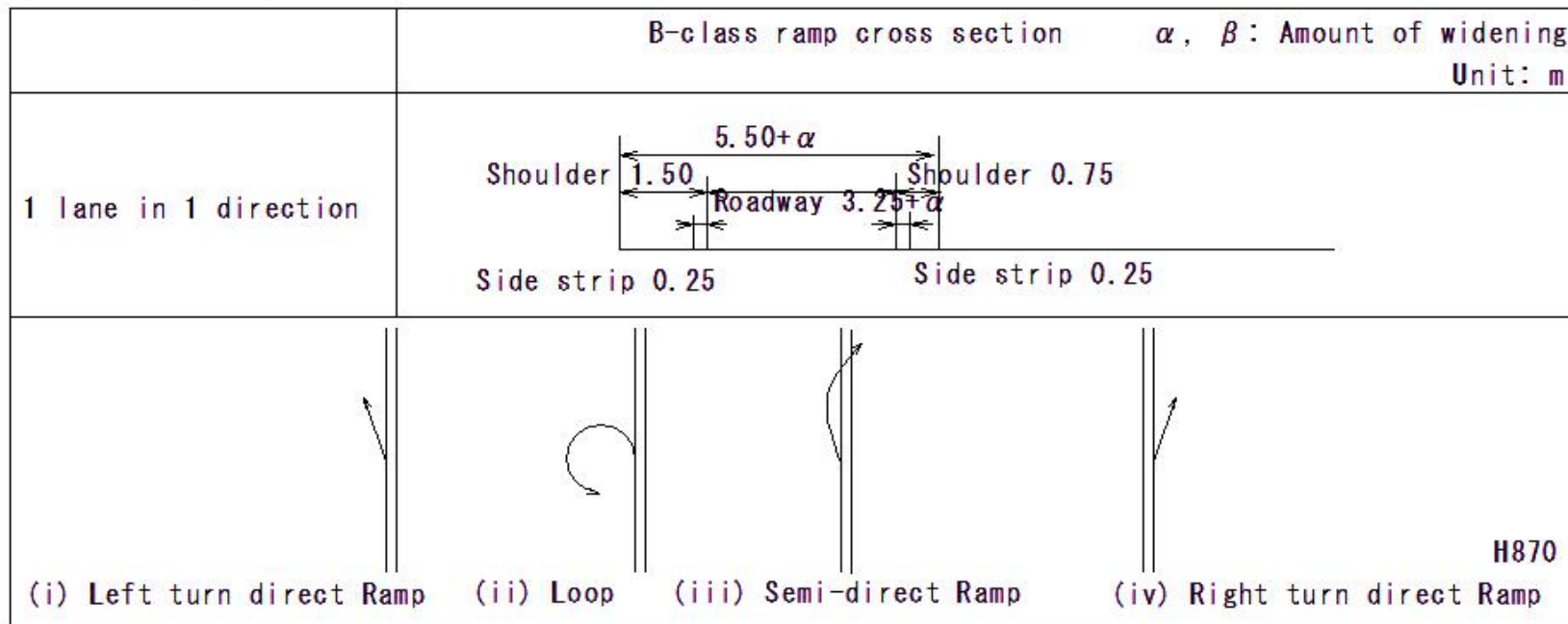


Figure 6-30. B-class ramp cross section

(H930)Road Structure Act(Intersections)

(H930)Road Structure Act(Intersections)

Road Structure Act

6. Intersections

6-4-3. Design standards for interchanges

Ramp cross section

	B-class ramp cross section α, β : Amount of widening Unit: m
2 lanes in one direction 2 undivided lanes in 2 directions	<p style="text-align: center;"> $8.00 + \alpha$ Shoulder 0.75 Roadway $6.50 + \alpha$ Shoulder 0.75 Side strip 0.25 Side strip 0.25 </p>
 (i) Left turn direct Ramp (ii) Loop (iii) Semi-direct Ramp (iv) Right turn direct Ramp	H870

Figure 6-30. B-class ramp cross section

(H931)Road Structure Act(Intersections)

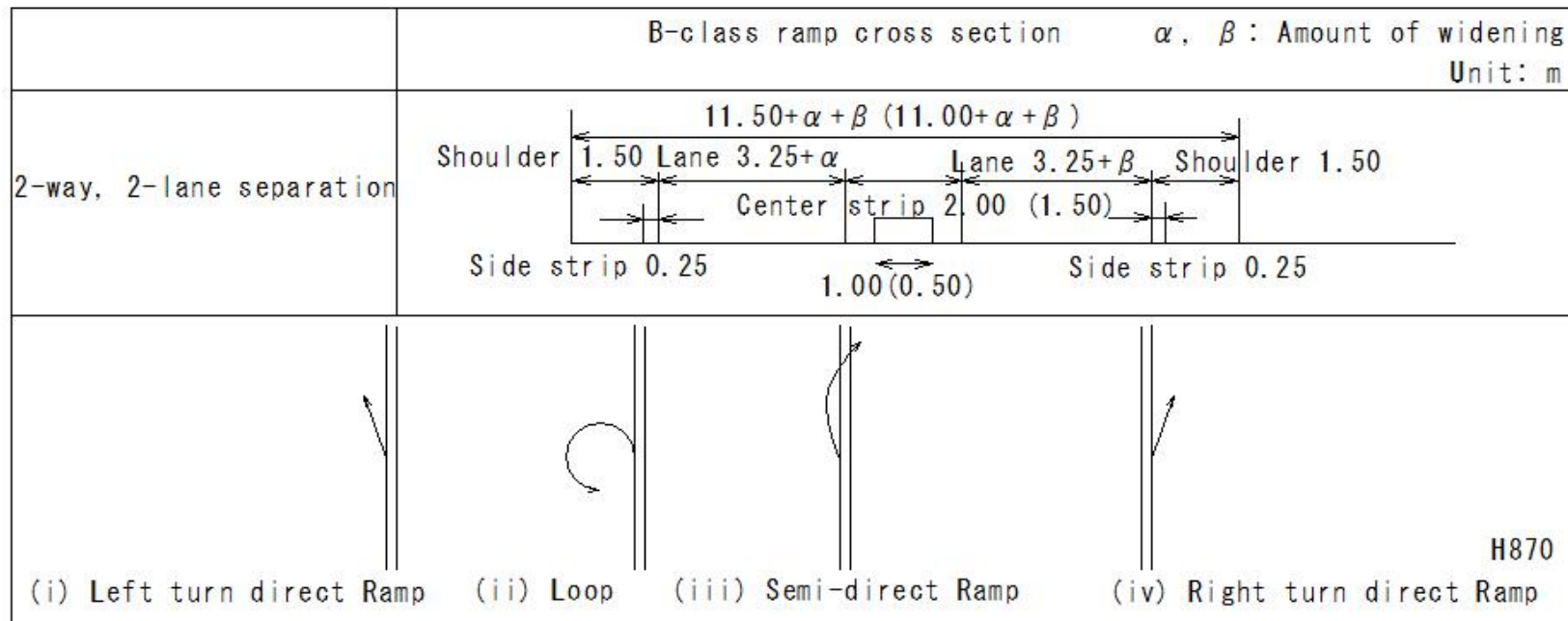
(H931)Road Structure Act(Intersections)

Road Structure Act

6. Intersections

6-4-3. Design standards for interchanges

Ramp cross section



H870

Figure 6-30. B-class ramp cross section

(H932)Road Structure Act(Intersections)

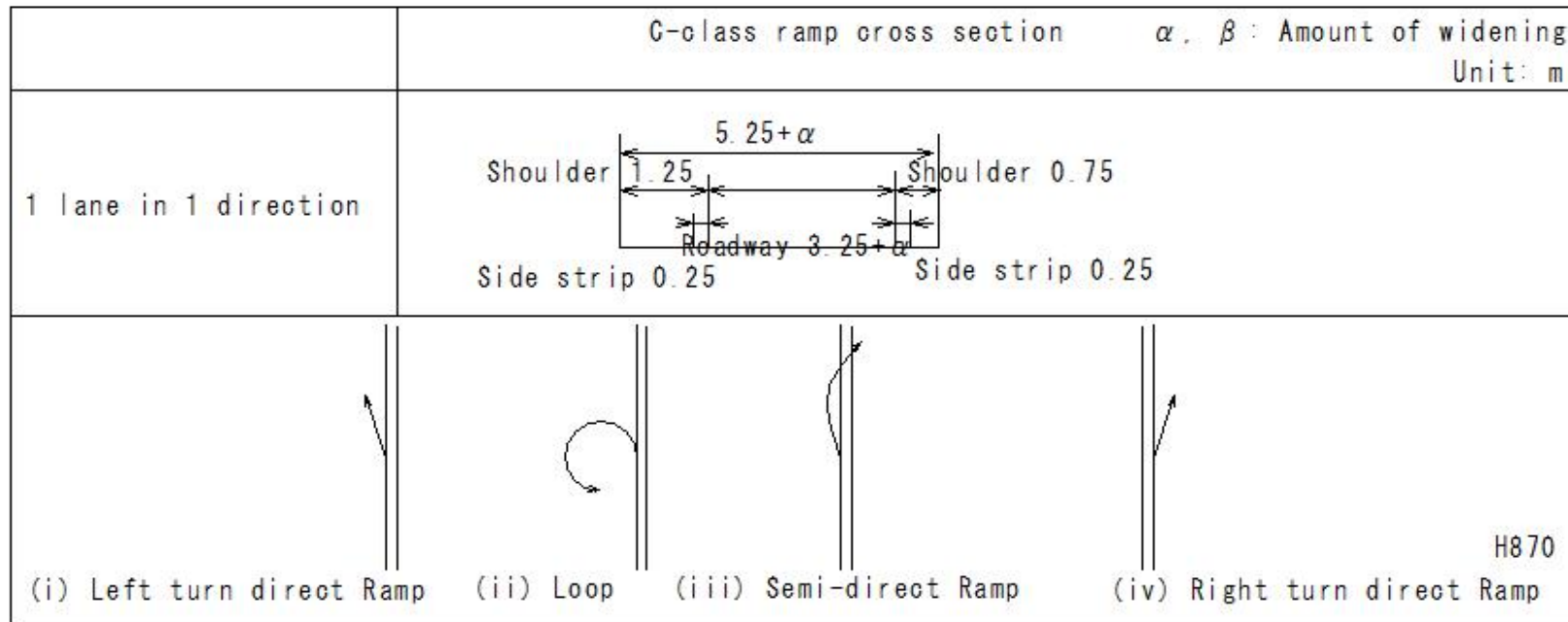
(H932)Road Structure Act(Intersections)

Road Structure Act

6. Intersections

6-4-3. Design standards for interchanges

Ramp cross section



H870

Figure 6-31. G-class ramp cross section

(H933)Road Structure Act(Intersections)

(H933)Road Structure Act(Intersections)

Road Structure Act

6. Intersections

6-4-3. Design standards for interchanges

Ramp cross section

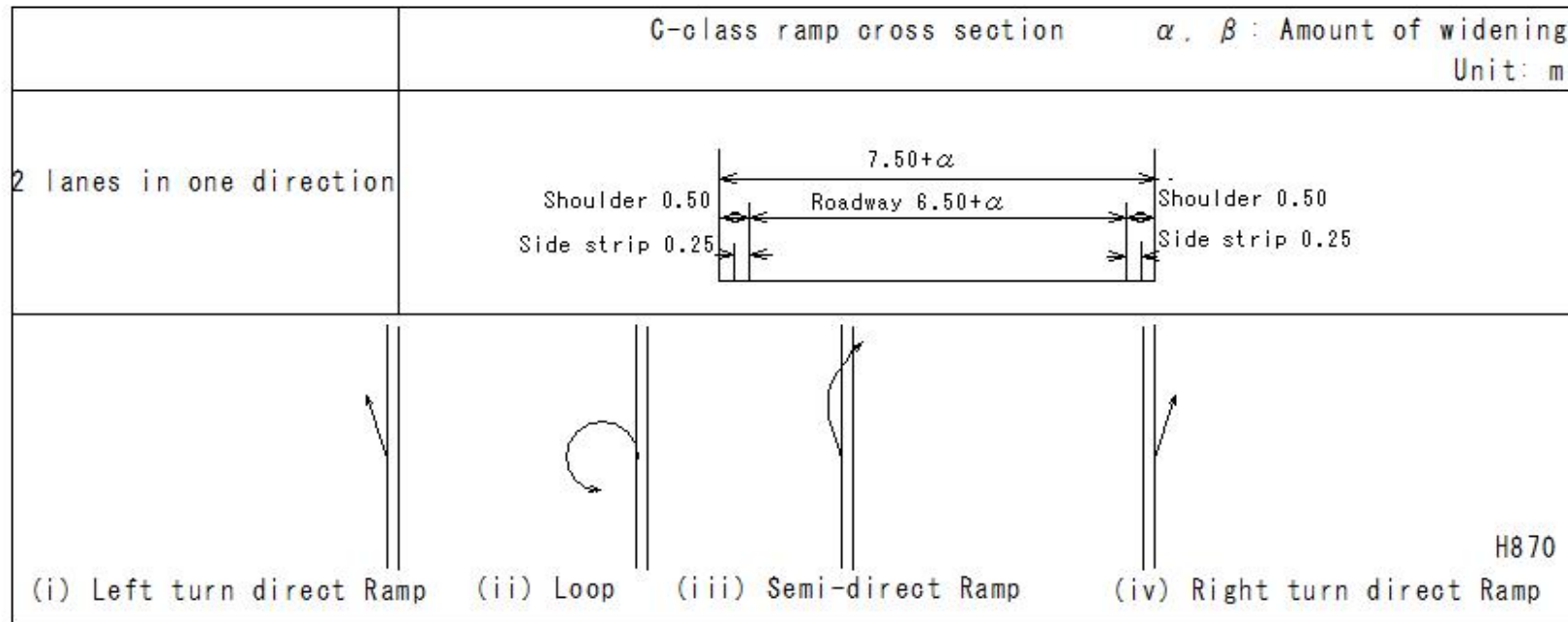


Figure 6-31. G-class ramp cross section

(H934)Road Structure Act(Intersections)

(H934)Road Structure Act(Intersections)

Road Structure Act

6. Intersections

6-4-3. Design standards for interchanges

Ramp cross section

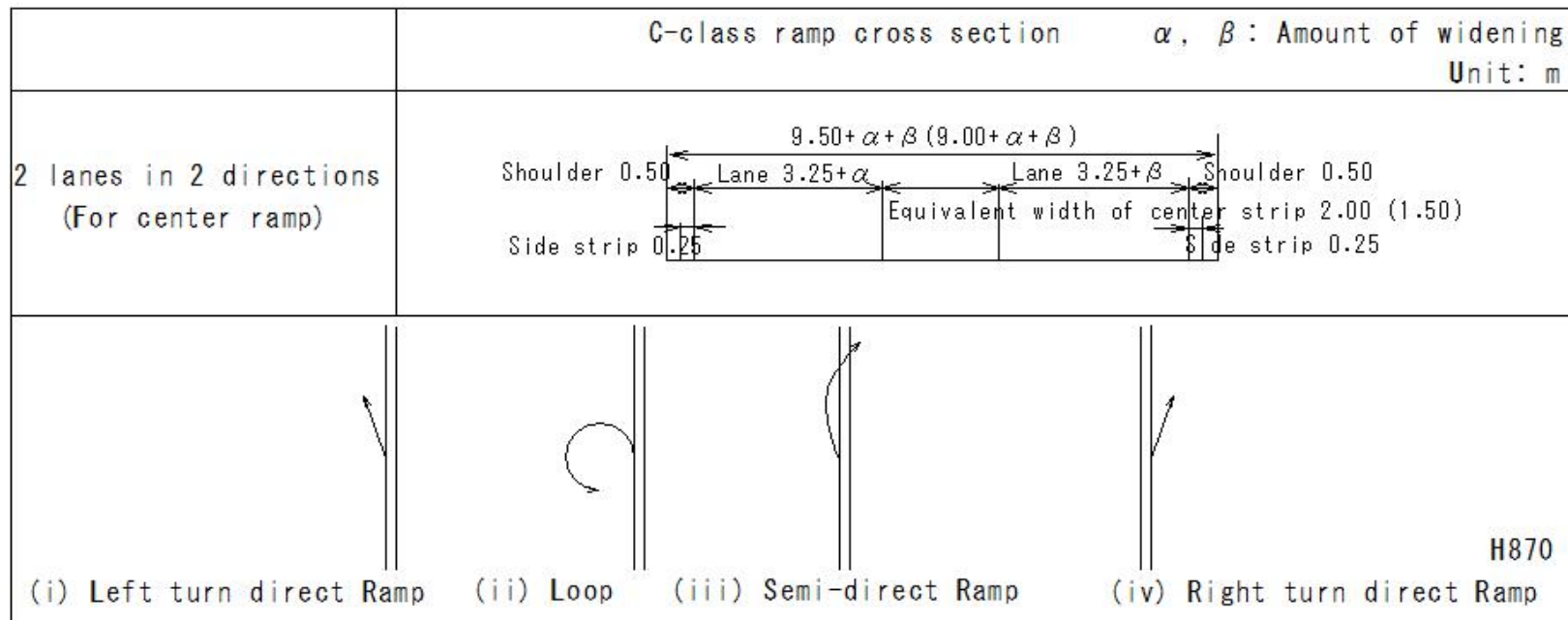


Figure 6-31. C-class ramp cross section

(H935)Road Structure Act(Intersections)

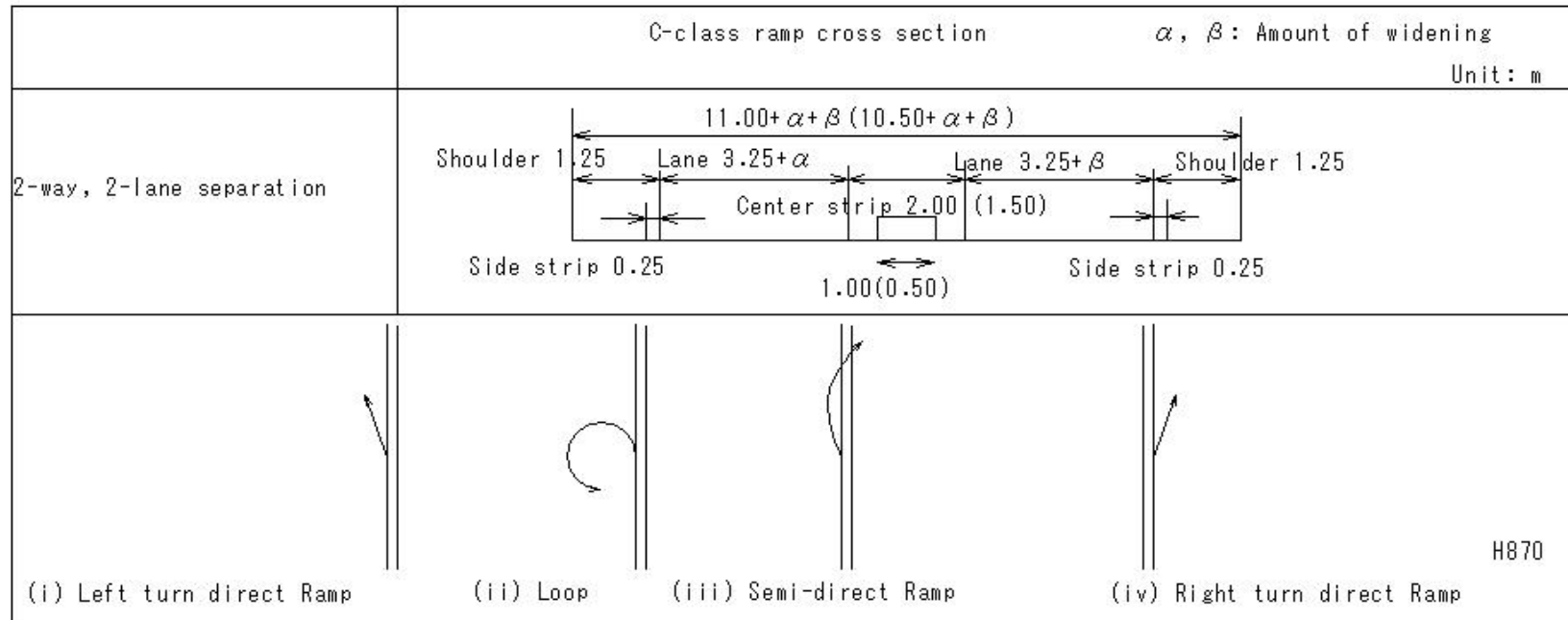
(H935)Road Structure Act(Intersections)

Road Structure Act

6. Intersections

6-4-3. Design standards for interchanges

Ramp cross section



H870

Figure 6-31. C-class ramp cross section

(H936)Road Structure Act(Intersections)

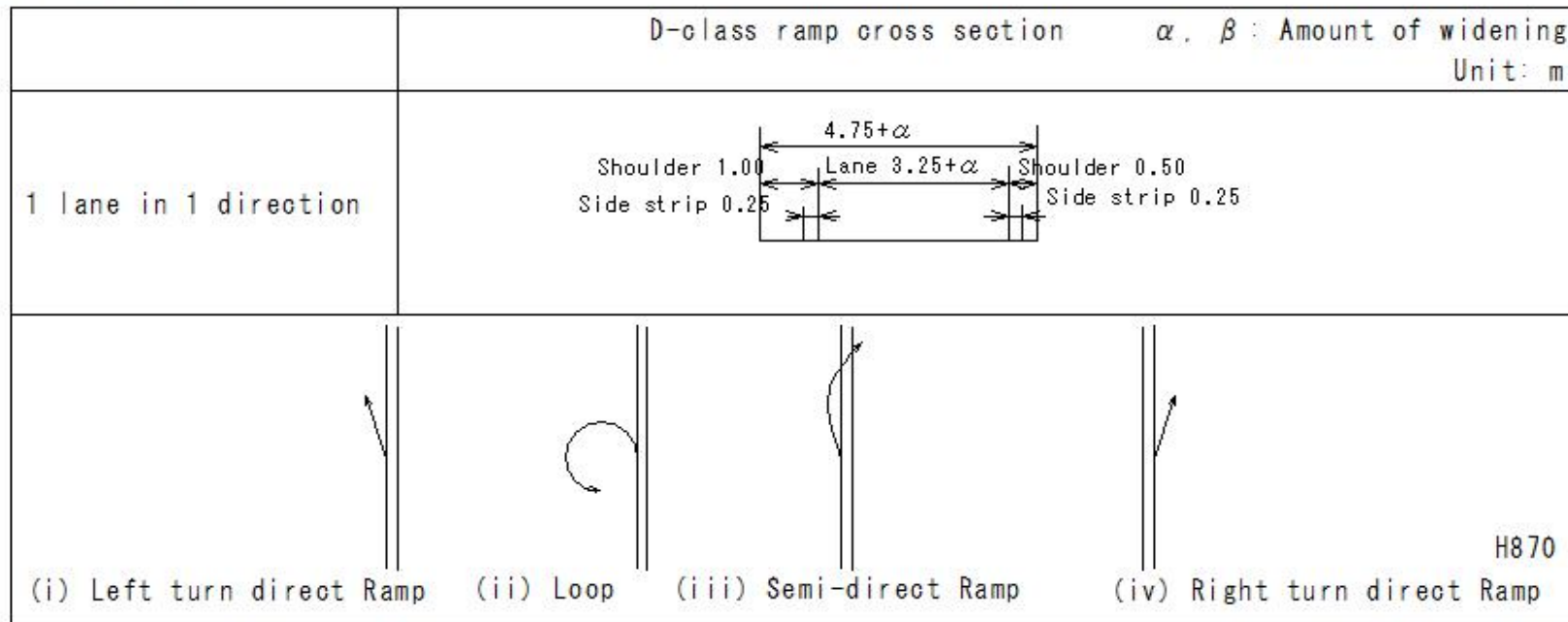
(H936)Road Structure Act(Intersections)

Road Structure Act

6. Intersections

6-4-3. Design standards for interchanges

Ramp cross section



H870

Figure 6-32. D-class ramp cross section

(H937)Road Structure Act(Intersections)

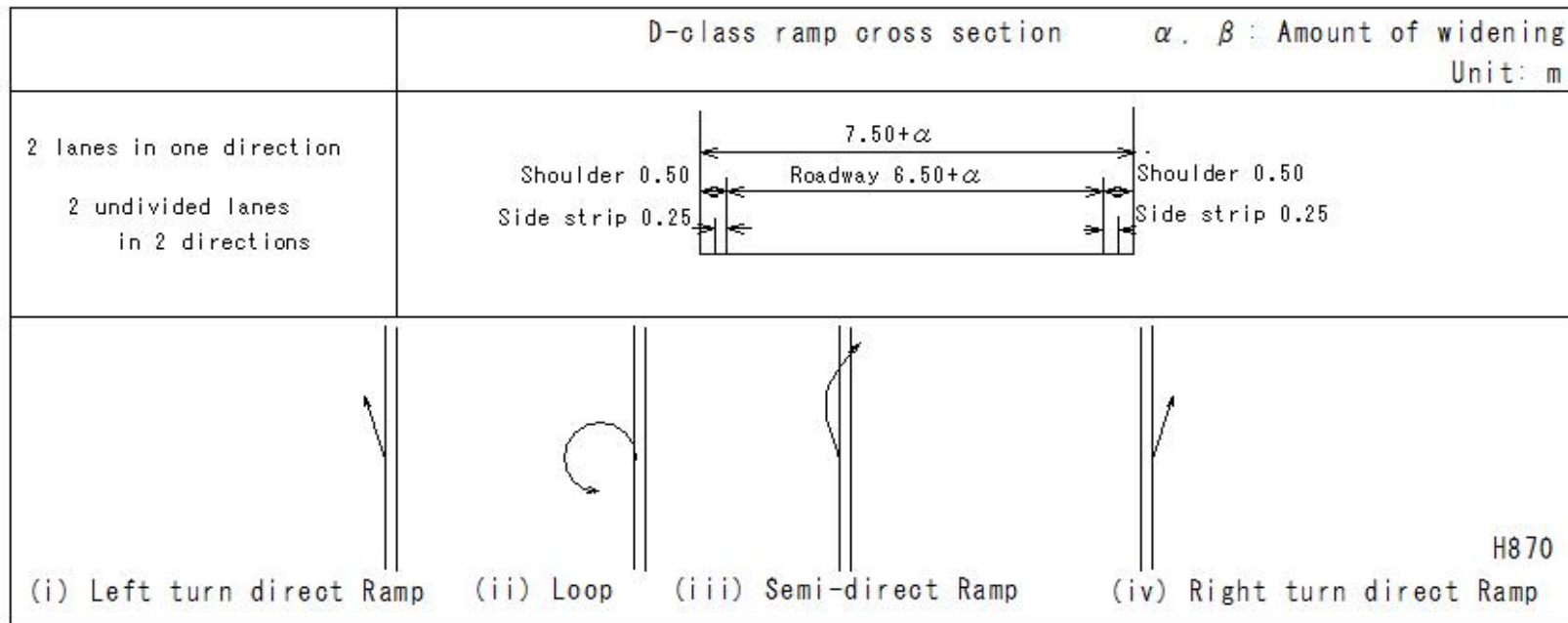
(H937)Road Structure Act(Intersections)

Road Structure Act

6. Intersections

6-4-3. Design standards for interchanges

Ramp cross section



H870

Figure 6-32. D-class ramp cross section

(H938)Road Structure Act(Intersections)

(H938)Road Structure Act(Intersections)

Road Structure Act

6. Intersections

6-4-3. Design standards for interchanges

Ramp cross section

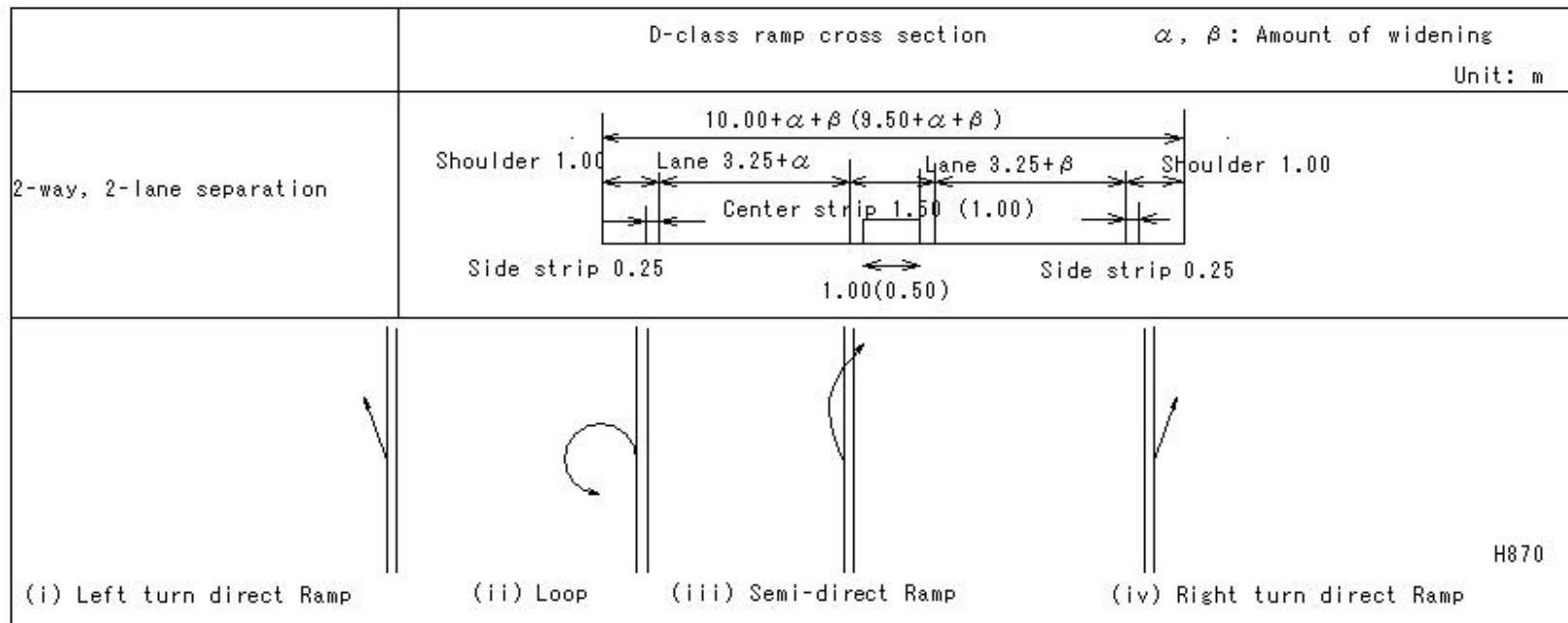


Figure 6-32. D-class ramp cross section

(H939)Road Structure Act(Intersections)

(H939)Road Structure Act(Intersections)

Road Structure Act

6. Intersections

6-4-3 Interchange design standards

Table 6-1 Side-slip friction coefficient used to calculate minimum curve radius

Design speed (km/h)	No snowfall		Snowfall
	Standard case	Special case	
80	0.12	0.12	0.10
60	0.15	0.17	0.10
50	0.17	0.20	0.10
40	0.19	0.23	0.10
35	0.19	0.23	0.10
30	0.19	0.23	0.10
25	0.19	0.23	0.10

(H940)Road Structure Act(Intersections)

(H940)Road Structure Act(Intersections)

Road Structure Act

6. Intersections

6-4-3 Interchange design standards

Table 6-2. Calculated minimum curve radius

Design speed (km/h)	Snow conditions	driving speed (km/h)	Standard case (m) 6%	Special cases		
				Areas with snow and cold		Other areas 10%
				Areas with extreme snow and cold 6%	Other areas 8%	
80	in case of not covered by	80	280	280	252	229
	in case of covered by snow	60	177	177	157	142
60	in case of not covered by	60	134	123	113	105
	in case of covered by snow	50	123	123	109	98
50	in case of not covered by	50	86	76	70	66
	in case of covered by snow	40	78	78	70	63
40	in case of not covered by	40	50	43	41	38
	in case of covered by snow	30	44	44	39	35
35	in case of not covered by	35	39	33	31	29
	in case of covered by snow	25	31	31	27	25
30	in case of not covered by	30	28	24	23	21
	in case of covered by snow	20	20	20	17	16
25	in case of not covered by	25	20	17	16	15
	in case of covered by snow	15	11	11	10	9

(H941)Road Structure Act(Intersections)

(H941)Road Structure Act(Intersections)

Road Structure Act

6. Intersections

6-4-3 Interchange design standards

Table 6-3 Minimum Curve Radius Allowable for Reverse Gradient

Reverse Gradient (%)	Design speed (km/h)						
	80	60	50	40	35	30	25
2	3,500	2,000	1,300	800	650	500	300
1.5	2,500	1,500	1,000	600	500	350	250

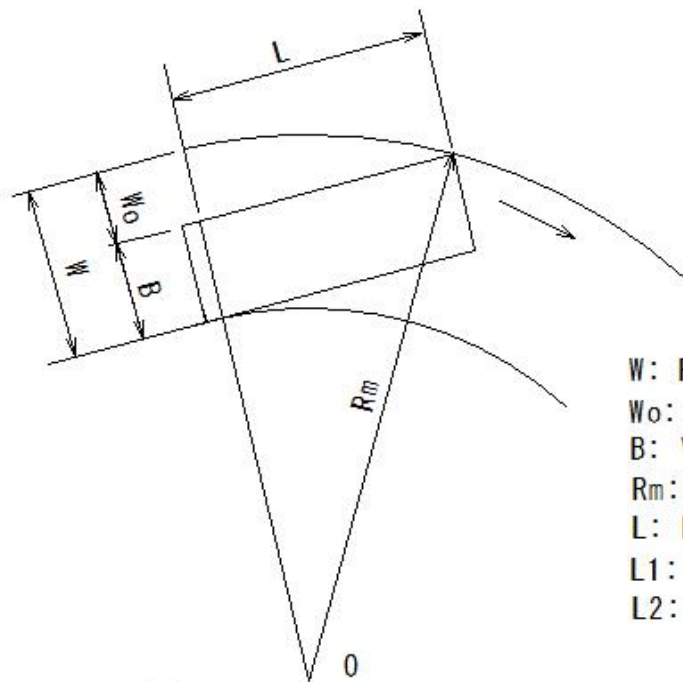
(H942)Road Structure Act(Intersections)

(H942)Road Structure Act(Intersections)

Road Structure Act

6. Intersections

6-4-3. Design standards for interchanges



- W: Required width
- W_o : Vehicle movement
- B: Vehicle width
- R_m : Turning radius of outer edge of vehicle
- L: Distance from front of vehicle to center of rear axle
- L1: Distance from front of towing vehicle to center of rear axle
- L2: Wheelbase of towed vehicle

(a) Standard vehicle

Figure 6-33. Vehicle trajectory

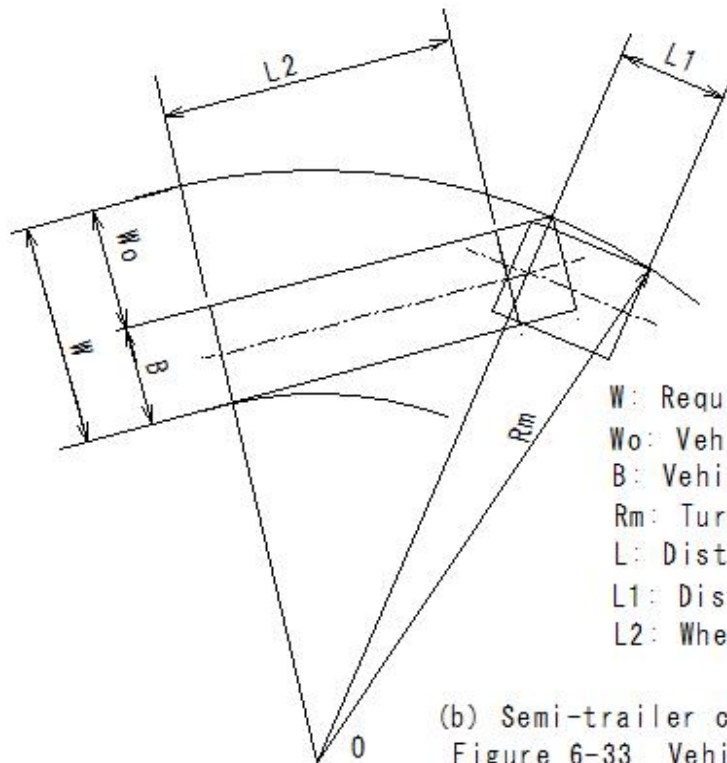
(H943)Road Structure Act(Intersections)

(H943)Road Structure Act(Intersections)

Road Structure Act

6. Intersections

6-4-3. Design standards for interchanges



- W : Required width
- W_o : Vehicle movement
- B : Vehicle width
- R_m : Turning radius of outer edge of vehicle
- L_1 : Distance from front of towing vehicle to center of rear axle
- L_2 : Wheelbase of towed vehicle

(b) Semi-trailer combination vehicle
Figure 6-33. Vehicle trajectory

(H944)Road Structure Act(Intersections)

(H944)Road Structure Act(Intersections)

Road Structure Act

6. Intersections

6-4-3. Design standards for interchanges

R: Ramp radius

Ro: Radius of right side shoulder of ramp

Rm: Turning radius of outer edge of vehicle

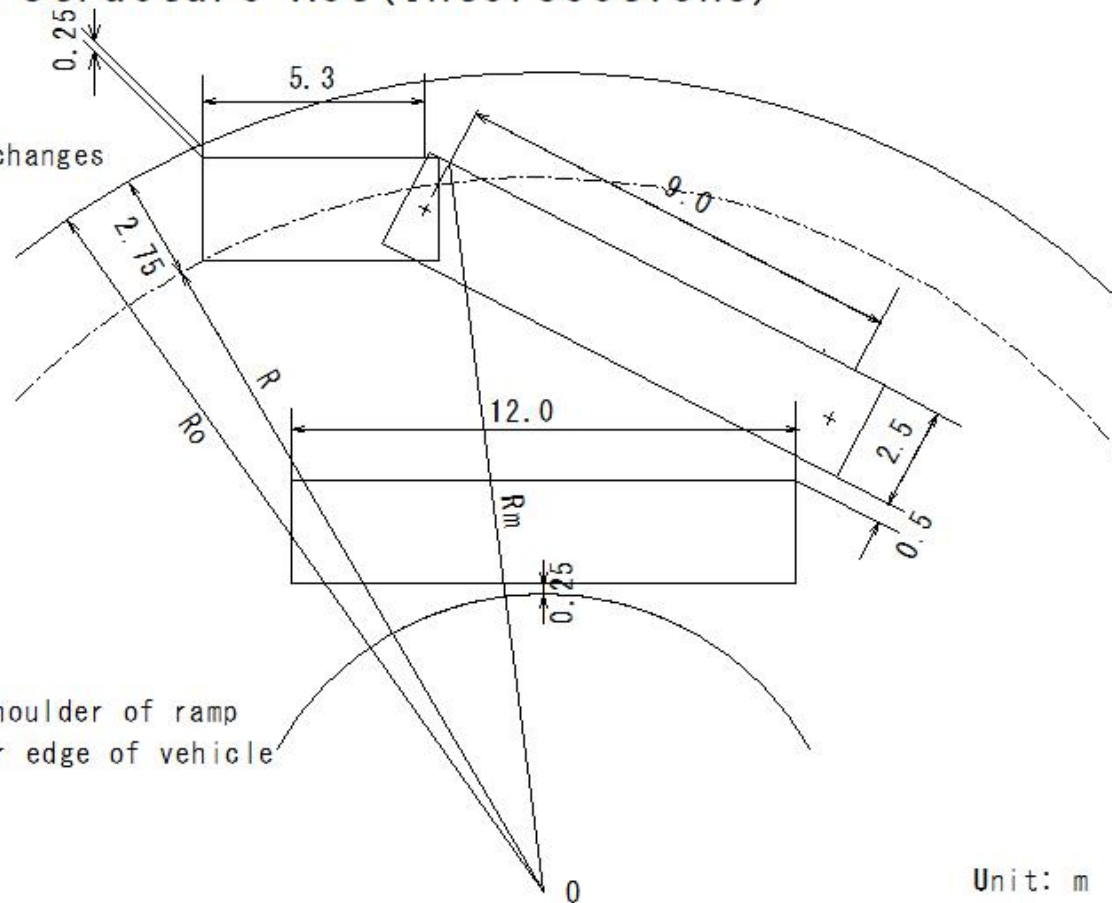


Figure 6-34. A-class (one lane, one direction) ramp case

(H945)Road Structure Act(Intersections)

(H945)Road Structure Act(Intersections)

Road Structure Act

6. Intersections

6-4-3. Design standards for interchanges

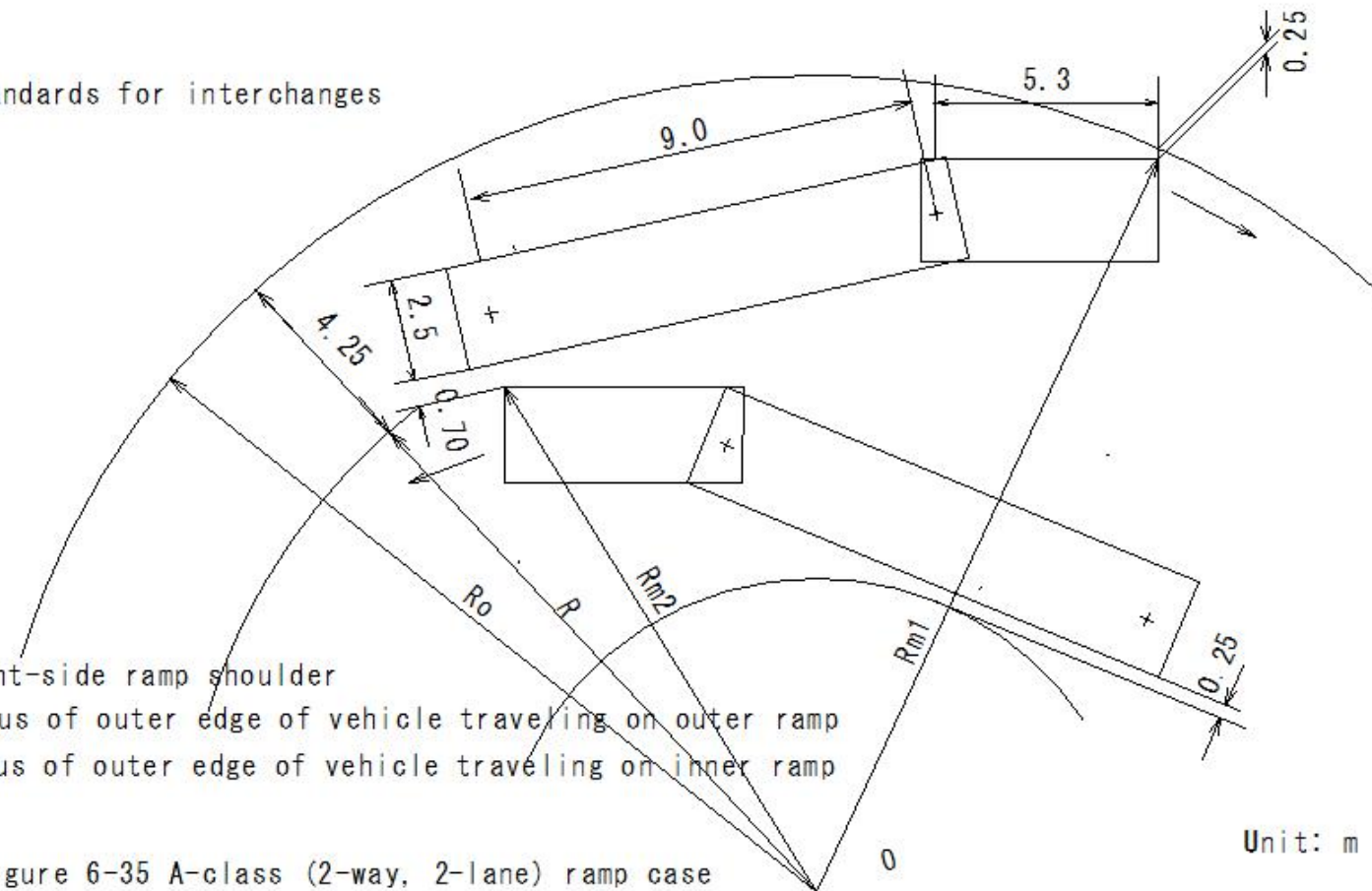
R: Ramp radius

Ro: Radius of right-side ramp shoulder

Rm1: Turning radius of outer edge of vehicle traveling on outer ramp

Rm2: Turning radius of outer edge of vehicle traveling on inner ramp

Figure 6-35 A-class (2-way, 2-lane) ramp case



Unit: m

(H946)Road Structure Act(Intersections)

(H946)Road Structure Act(Intersections)

Road Structure Act

6. Intersections

6-4-3. Design standards for interchanges

Table 6-4 Calculated values of minimum allowable parameters

Design speed (km/h)	80	60	50	40	35	30	25
Rate of change of centrifugal acceleration (m/S ²)	0.6	0.9	1.05	1.15	1.2	1.25	1.3
Calculated values of minimum allowable parameters (m)	135	71.7	50.5	34.5	27.7	21.5	16.1
Calculated values of minimum allowable parameters (m)	140	70	50	35	30	20	15

(H947)Road Structure Act(Intersections)

(H947)Road Structure Act(Intersections)

Road Structure Act

6. Intersections

6-4-3. Design standards for interchanges

Table 6-5 Calculated limit curve radius for which the transition zone can be omitted

Design speed (km/h)	80	60	50	Under 40
Calculated limit curve radius (m)	411	177	111	67
Calculated limit curve radius (m)	800	350	220	140

(H948)Road Structure Act(Intersections)

(H948)Road Structure Act(Intersections)

Road Structure Act

6. Intersections

6-4-3. Design standards for interchanges

Composite gradient

Table 6-6 Composite gradient calculations and prescribed values

Design speed (km/h)	jmax(%)		i(%)	R(m)	$\frac{(V/3.6)^2}{2i(gR)}$	J(%)		Composite gradient (%)		Prescribed value (%)
	Type 1	Types 2, 3, 4				Type 1	Types 2, 3, 4	Type 1	Types 2, 3, 4	
80	6.0	7.0	10.0	230	2.2	3.8	4.8	10.7	11.1	11.0
60	7.0	8.0	10.0	110	2.6	4.4	5.4	10.9	11.4	11.0
50	7.5	9.0	10.0	70	2.8	4.7	6.2	11.0	11.8	11.5
40	8.0	10.0	10.0	40	3.1	4.9	6.9	11.1	12.1	11.5
35	8.5	10.0	10.0	30	3.2	5.3	6.8	11.3	12.1	12.0
30	9.0	10.0	10.0	20	3.5	5.5	6.5	11.4	11.9	12.0
25	9.5	10.0	10.0	15	3.3	6.2	6.7	11.8	12.0	12.0

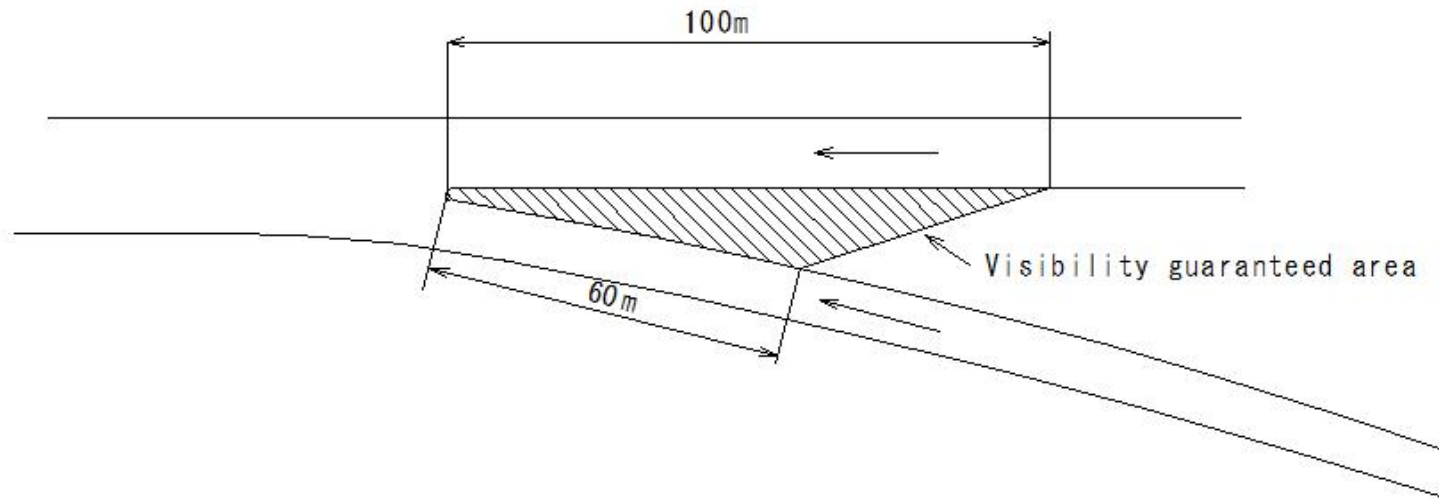
(H949)Road Structure Act(Intersections)

(H949)Road Structure Act(Intersections)

Road Structure Act

6. Intersections

6-4-3. Design standards for interchanges



Entry ramp terminal

Figure 6-36 Visibility near the nose

(H950)Road Structure Act(Intersections)

(H950)Road Structure Act(Intersections)

Road Structure Act

6. Intersections

6-4-3. Design standards for interchanges

- Geometric structure near the nose

Cross-sectional configuration of speed change lanes

Minimum curve radius at the nose

Design speed (km/h)	120	100	80	60
Minimum curve radius at the nose (m)	250	200	170	100

(H951)Road Structure Act(Intersections)

(H951)Road Structure Act(Intersections)

Road Structure Act

6. Intersections

6-4-3. Design standards for interchanges

- Geometric structure near the nose

Cross-sectional configuration of speed change lanes

(Transition curve)

Minimum curve radius at the nose of exit ramp

Design speed (km/h)	120	100	80	60
Absolute minimum (m)	70	60	50	40
Standard minimum (m)	90	70	60	50

(H952)Road Structure Act(Intersections)

(H952)Road Structure Act(Intersections)

Road Structure Act

6. Intersections

6-4-3. Design standards for interchanges

- Geometric structure near the nose

(radius of vertical curve)

Radius of vertical curve of ramp near the Ramp

Design speed (km/h)	120	100	80	60
Convex vertical curve (m)	1,400	1,000	800	450
Concave vertical curve (m)	1,000	850	700	450

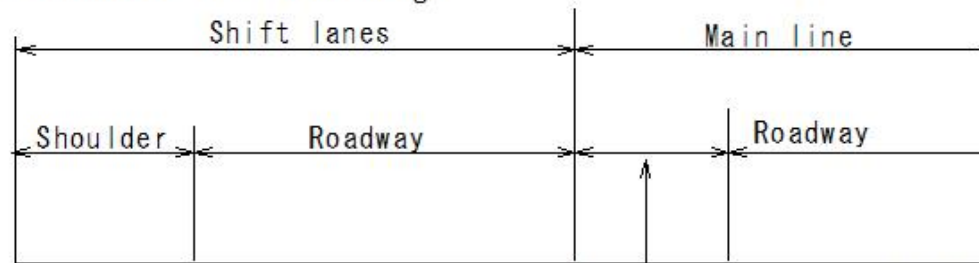
(H953)Road Structure Act(Intersections)

(H953)Road Structure Act(Intersections)

Road Structure Act

6. Intersections

6-4-3. Design standards for interchanges

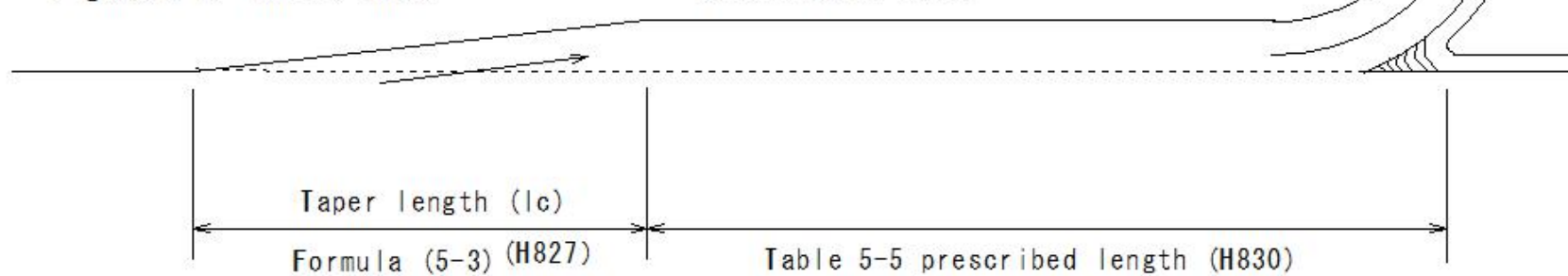


Equivalent width of side strip
Same width as main line side strip

Figure 6-37 Crossing configuration of shift lanes

Figure 5-17 Shift lanes

Deceleration lanes



H831

(H954)Road Structure Act(Intersections)

(H954)Road Structure Act(Intersections)

Road Structure Act

6. Intersections

6-4-3. Design standards for interchanges

- Geometric structure near the nose
- Minimum curve radius at the nose

Table 6-7

Main line design speed (km/h)	120	100	80	60
Nose passing speed (km/h)	60	55	50	40

(H955)Road Structure Act(Intersections)

Road Structure Act

6. Intersections

6-4-3. Design standards for interchanges

- Geometric structure near the nose

Table 6-8 Minimum parameters for clothoids used near the nose

Design speed (km/h)	Nose passing speed V_0 (km/h)	Minimum ramp curve radius R (m)	Minimum ramp curve radius passing speed $V_1 = \sqrt{127(i+f)R}$ $i=0.10$ $f=0.10$ (km/h)	Deceleration α (m/s ²)	transition zone length L (m)	Minimum parameter calculation value A(m)	Absolute minimum value A (m)	Standard minimum value A (m)
120	60	40	32	1.0	99	63	70	90
100	55	35	30	1.0	82	54	60	70
80	50	30	28	1.0	66	44	50	60
60	40	25	25	1.0	38	31	40	50

(H956)Road Structure Act(Intersections)

(H956)Road Structure Act(Intersections)

Road Structure Act

6. Intersections

6-4-3. Design standards for interchanges

Deceleration Lane Length (m)

From Taper End to Diversion End

Road Classification	Type 1, Type 2, Type 3 Roads					
Design Speed (km/h)	120	100	80	60	50	40
Deceleration Lane Length Excluding Taper Section	100	90	80	70	50	30
Standard Taper Length of Parallel Deceleration Lane	70	60	50	45	40	40

Slope Section Correction: Applies to Downhill Slopes Only

Correction Rate

Average Slope of Main Line (%)	$0 < i \leq 2$	$2 < i \leq 3$	$3 < i \leq 4$	$4 < i$
Deceleration Lane Length Correction Rate for Downhill Slopes	1.00	1.10	1.20	1.30

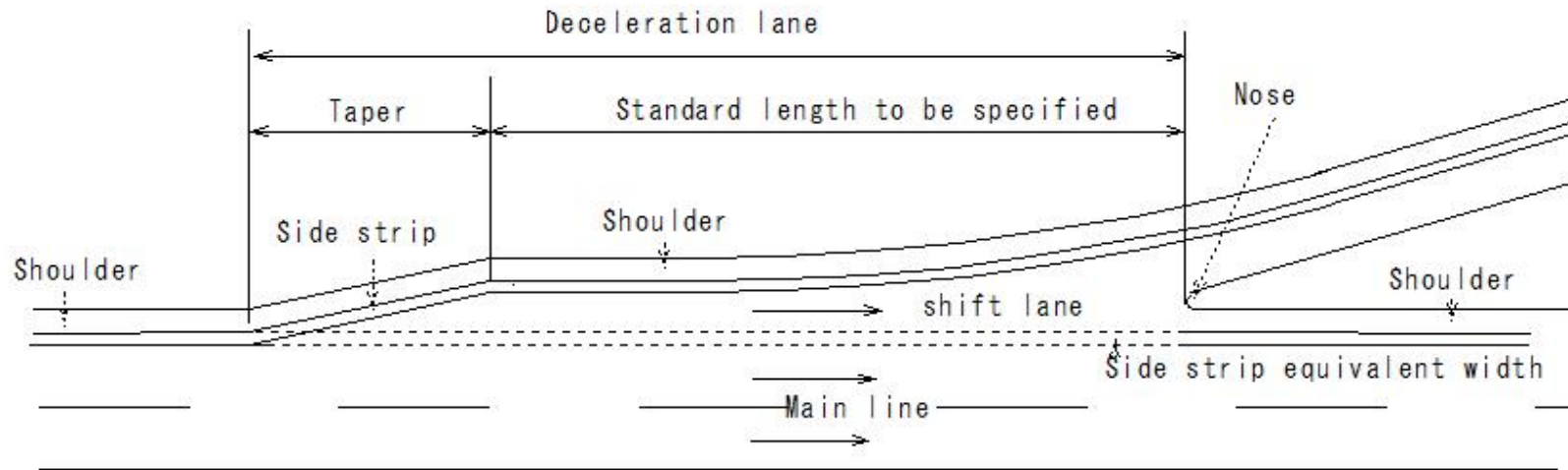
(H957)Road Structure Act(Intersections)

(H957)Road Structure Act(Intersections)

Road Structure Act

6. Intersections

6-4-3. Design standards for interchanges



(a) Parallel type

Figure 6-38 Type of shift lane

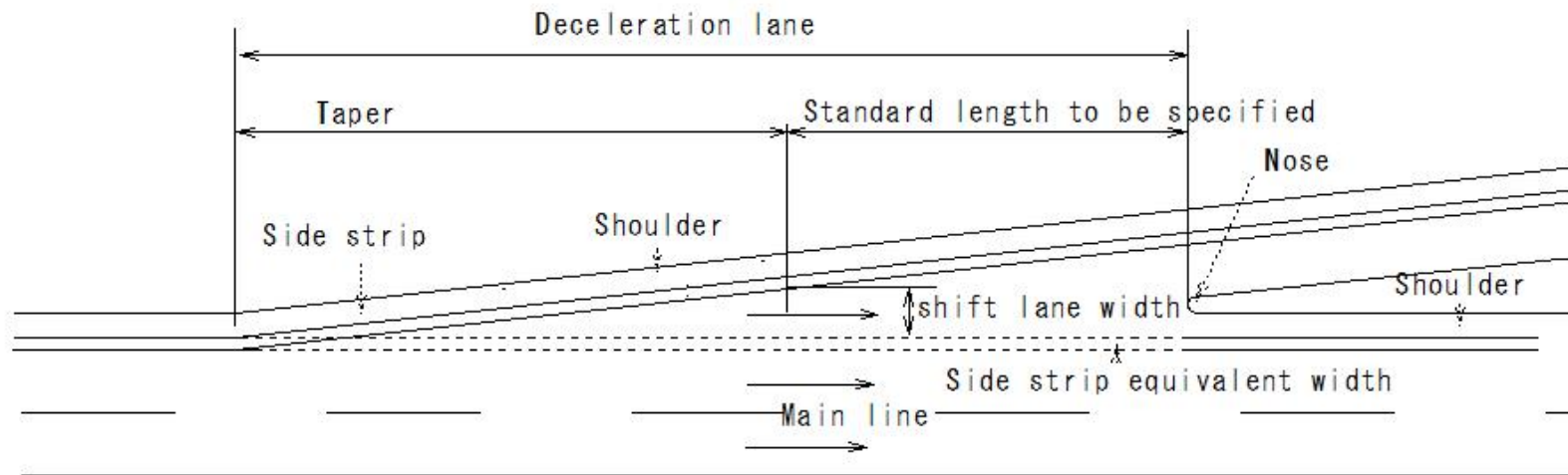
(H958)Road Structure Act(Intersections)

(H958)Road Structure Act(Intersections)

Road Structure Act

6. Intersections

6-4-3. Design standards for interchanges



(b) Direct type

Figure 6-38 Type of shift lane

(H959)Road Structure Act(Intersections)

(H959) Road Structure Act(Intersections)

Road Structure Act

6. Intersections

6-4-3. Design standards for interchanges

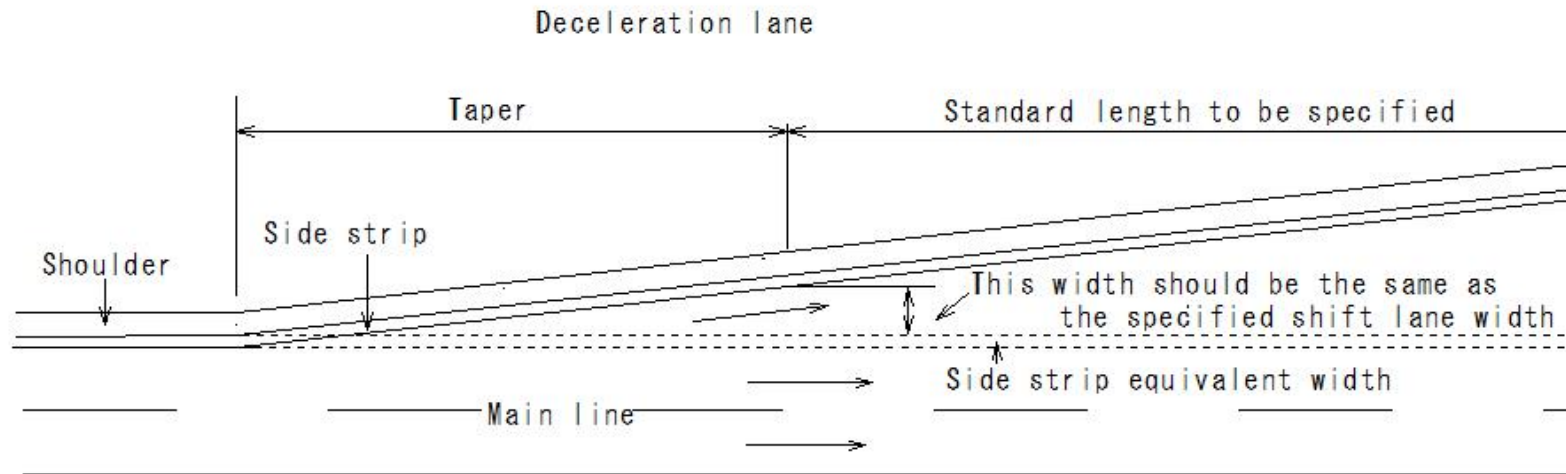


Figure 6-39. Ensuring deceleration lane width

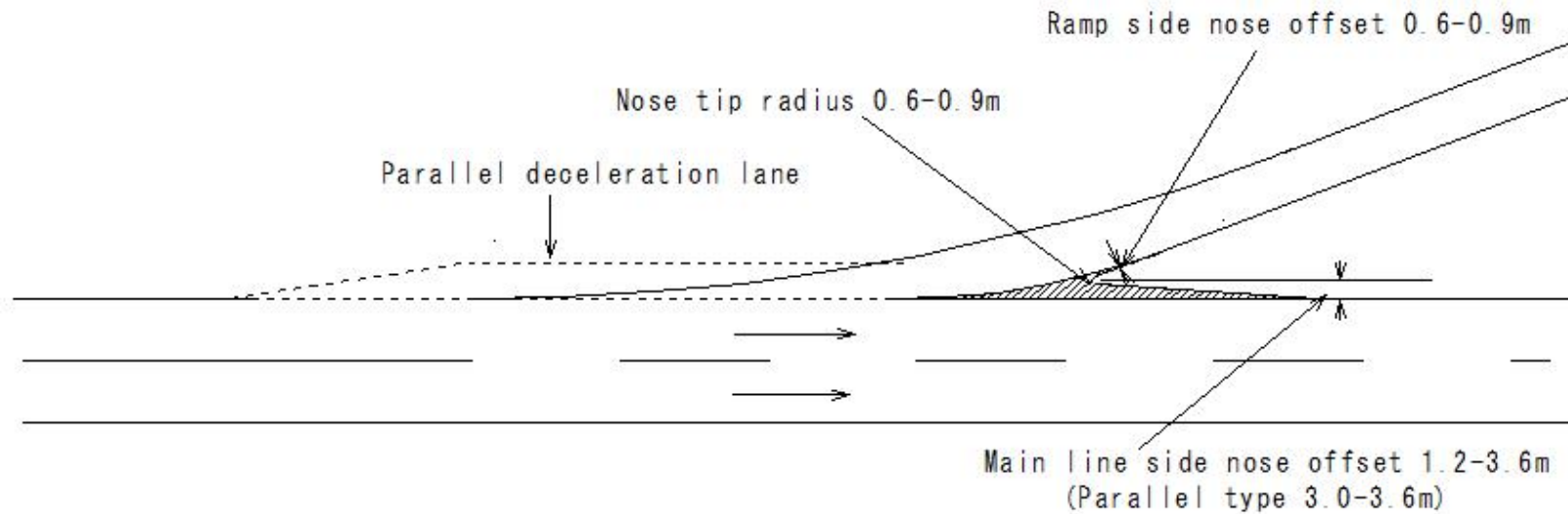
(H960)Road Structure Act(Intersections)

(H960)Road Structure Act(Intersections)

Road Structure Act

6. Intersections

6-4-3. Design standards for interchanges



(a) in case of the shoulder is narrow

Figure 6-40 Nose offset

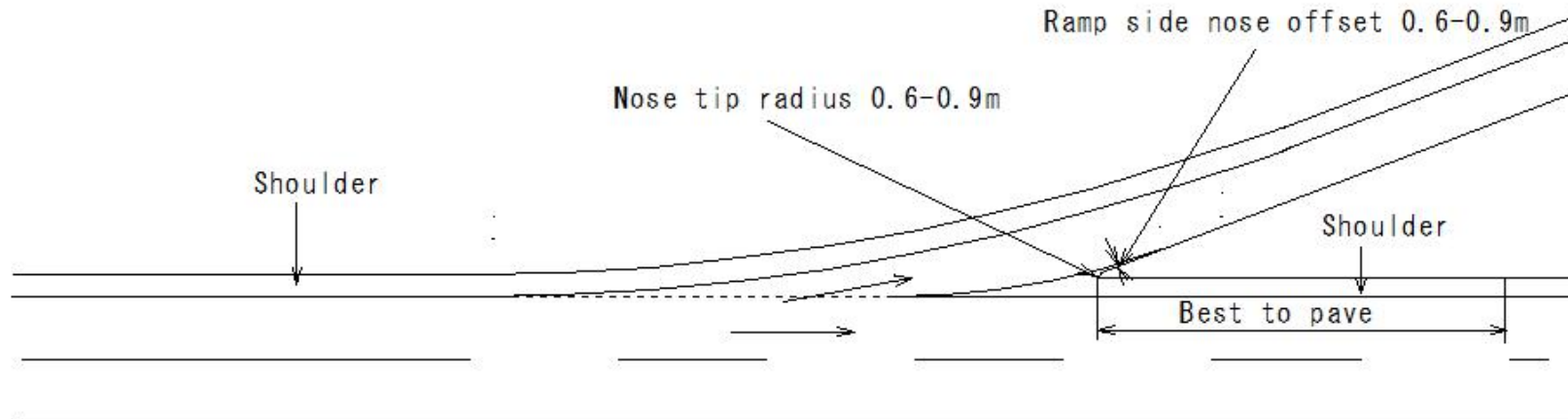
(H961)Road Structure Act(Intersections)

(H961)Road Structure Act(Intersections)

Road Structure Act

6. Intersections

6-4-3. Design standards for interchanges



(b) in case of the shoulder is wide

Figure 6-40 Nose offset

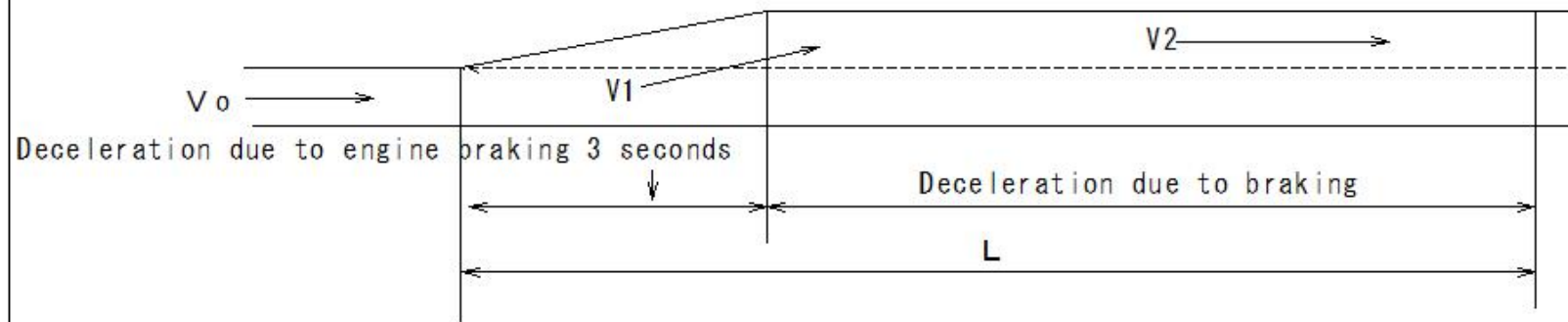
(H962)Road Structure Act(Intersections)

(H962) Road Structure Act(Intersections)

Road Structure Act

6. Intersections

6-4-3. Design standards for interchanges



V_0 : Average driving speed on main line

V_1 : Driving speed at deceleration speed due to engine braking

V_2 : Average driving speed at the start of the ramp

Figure 6-41 Driving conditions

(H963)Road Structure Act(Intersections)

(H963)Road Structure Act(Intersections)

Road Structure Act

6. Intersections

6-4-3. Design standards for interchanges

Deceleration lane

Table 6-9 Design speed and initial speed

Main line design speed (km/h)	120	100	80	60	50	40
Initial speed (km/h)	90	100	80	60	50	40

(H964)Road Structure Act(Intersections)

(H964)Road Structure Act(Intersections)

Road Structure Act

6. Intersections

6-4-3. Design standards for interchanges

Deceleration lane

Table 6-10 Calculated deceleration lane length (including taper) Unit: m

		Ramp design speed (km/h)				
		25	30	35	40	50
Main line design speed (km/h)	120	-	-	181	175	161
	100	-	159	153	147	131
	80	137	132	126	118	101
	60	129	122	113	103	78
	50	100	91	81	69	-
	40	65	55	-	-	-

(H965)Road Structure Act(Intersections)

(H965)Road Structure Act(Intersections)

Road Structure Act

6. Intersections

6-4-3. Design standards for interchanges

Acceleration lane

Road classification

Design speed (km/h)

Acceleration lane length excluding tapered section

Parallel acceleration lane length

Unit: m

Road classification	Type 1, Type 2, Type 3 Roads					
Design speed (km/h)	120	100	80	60	50	40
Deceleration lane length excluding tapered section	200	180	160	120	90	50
Standard taper length of parallel deceleration lane	70	60	50	45	40	40

Slope section correction: Applies only to uphill sections

Correction rate

Average gradient of main line (%)	$0 < i \leq 2$	$2 < i \leq 3$	$3 < i \leq 4$	$4 < i$
Deceleration lane length correction rate for uphill sections	1.00	1.20	1.30	1.40

(H966)Road Structure Act(Intersections)

(H966)Road Structure Act(Intersections)

Road Structure Act

6. Intersections

6-4-3. Design standards for interchanges

Acceleration lanes

Basis for calculating acceleration lane length

Table 6-11

Average speed (km/h)	60	55	50	45	40	35
Average acceleration (m/s ²)	0.36	0.41	0.47	0.54	0.62	0.73

Table 6-12

Average speed (km/h)	120	100	80	60	50	40
Average acceleration (m/s ²)	70	65	63	60	50	40

(H967)Road Structure Act(Intersections)

(H967)Road Structure Act(Intersections)

Road Structure Act

6. Intersections

6-4-3. Design standards for interchanges

Acceleration lane

Basis for calculating acceleration lane length

Table 6-13 Calculated acceleration lane length (including taper) Unit: m

		Ramp design speed (km/h)				
		25	30	35	40	50
Main line design speed (km/h)	120	-	-	322	310	266
	100	-	256	246	230	176
	80	180	225	215	198	141
	60	150	193	183	164	104
	50	108	100	85	64	-
	40	47	37	-	-	-

(H968)Road Structure Act(Intersections)

(H968) Road Structure Act(Intersections)

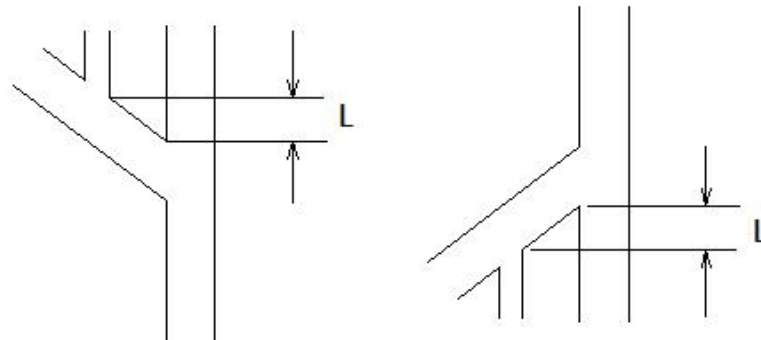
Road Structure Act

6. Intersections

6-4-3. Design standards for interchanges

Table 6-14 Distance between connecting ends of ramps

Design speed (km/h)	48 or less	64-80	96-113	129
Traveling speed (km/h)	37-45	60-70	84-93	103
Distance L (m) Minimum	60	120	150	275
Distance L (m) Standard	120	215	275	365



(a) in case of a branch on the main line and a branch on the ramp are connected

Figure 6-42 Ramp connection

(H969)Road Structure Act(Intersections)

(H969)Road Structure Act(Intersections)

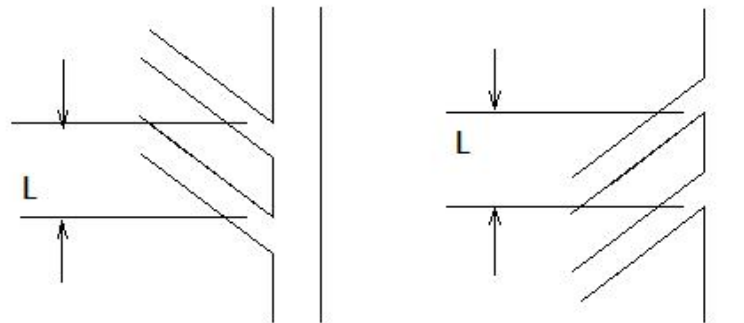
Road Structure Act

6. Intersections

6-4-3. Design standards for interchanges

Table 6-14 Distance between connecting ends of ramps

Design speed (km/h)	48 or less	64-80	96-113	129
Traveling speed (km/h)	37-45	60-70	84-93	103
Distance L (m) Minimum	60	120	150	275
Distance L (m) Standard	120	215	275	365



(b) in case of there are continuous outflows or inflows on the main line

Figure 6-42 Ramp connection

(H970)Road Structure Act(Intersections)

(H970) Road Structure Act(Intersections)

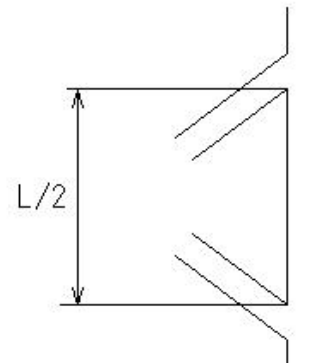
Road Structure Act

6. Intersections

6-4-3. Design standards for interchanges

Table 6-14 Distance between connecting ends of ramps

Design speed (km/h)	48 or less	64-80	96-113	129
Traveling speed (km/h)	37-45	60-70	84-93	103
Distance L (m) Minimum	60	120	150	275
Distance L (m) Standard	120	215	275	365



(c) in case of there is an inflow beyond the outflow
Figure 6-42 Ramp connection

(H971)Road Structure Act(Intersections)

(H971)Road Structure Act(Intersections)

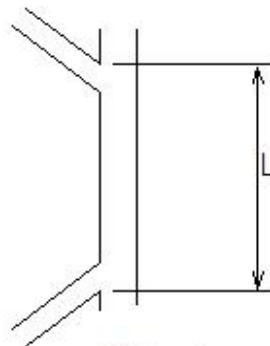
Road Structure Act

6. Intersections

6-4-3. Design standards for interchanges

Table 6-14 Distance between connecting ends of ramps

Design speed (km/h)	48 or less	64-80	96-113	129
Traveling speed (km/h)	37-45	60-70	84-93	103
Distance L (m) Minimum	60	120	150	275
Distance L (m) Standard	120	215	275	365



(d) in case of there is an outflow beyond the inflow
Figure 6-42 Ramp connection

(H972)Road Structure Act(Intersections)

(H972)Road Structure Act(Intersections)

Road Structure Act

6. Intersections

6-4-3. Design standards for interchanges

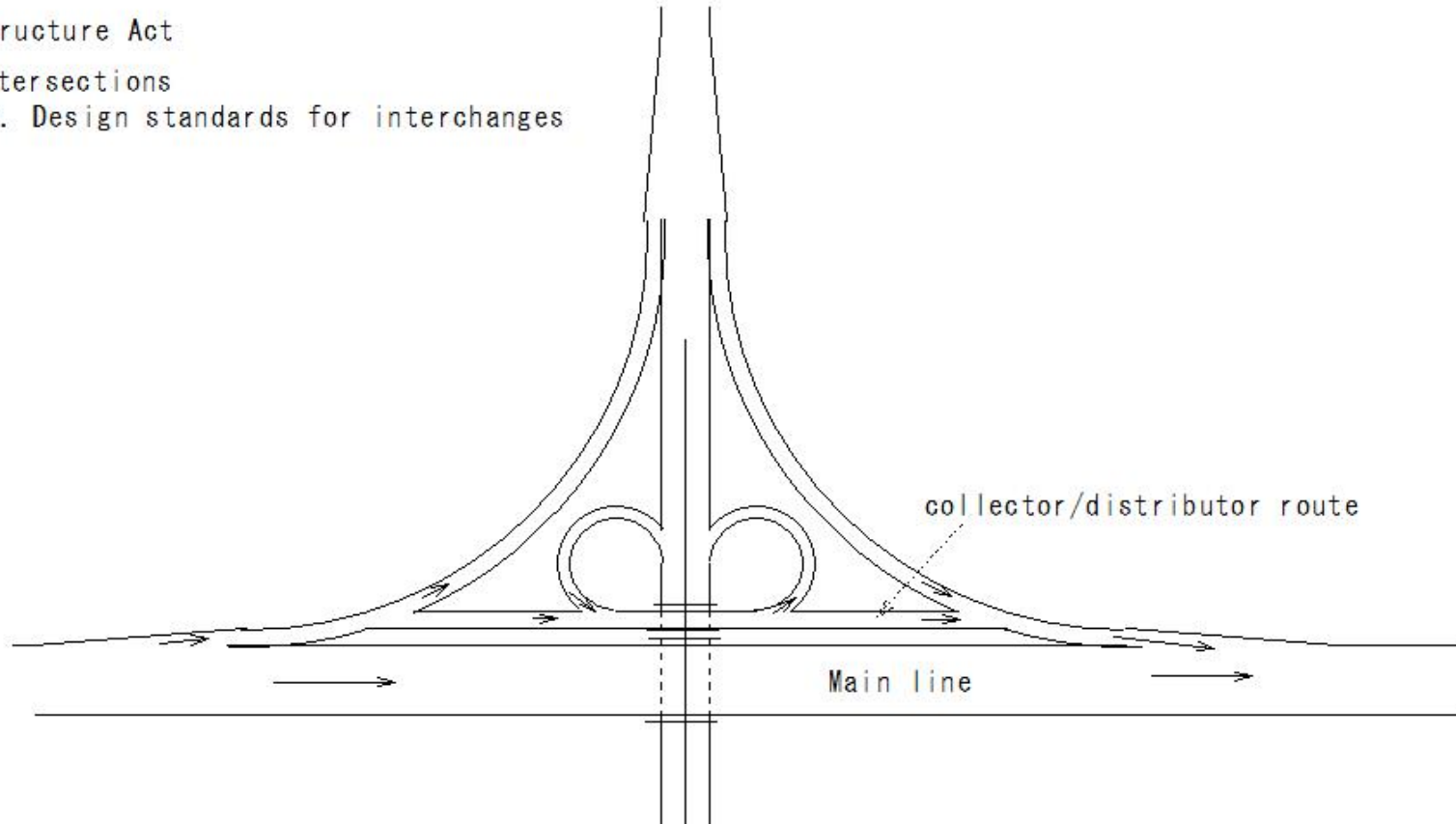


Figure 6-43. Ramp collector/distributor route

(H973)Road Structure Act(Intersections)

(H973)Road Structure Act(Intersections)

Road Structure Act

6. Intersections

6-4-3. Design standards for interchanges

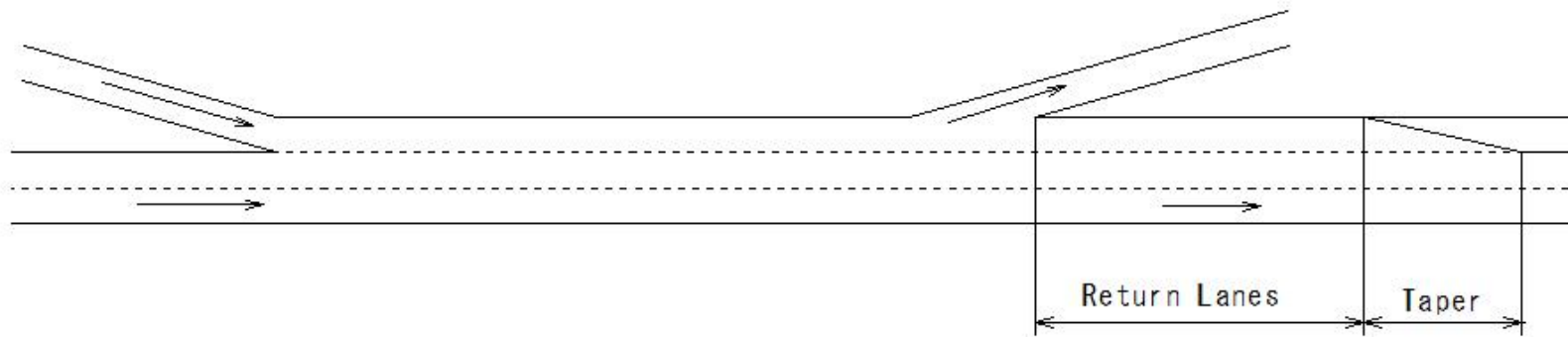


Figure 6-44 Ramp Return Lanes

(H976)Road Structure Act(Intersections with railways)

(H976)Road Structure Act(Intersections with railways)

Road Structure Act

7 Intersections with railways, etc.

7-2 Level intersections with railways, etc.

Maximum speed of railway vehicles at level crossings (unit: km/h)	Length of sight section (unit: m)
Less than 50	110
50 to 70	160
70 to 80	200
80 to 90	230
90 to 100	260
100 to 110	300
110 or more	350

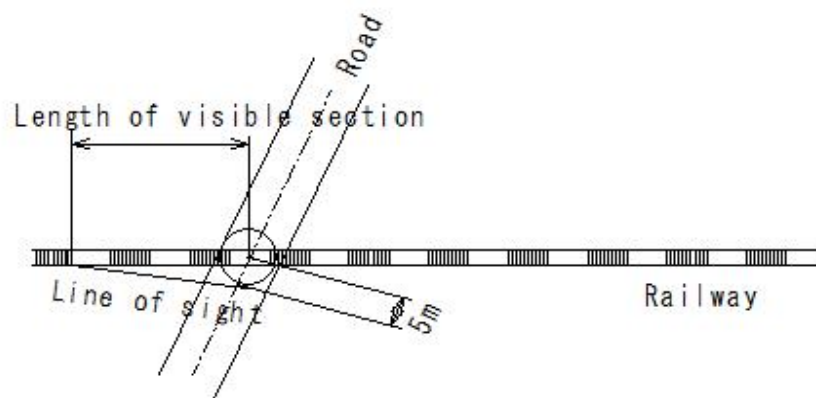
(H977)Road Structure Act(Intersections with railways)

(H977)Road Structure Act(Intersections with railways)

Road Structure Act

- 7 Intersections with railways, etc.
- 7-2 Level intersections with railways, etc.
- 7-2-3 Length of sight area

Maximum speed of railway vehicles at level crossings	Length of visible section curve (unit: meters)
Less than 50	110
50 to less than 70	160
70 to less than 80	200
80 to less than 90	230
90 to less than 100	260
100 to less than 110	300
110 or more	350



(H978)Road Structure Act(Intersections with railways)

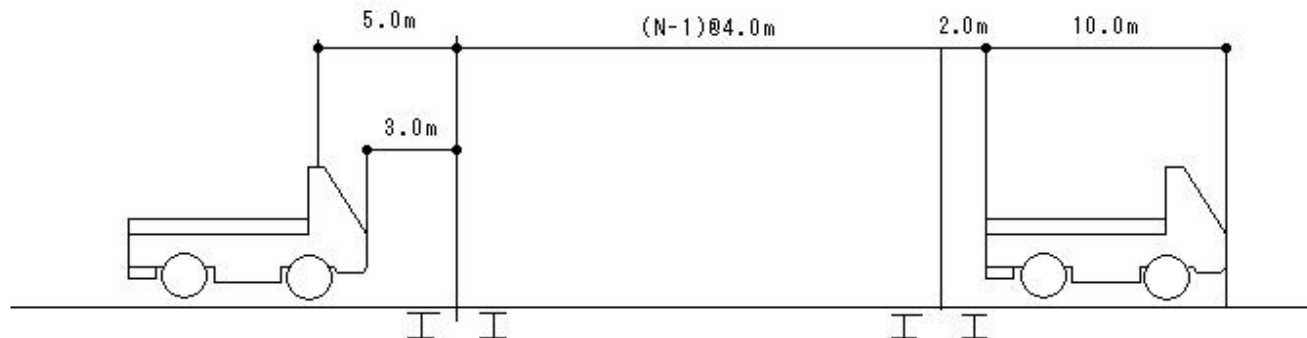
(H978)Road Structure Act(Intersections with railways)

Road Structure Act

7 Intersections with railways, etc.

7-2 Level intersections with railways, etc.

7-2-3 Length of sight area



L: Required passing distance (m)

N: Number of tracks

t: $5.7 + 0.96(N-1)$

$T = 1.5t$

$= 8.5 + 1.4(N-1)$

T: Time to pass through the crossing (sec) taking into account safety factor (50%)

N: Number of tracks

D: Required visibility distance (one side)

$D = (V/3.6) \cdot T$

Figure 7-4 Required passing distance for automobiles

(H979)Road Structure Act(Earthworks, pavements and road structures)

(H979)Road Structure Act(Earthworks, pavements and road structures)

Road Structure Act

8 Earthworks, pavements and road structures

Earthworks, pavements and road structures

8-1 Road body and subgrade

8-1-2 Road body

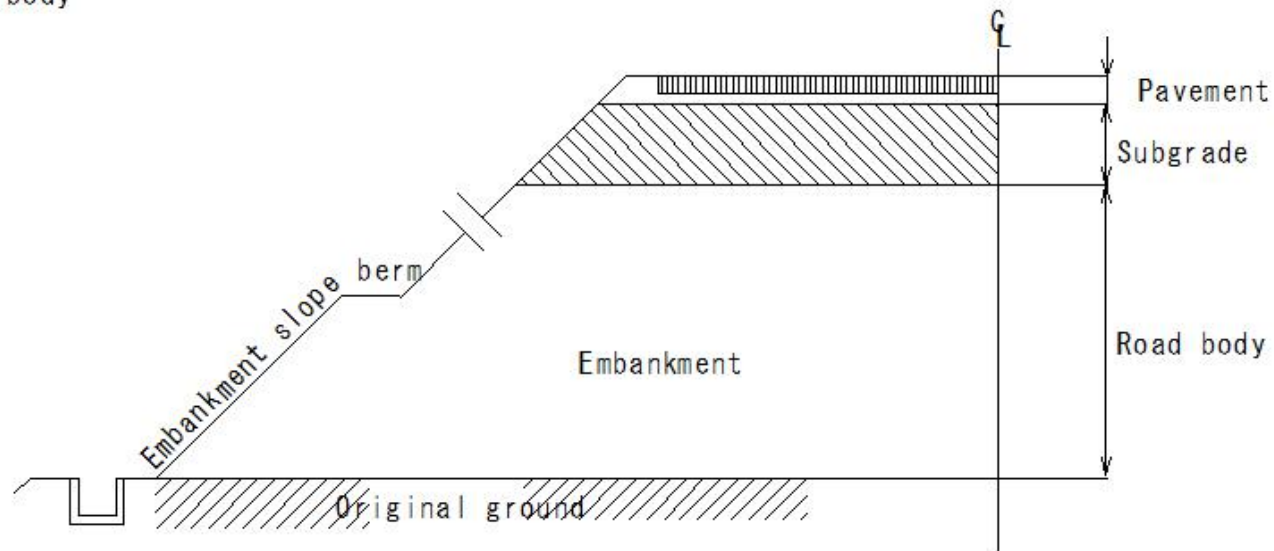


Figure 8-1 Names of embankment cross sections

(H980)Road Structure Act(Earthworks, pavements and road structures)

(H980)Road Structure Act(Earthworks, pavements and road structures)

Road Structure Act

8 Earthworks, pavements and road structures

Earthworks, pavements and road structures

8-1 Road body and subgrade

8-1-2 Road body

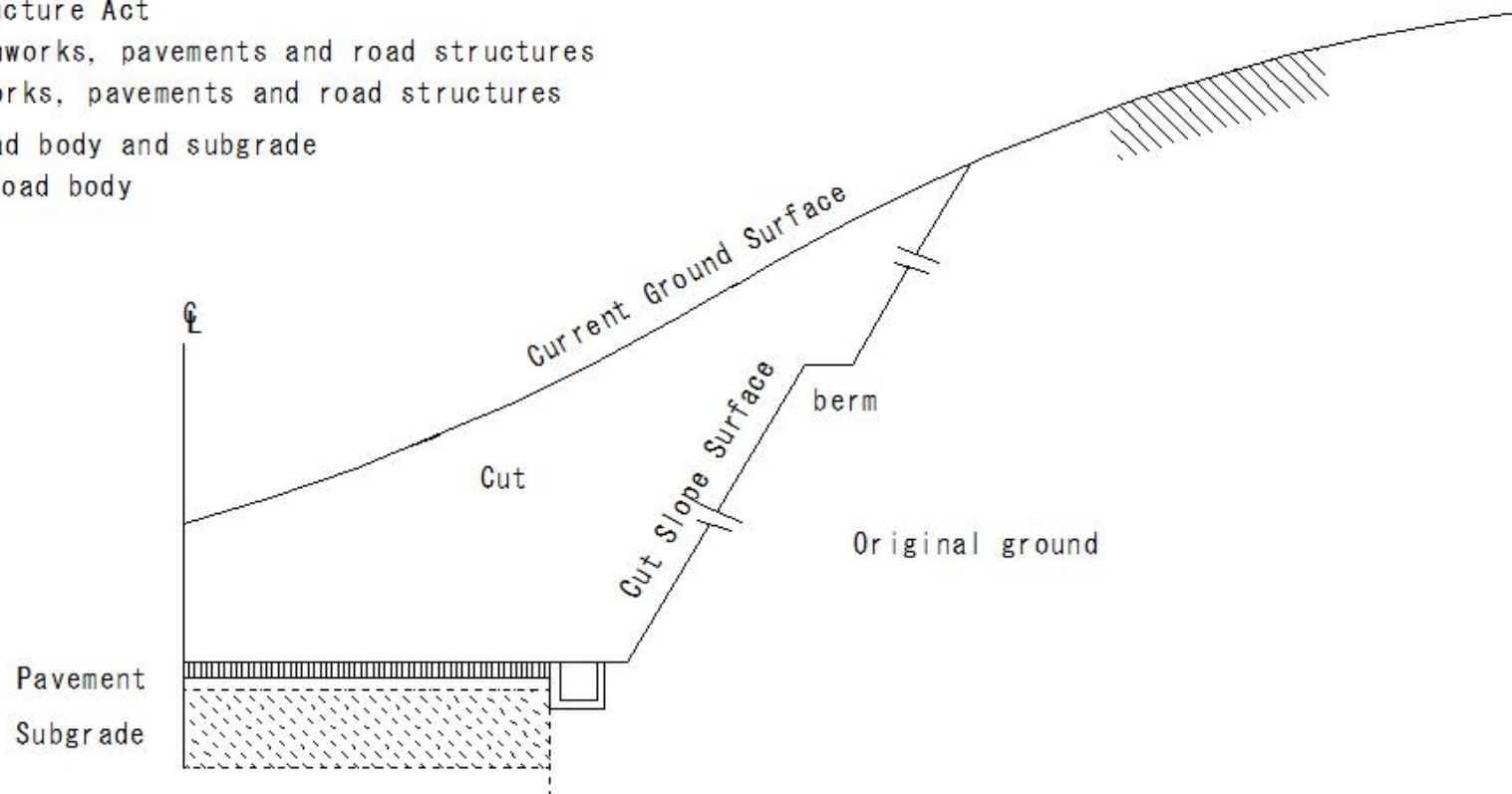


Figure 8-2 Names of Cut Sections

(H981)Road Structure Act(Earthworks, pavements and road structures)

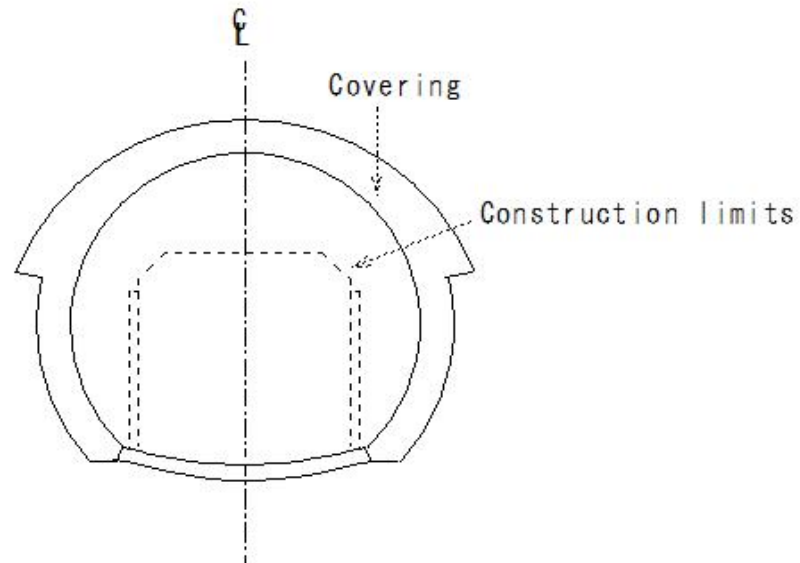
(H981)Road Structure Act(Earthworks, pavements and road structures)

Road Structure Act

8 Earthworks, pavements and road structures

8-4 Tunnels

8-4-1 Tunnel design



T33
T77

Figure 8-3 Standard cross-section of tunnel

(H982)Road Structure Act(Earthworks, pavements and road structures)

(H982)Road Structure Act(Earthworks, pavements and road structures)

Road Structure Act

8 Earthworks, pavement and road structures

8-4-3 Ancillary facilities of tunnels

Table 8-1 Emergency facilities by tunnel class

Tunnel class		AA	A	B	C	D
Emergency facilities						
•Reporting and warning equipment	1 Emergency telephone	○	○	○	○	
	2 Push-button reporting device	○	○	○	○	
	3 Fire detector	○	△			
	4 Emergency warning device	○	○	○	○	
•Fire extinguishing equipment	5 Fire extinguishing equipment	○	○	○		
	6 Fire hydrant	○	○			
•Evacuation guidance equipment	7 Guidance display board	○	○	○		
	8 Smoke exhaust equipment or evacuation passage	○	△			
•Other equipment	9 Water hydrant	○	△			
	10 Radio communication auxiliary equipment	○	△			
	11 Radio rebroadcast equipment or loudspeaker equipment	○	△			
	12 Water spray equipment	○	△			
	13 Monitoring equipment	○	△			

(H983)Road Structure Act(Earthworks, pavements and road structures)

(H983)Road Structure Act(Earthworks, pavements and road structures)

Road Structure Act

8 Earthworks, pavements and road structures

8-4-3 Tunnel ancillary facilities

(vehicles/day)

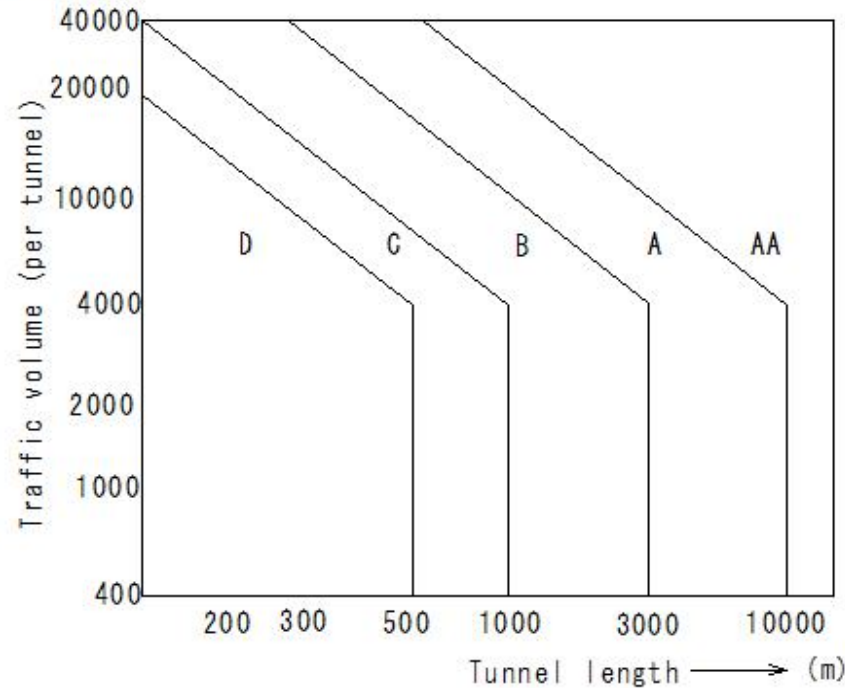


Figure 8-4 Tunnel classification

(H984)Road Structure Act(Earthworks, pavements and road structures)

(H984)Road Structure Act(Earthworks, pavements and road structures)

Road Structure Act

8 Earthworks, pavements and road structures

8-5 Bridges, elevated roads, etc.

8-5-2 Design vehicle load

Loads to be applied to first and second class bridges

Table 1 T load

1 Bridge class	2 Load	3 Total load W (t)	4 Front wheel load 0.1W (t)	5 Rear wheel load 0.4W (t)	6 Front wheel zone width b1 (cm)	7 Rear wheel zone width b2 (cm)	8 Wheel contact length a (cm)
First class bridge	T-20	20	2000	8000	12.5	50	20
Second class bridge	T-14	14	1400	5600	12.5	50	20

(H985)Road Structure Act(Earthworks, pavements and road structures)

(H985)Road Structure Act(Earthworks, pavements and road structures)

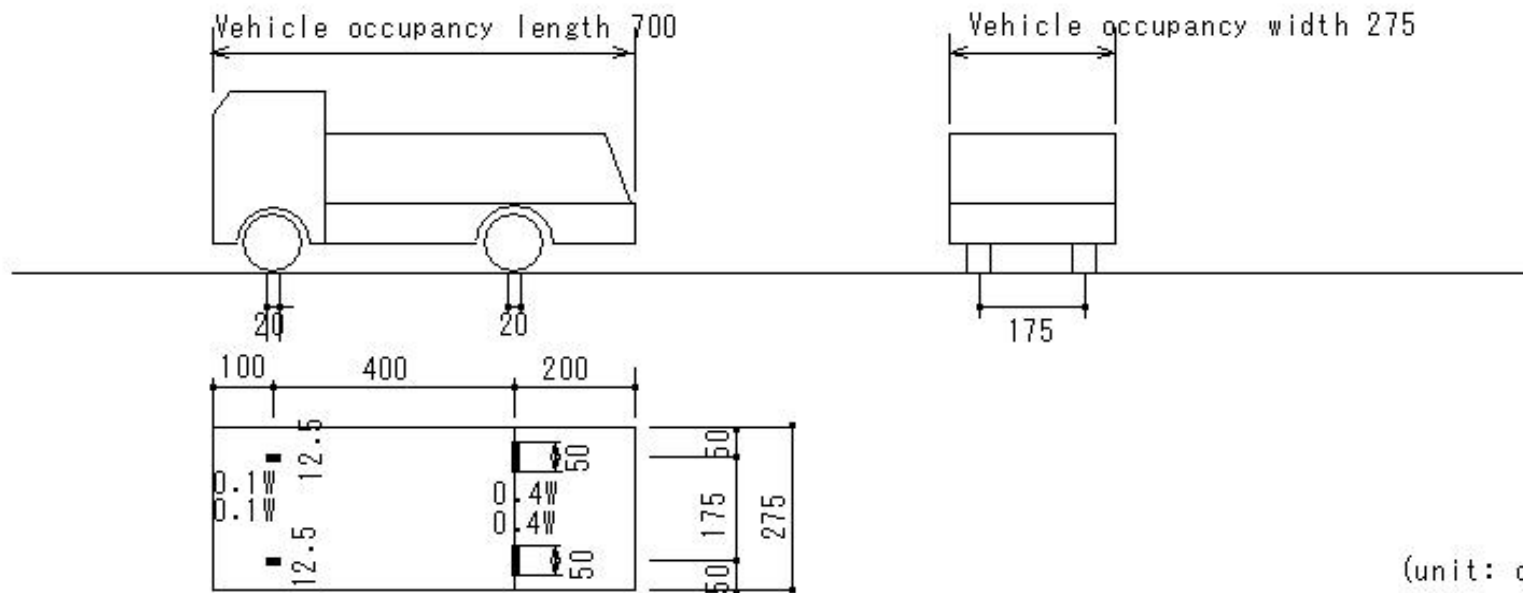
Road Structure Act

8 Earthworks, pavements and road structures

8-5 Bridges, elevated roads, etc.

8-5-2 Design vehicle load

Loads to be applied to first and second class bridges



(unit: cm)

Figure-1 T load

(H986)Road Structure Act(Earthworks, pavements and road structures)

(H986)Road Structure Act(Earthworks, pavements and road structures)

Road Structure Act

8 Earthworks, pavements and road structures

8-5 Bridges, elevated roads, etc.

8-5-2 Design vehicle load

Loads to be applied to first-class and second-class bridges

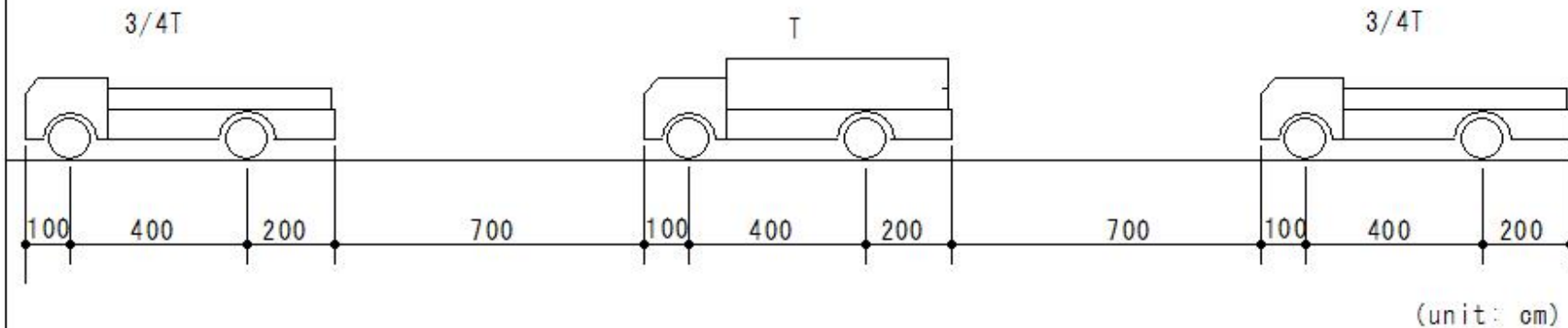


Figure 2 Vehicle load

(H987)Road Structure Act(Earthworks, pavements and road structures)

(H987)Road Structure Act(Earthworks, pavements and road structures)

Road Structure Act

8 Earthworks, pavements and road structures

8-5 Bridges, elevated roads, etc.

8-5-2 Design vehicle load

Loads applied to first-class and second-class bridges

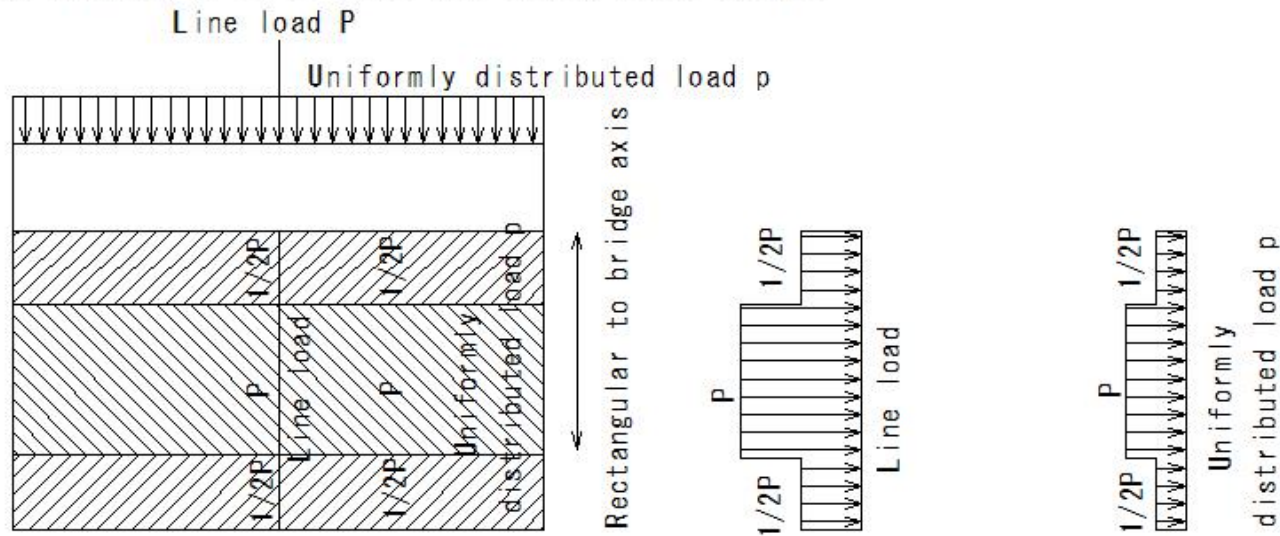


Figure-3 L load

(H988)Road Structure Act(Earthworks, pavements and road structures)

(H988)Road Structure Act(Earthworks, pavements and road structures)

Road Structure Act

8 Earthworks, pavements and road structures

8-5 Bridges, elevated roads, etc.

8-5-2 Design vehicle load

Loads to be applied to first and second class bridges

Table 2 L load

Bridge class	Load	Primary load (5.5m)				condary load
		Line load p (kg/m)	Uniformly distributed load p (kg/m ²)			
			$L \leq 80$	$80 < L \leq 130$	$L > 130$	
First class bridge	L-20	5000	350	$430 - L$	$L > 130$	50% of primary load
Second class bridge	L-14	70% of first-class bridges				

(H989)Road Structure Act(Earthworks, pavements and road structures)

(H989)Road Structure Act(Earthworks, pavements and road structures)

Road Structure Act

8 Earthworks, pavements and road structures

8-5 Bridges, elevated roads, etc.

8-5-2 Design vehicle load

Loads to be applied to first and second class bridges

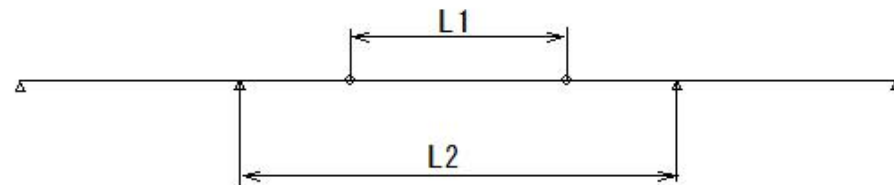


Figure 4 Span length for Gerber girders

(H990)Road Structure Act(Earthworks, pavements and road structures)

(H990)Road Structure Act(Earthworks, pavements and road structures)

Road Structure Act

8 Earthworks, pavements and road structures

8-5 Bridges, elevated roads, etc.

8-5-2 Design vehicle load

Loads on first-class and second-class bridges

Table 3 Uniformly distributed loads on sidewalks, etc.

Span length (m)	$L \leq 80$	$80 < L \leq 130$	$L > 130$
Load (kg/m ²)	350	$430 - L$	300

(H991)Road Structure Act(Earthworks, pavements and road structures)

(H991)Road Structure Act(Earthworks, pavements and road structures)

Road Structure Act

8 Earthworks, pavements and road structures

8-5 Bridges, elevated roads, etc.

8-5-2 Design vehicle load

Loads on bridges over specific routes

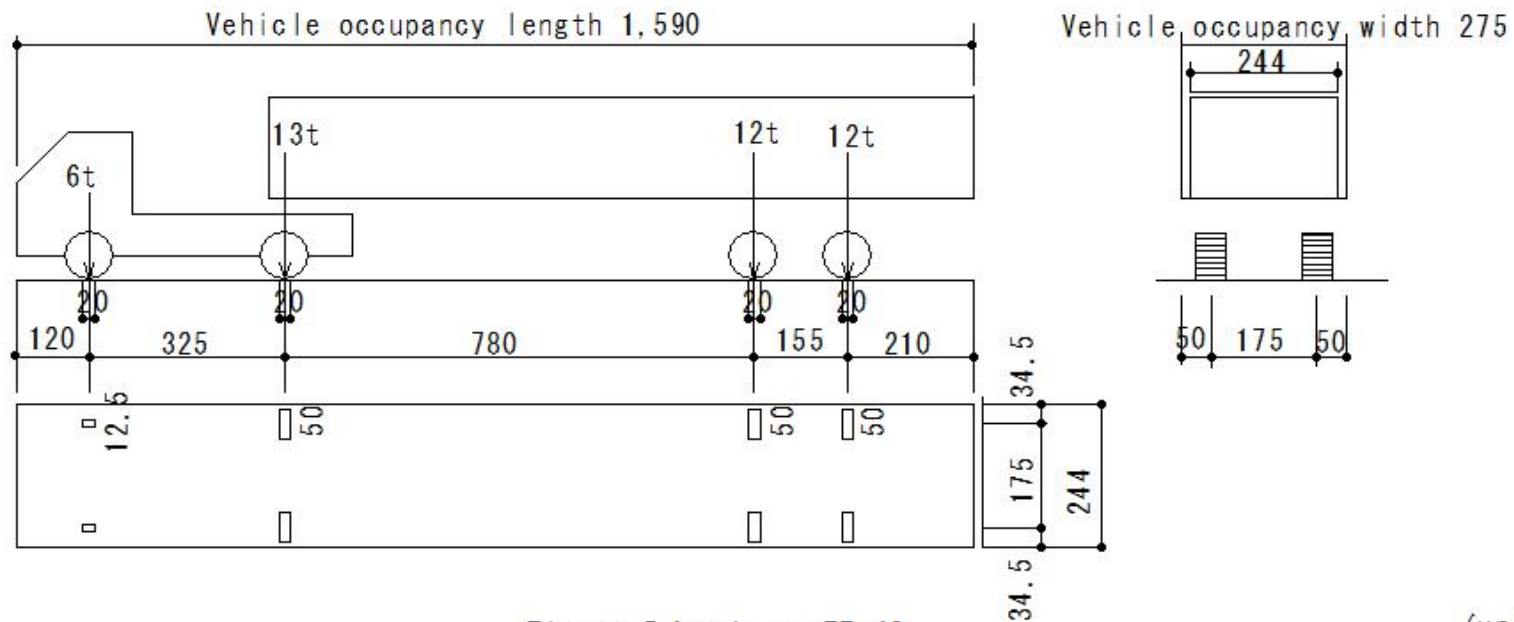


Figure 5 Loads on TT-43

(unit: cm)

(H992)Road Structure Act(Earthworks, pavements and road structures)

(H992)Road Structure Act(Earthworks, pavements and road structures)

Road Structure Act

8 Earthworks, pavements and road structures

8-5 Bridges, elevated roads, etc.

8-5-2 Design vehicle load

Loads on bridges over specific routes

Table 4 Coefficients used in designing decks

Span length (m)	$L \leq 4$	$4 < L \leq 10$	$10 < L$
Coefficients	1.2	$1.2 - 1/30(L-4)$	1.0

(H993)Road Structure Act(Earthworks, pavements and road structures)

(H993)Road Structure Act(Earthworks, pavements and road structures)

Road Structure Act

8 Earthworks, Pavements and Road Structures

8-5 Bridges, elevated roads, etc.

8-5-2 Design vehicle load

Live load in case of designing main girders

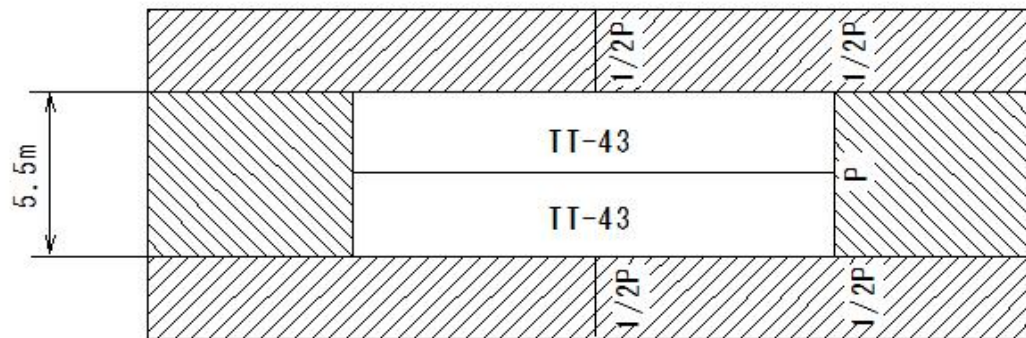


Figure 6 Loading method for TT-43

(H994)Road Structure Act(Earthworks, pavements and road structures)

(H994)Road Structure Act(Earthworks, pavements and road structures)

Road Structure Act

9 Road ancillary facilities

9-1 Shelters

- ① Distance between shelters: Within 300m
- ② Most of the shelters are visible
- ③ Length of shelter: 20m or more Roadway width: 5m or more

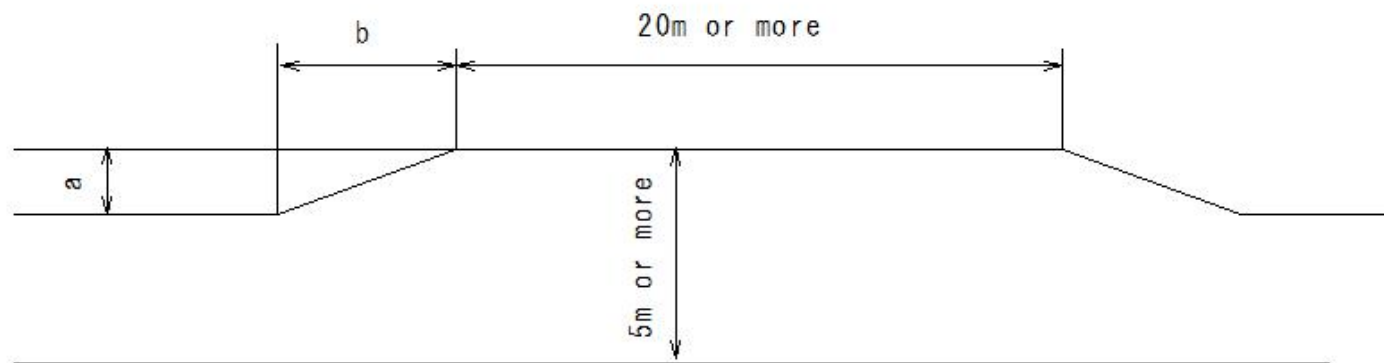


Figure 9-1 Length and width of shelter

(H995)Road Structure Act(Earthworks, pavements and road structures)


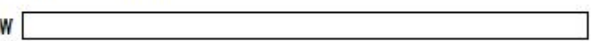

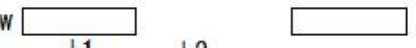
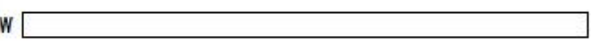
(H995) Road Structure Act(Earthworks, pavements and road structures)

Road Structure Act

9 Road ancillary facilities

9-3 Traffic management facilities

9-3-2 Markings Table 9-1 Styles and dimensions of road markings, etc.

Types	Style	Standard dimensions(cm)	Notes
Road center line	Dashed line w 	w = 12-15 l 1 = l 2 = 300-1000	in case of installing on a two-lane roadway
	Solid line w 	w = 15-20	in case of installing on a roadway with four or more lanes
Road boundary line	Dashed line w 	w = 10-15 l 1 = 300-1000 l 2 = (1-2) l 1	General cases
	Solid line w 	w = 30-75 l 1 = 200-500 l 2 = (1-1.5) l 1	in case of installing on additional lanes such as expressways
Road outer line	Solid line w 	w = 15-20	

(H996)Road Structure Act(Earthworks, pavements and road structures)

(H996)Road Structure Act(Earthworks, pavements and road structures)

Road Structure Act

9 Road ancillary facilities

9-3 Traffic management facilities

9-3-2 Markings

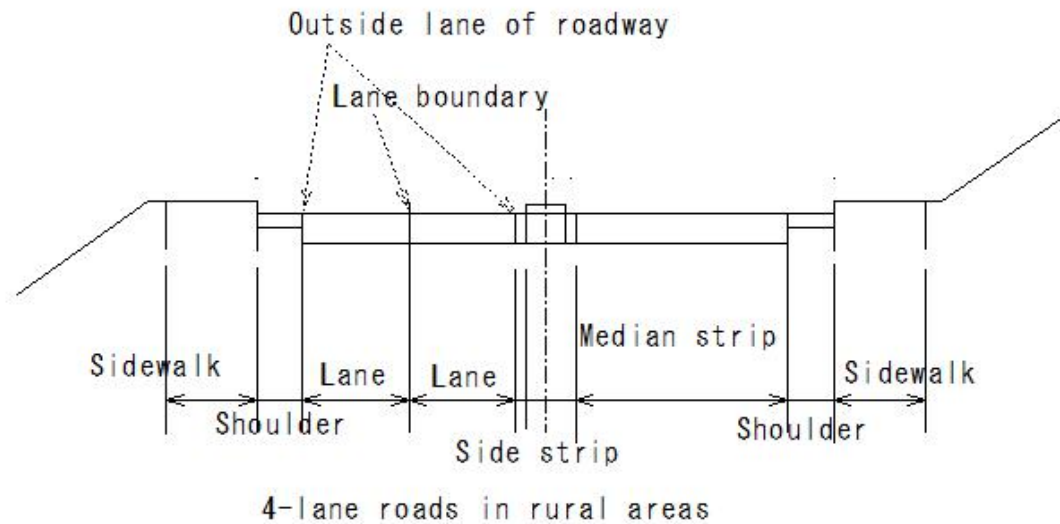


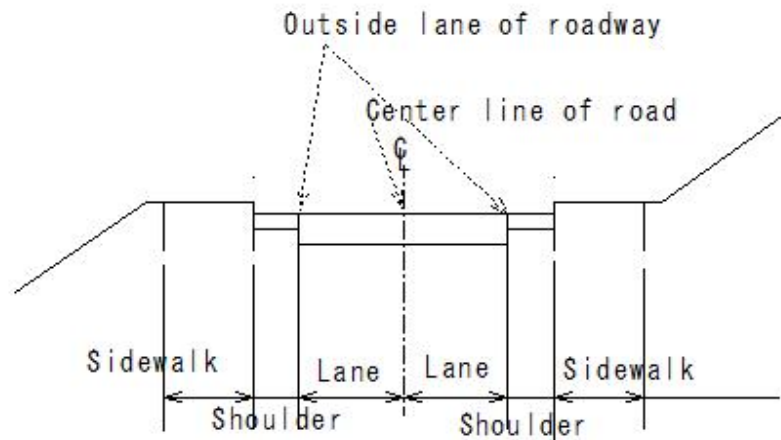
Figure 9-2 Location of road markings

(H997)Road Structure Act(Earthworks, pavements and road structures)

(H997)Road Structure Act(Earthworks, pavements and road structures)

Road Structure Act

- 9 Road ancillary facilities
- 9-3 Traffic management facilities
- 9-3-2 Markings



Two-lane roads in rural areas
Figure 9-2 Location of road markings

(H998)Road Structure Act(Earthworks, pavements and road structures)

(H998)Road Structure Act(Earthworks, pavements and road structures)

Road Structure Act

9 Road ancillary facilities

9-3 Traffic management facilities

9-3-2 Markings



w1=15-20

w2=10-75

l1=200-1000

l2=(1-2) l1

(Unit: cm)

(a) Linear

Figure 9-3 Style, dimensions and installation example of guideway markings <Style Dimensions>

(H999Road Structure Act(Earthworks, pavements and road structures)

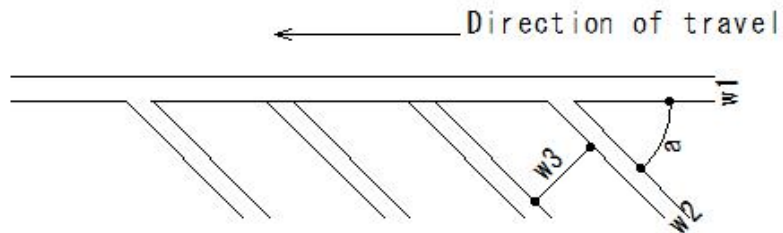
(H999) Road Structure Act(Earthworks, pavements and road structures)

Road Structure Act

9 Road ancillary facilities

9-3 Traffic management facilities

9-3-2 Markings



w1=15-20

w2=30-45

w3=100-150

a=30° , 45° , 90°

(Unit: cm)

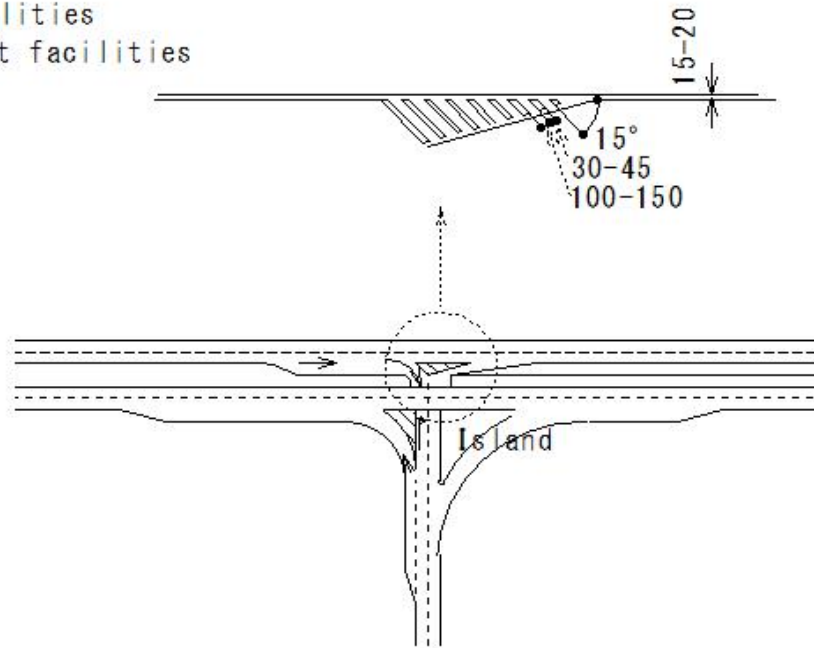
Figure 9-3 Style, dimensions and installation example of guideway markings <Style Dimensions>

(H1000)Road Structure Act(Earthworks, pavements and road structures)

(H1000)Road Structure Act(Earthworks, pavements and road structures)

Road Structure Act

- 9 Road ancillary facilities
- 9-3 Traffic management facilities
- 9-3-2 Markings



(a) T-shaped intersection with diversion

Figure 9-3 Style, dimensions and installation example of diversion markings <Installation example>

(H1001)Road Structure Act(Earthworks, pavements and road structures)

(H1001)Road Structure Act(Earthworks, pavements and road structures)

Road Structure Act

9 Road ancillary facilities

9-3 Traffic management facilities

9-3-2 Markings

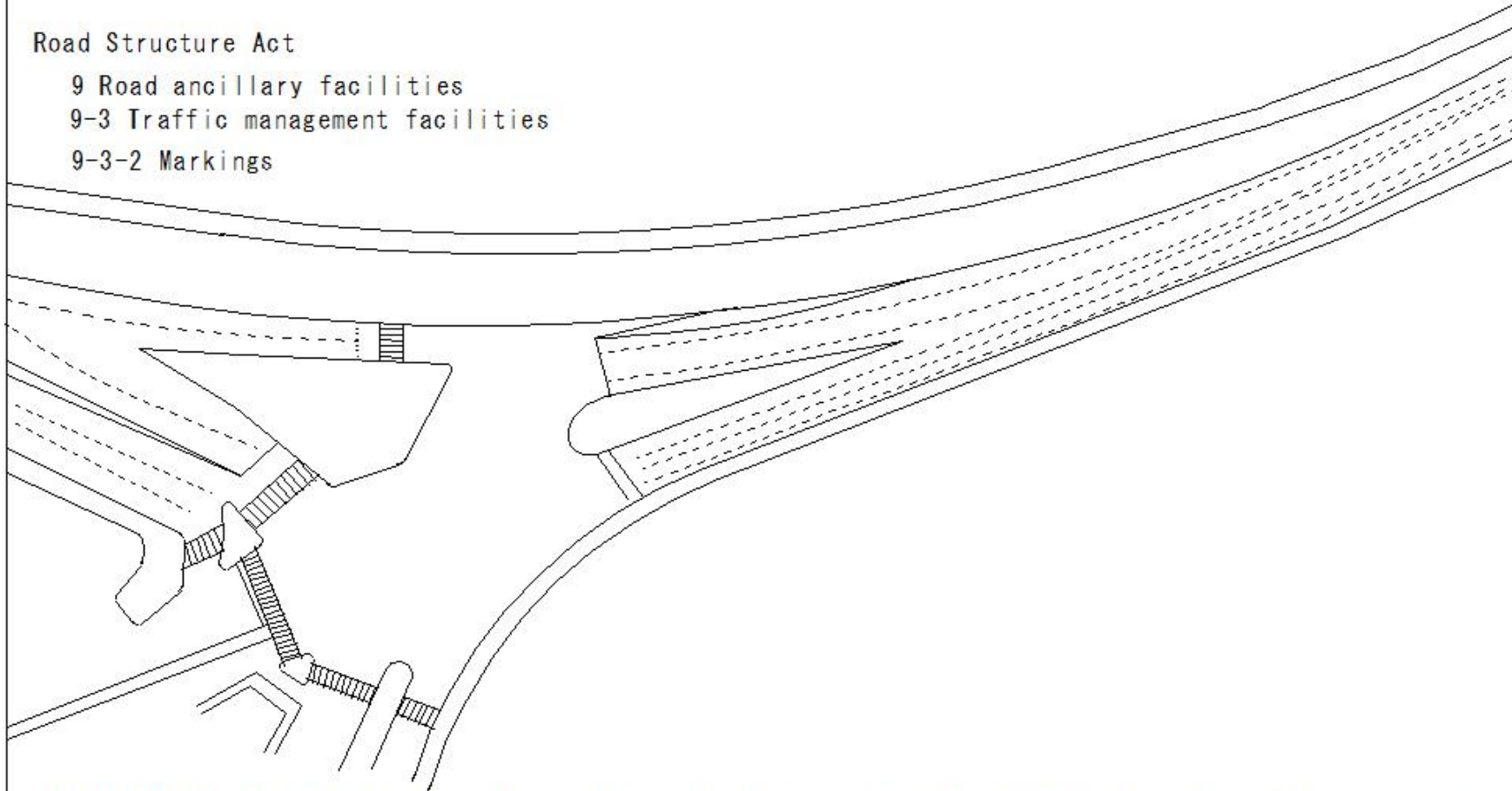


Figure 9-3 Style, dimensions and installation examples of diversion markings <Installation examples>

(H1002) Road Structure Act (Earthworks, pavements and road structures)

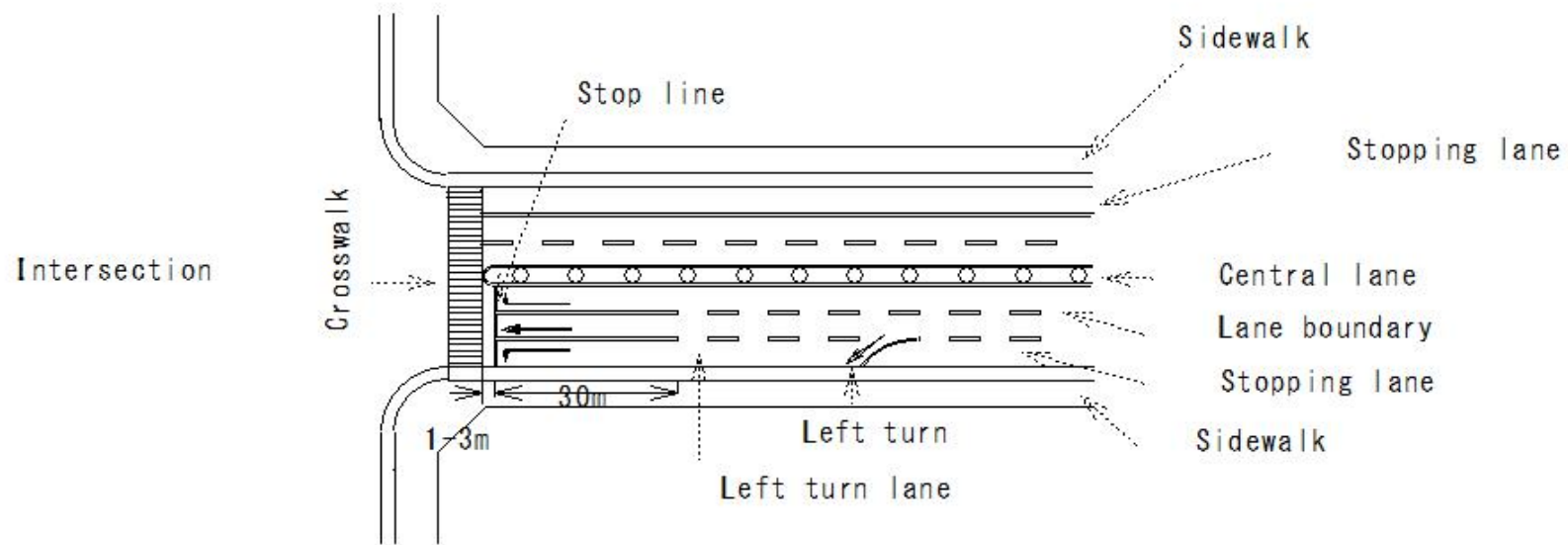
(H1002) Road Structure Act (Earthworks, pavements and road structures)

Road Structure Act

9 Road ancillary facilities

9-3 Traffic management facilities

9-3-2 Markings



Urban 4-lane roads

Figure 9-4 Example of marking near intersections

(H1003)Road Structure Act(Earthworks, pavements and road structures)

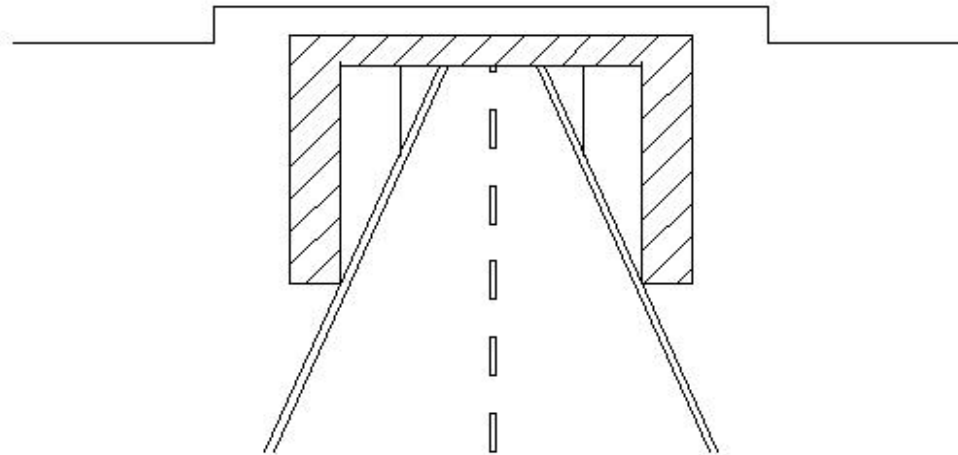
(H1003)Road Structure Act(Earthworks, pavements and road structures)

Road Structure Act

9 Road ancillary facilities

9-3 Traffic management facilities

9-3-2 Markings



Piers and girders of overpasses

Figure 9-5 Example of vertical marking installation

(H1004)Road Structure Act(Earthworks, pavements and road structures)

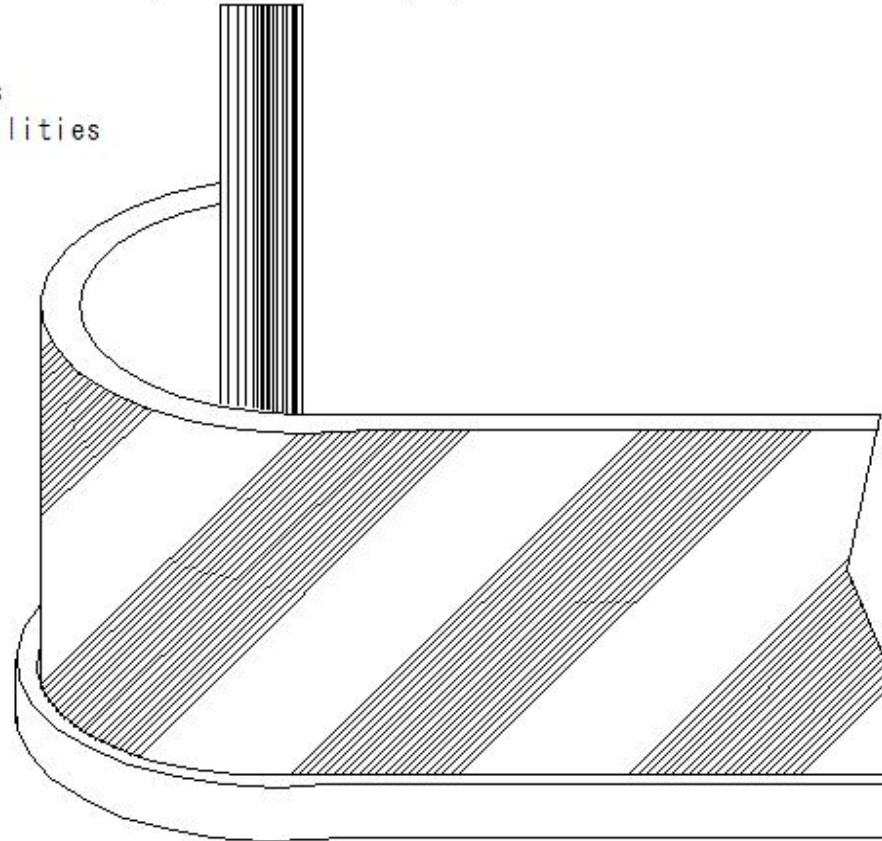
(H1004)Road Structure Act(Earthworks, pavements and road structures)

Road Structure Act

9 Road ancillary facilities

9-3 Traffic management facilities

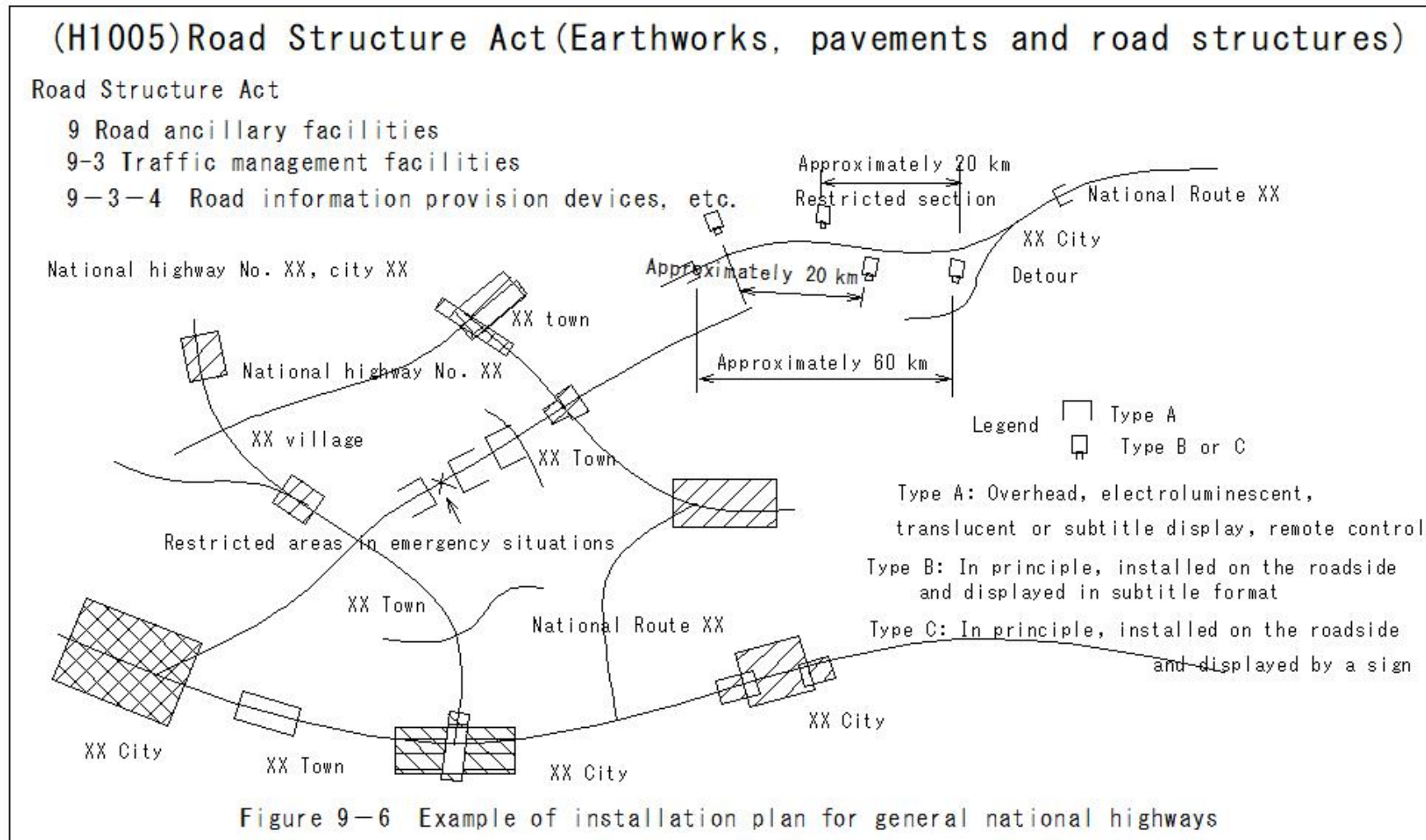
9-3-2 Markings



Barrier

Figure 9-5 Example of vertical marking installation

(H1005)Road Structure Act(Earthworks, pavements and road structures)



(H1006)Road Structure Act(Earthworks, pavements and road structures)

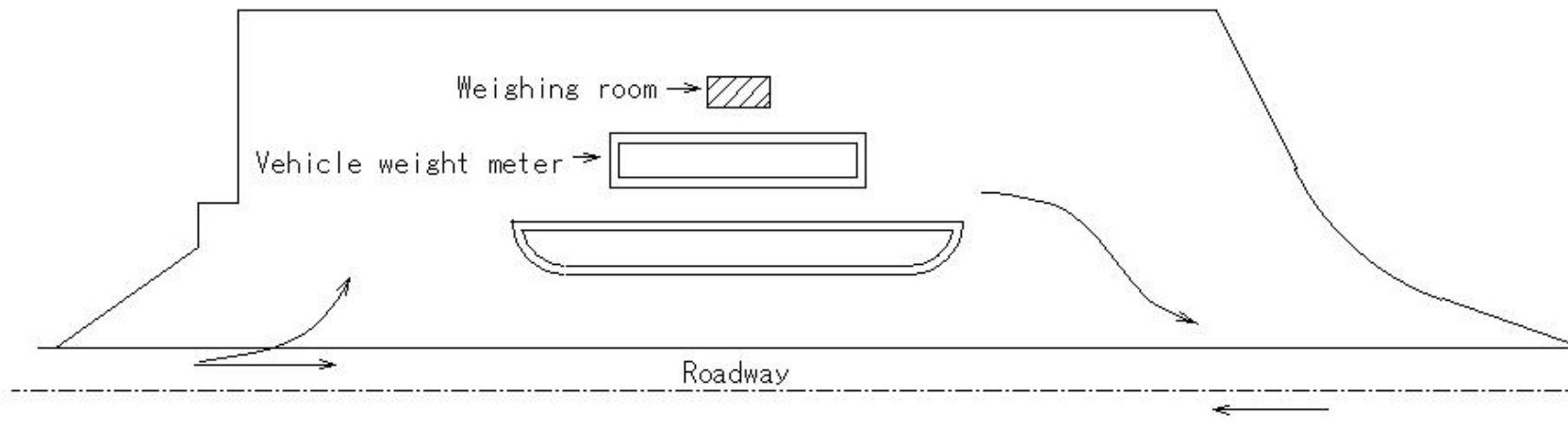
(H1006)Road Structure Act(Earthworks, pavements and road structures)

Road Structure Act

9 Road ancillary facilities

9-3 Traffic management facilities

9-3-4 Road information provision devices, etc.



(a) National highway

Figure 9-7 Example of installation of vehicle specification measurement facilities

(H1007)Road Structure Act(Earthworks, pavements and road structures)

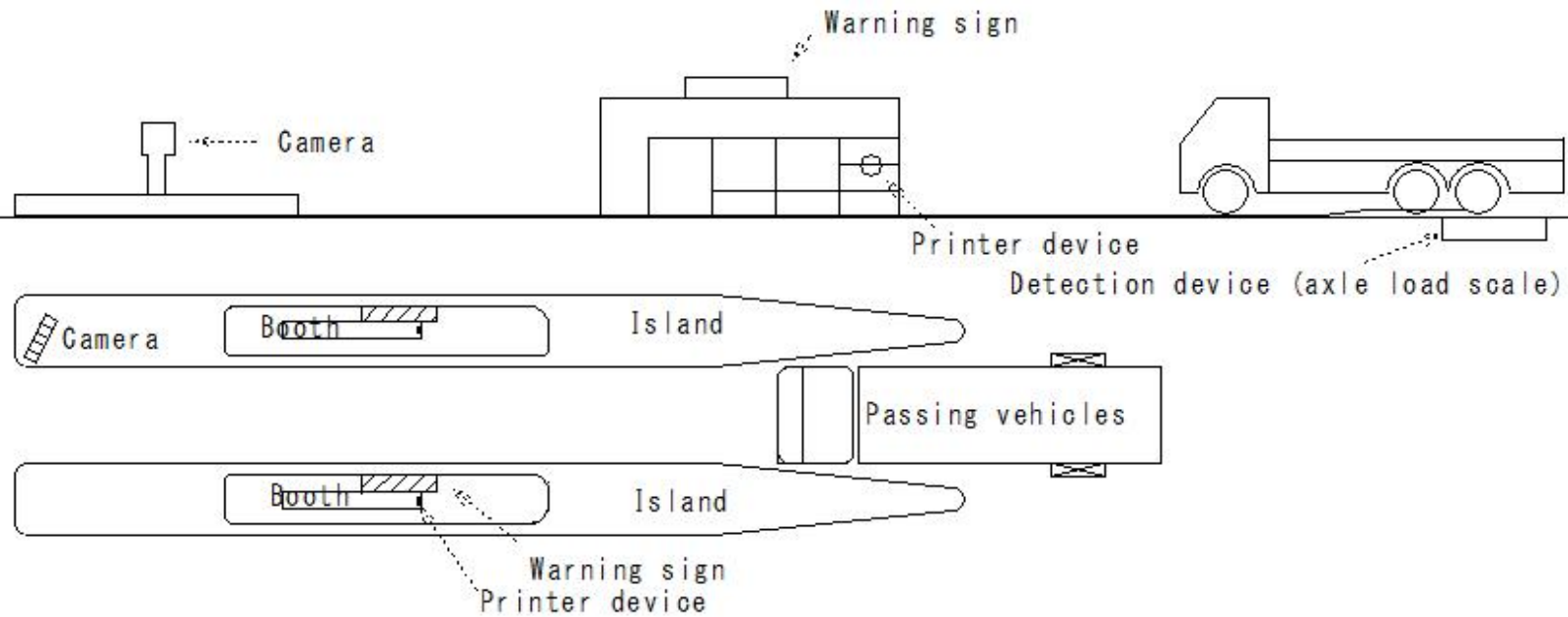
(H1007)Road Structure Act(Earthworks, pavements and road structures)

Road Structure Act

9 Road ancillary facilities

9-3 Traffic management facilities

9-3-6 Vehicle specification measurement facilities



(b) National Expressways, etc.

Figure 9-7 Installation example of vehicle specification measurement facility

(H1008)Road Structure Act(Earthworks, pavements and road structures)

(H1008) Road Structure Act (Earthworks, pavements and road structures)

Road Structure Act

9 Road ancillary facilities

9-3 Traffic management facilities

9-3-7. Toll gate

(Example of installation inside an interchange on an intercity expressway)

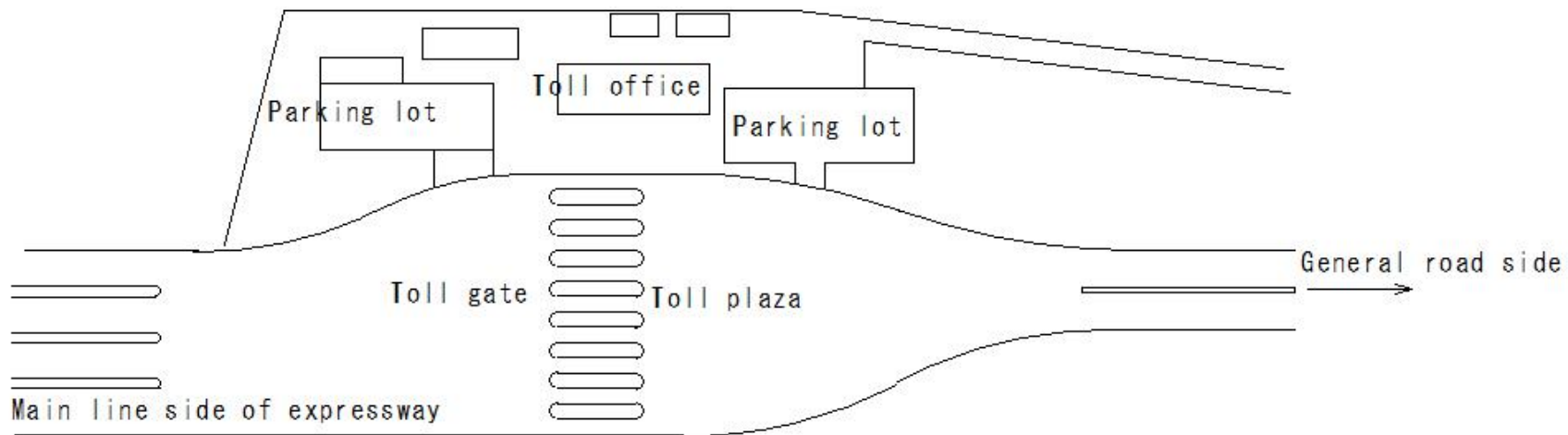


Figure 9-8. Conceptual diagram of a toll gate

(H1009)Road Structure Act(Earthworks, pavements and road structures)

(H1009)Road Structure Act(Earthworks, pavements and road structures)

Road Structure Act

9. Accessory facilities for roads

9-3. Traffic management facilities

9-3-8. Traffic signals

Table 9-2. Requirements for installing traffic signals

Main road	Carriageway width		Round-trip traffic volume of automobiles, etc. on main roads		Inflow traffic volume of automobiles, etc. on the road with the largest outflow volume among minor roads	
	Main road	Secondary road	12 hours (or 1-hour peak) (vehicles or more)		12 hours (or 1-hour peak) (vehicles or more)	
Main trunk line Less than 10m Less than 10m	Less than 10m	Less than 10m	6000	(650)	2700	(300)
			7000	(750)	2100	(230)
			9000	(1000)	1500	(160)
	Less than 10m	More than 10m	6000	(650)	3300	(360)
			7000	(750)	2500	(280)
			9000	(1000)	1800	(190)
	More than 10m	Less than 10m	7000	(800)	2700	(300)
			8000	(900)	2100	(200)
			11000	(1200)	1500	(160)
	More than 10m	More than 10m	14000	(1500)	1050	(120)
			7000	(800)	3300	(360)
			8000	(900)	2500	(280)
Urban streets Less than 10m Less than 10m	Less than 10m	Less than 10m	7000	(800)	1800	(190)
			8000	(900)	1300	(140)
			11000	(1200)	1050	(120)
	Less than 10m	More than 10m	8,000	(750)	3,800	(350)
			9,000	(800)	3,100	(270)
			13,000	(1200)	2,000	(190)
	More than 10m	Less than 10m	8,000	(750)	4,500	(420)
			9,000	(800)	3,500	(320)
			13,000	(1200)	2,500	(220)
	More than 10m	More than 10m	10,000	(900)	3,800	(350)
			12,000	(1000)	3,100	(270)
			15,000	(1400)	2,000	(190)
More than 10m	More than 10m	20,000	(1800)	1,450	(140)	
		10,000	(900)	4,500	(420)	
		12,000	(1000)	3,500	(320)	
More than 10m	More than 10m	15,000	(1400)	2,500	(220)	
		20,000	(1800)	1,700	(160)	
		10,000	(900)	3,800	(350)	

(H1010)Road Structure Act(Earthworks, pavements and road structures)

(H1010)Road Structure Act(Earthworks, pavements and road structures)

Road Structure Act

9 Road auxiliary facilities

9-3 Traffic management facilities

9-3-8 Traffic signals

Table 9-3 Requirements for installing traffic signals (point-sensitive signals)

Main roads	Two-way traffic volume of automobiles, etc. on main roads	Inflow traffic volume of automobiles, etc. on secondary roads
	12 hours (or peak hour) (vehicles or more)	Peak hour (vehicles or more)
Main trunk roads	8000(900)	100
Urban streets	12000(1000)	120

(H1011)Road Structure Act(Earthworks, pavements and road structures)

(H1011)Road Structure Act(Earthworks, pavements and road structures)

Road Structure Act

9 Road auxiliary facilities

9-3 Traffic management facilities

9-3-8 Traffic signals

Table 9-4 Requirements for installing traffic lights (crosswalks other than intersections)

Main roads	Round-trip traffic volume of automobiles, etc.	Traffic volume of pedestrians crossing main roads
	12 hours (or peak hour) (vehicles or more)	Peak hour (vehicles or more)
in trunk roads	6000(650)	200
urban streets	8000(750)	250

(H1012)Road Structure Act(Earthworks, pavements and road structures)

(H1012)Road Structure Act(Earthworks, pavements and road structures)

Road Structure Act

9 Road ancillary facilities

9-3 Traffic management facilities

9-3-8 Traffic signals

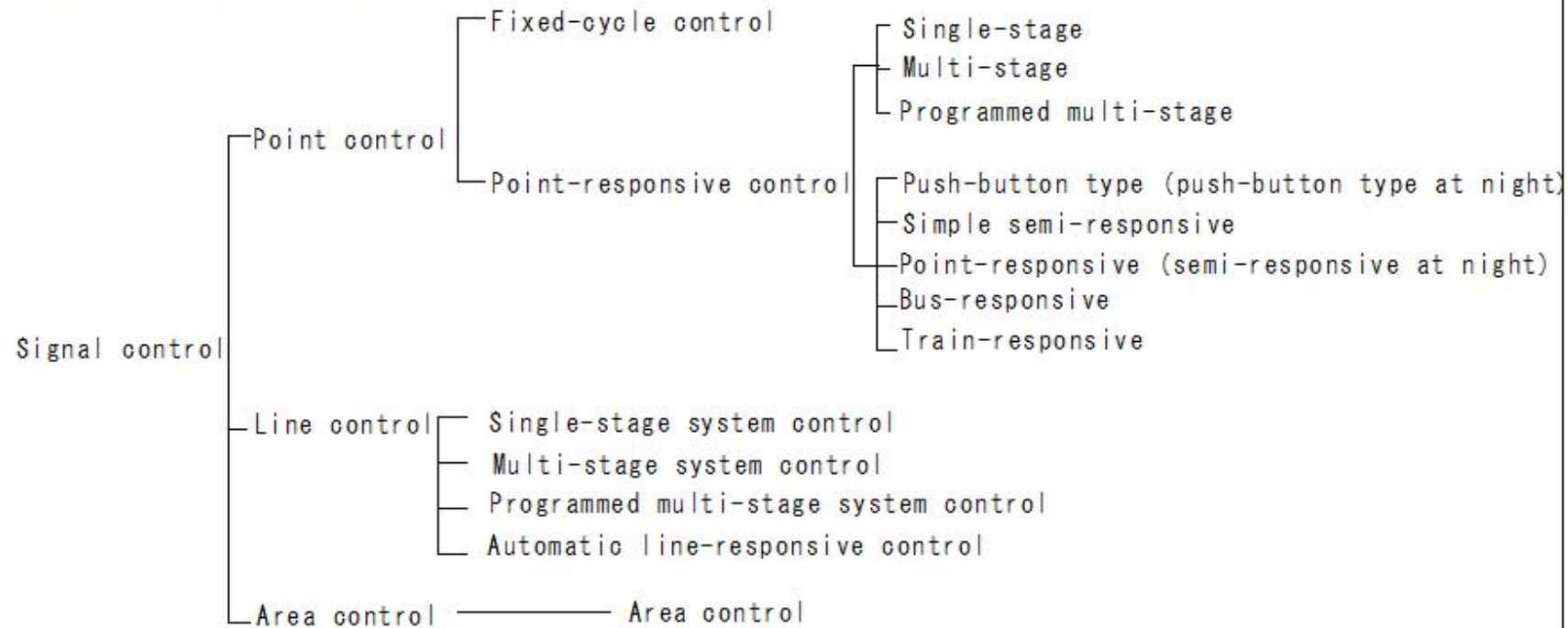


Figure 9-9 Classification by control method

(H1013)Road Structure Act(Earthworks, pavements and road structures)

(H1013)Road Structure Act(Earthworks, pavements and road structures)

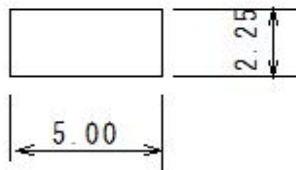
Road Structure Act

9 Road ancillary facilities

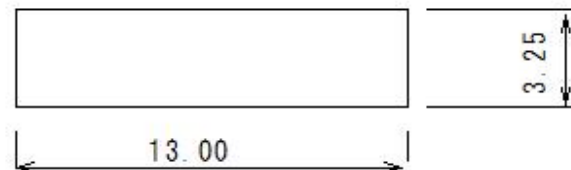
9-4 Car parking lot

9-4-1 Car parking lot

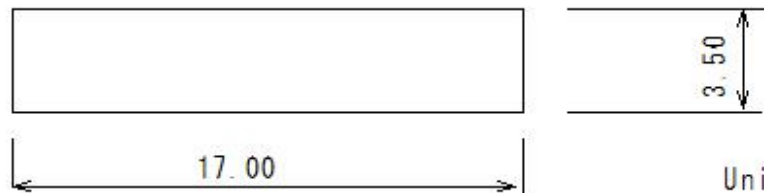
Small car parking space



Large car parking space



Special large car parking space



Unit: m

Figure 9-10 Standard dimensions of parking spaces

(H1014)Road Structure Act(Earthworks, pavements and road structures)

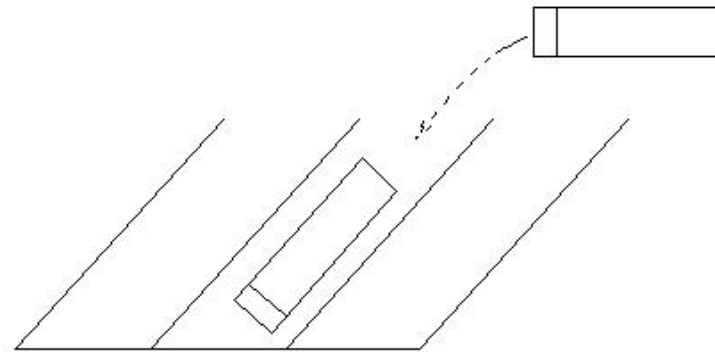
(H1014)Road Structure Act(Earthworks, pavements and road structures)

Road Structure Act

9 Road ancillary facilities

9-4 Car parking lot

9-4-1 Car parking lot



(a) Forward parking

Figure 9-11. How to park

(H1015)Road Structure Act(Earthworks, pavements and road structures)

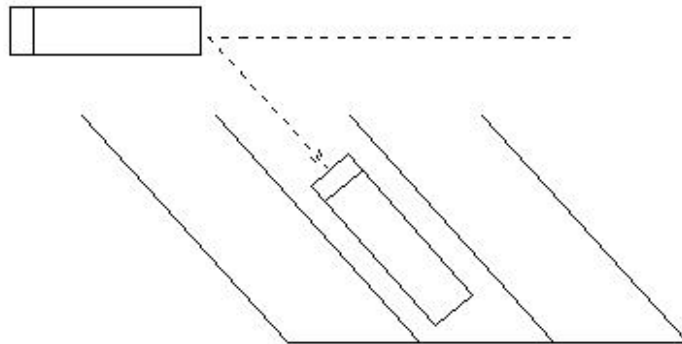
(H1015)Road Structure Act(Earthworks, pavements and road structures)

Road Structure Act

9 Road ancillary facilities

9-4 Car parking lot

9-4-1 Car parking lot



(b) Back-up parking

Figure 9-11. How to park

(H1016)Road Structure Act(Earthworks, pavements and road structures)

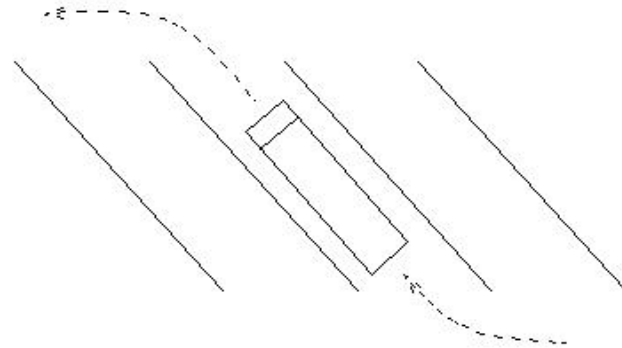
(H1016)Road Structure Act(Earthworks, pavements and road structures)

Road Structure Act

9 Road ancillary facilities

9-4 Car parking lot

9-4-1 Car parking lot



(c) Forward parking/forward departure

Figure 9-11. How to park

(H1017)Road Structure Act(Earthworks, pavements and road structures)

(H1017)Road Structure Act(Earthworks, pavements and road structures)

Road Structure Act

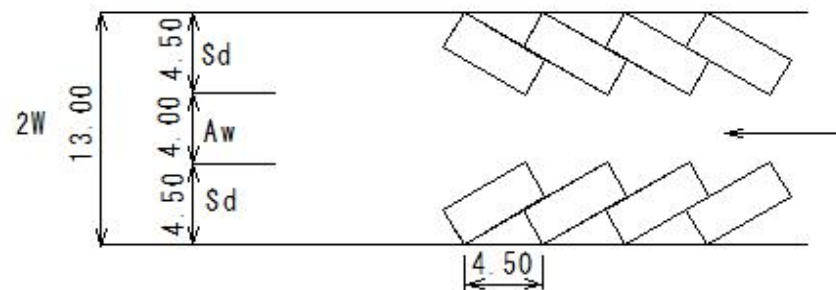
9 Road ancillary facilities

9-4 Car parking lot

9-4-1 Car parking lot

Table 9-5. Evaluation of parking methods

Angle and method	Evaluation
30° (forward parking)	Forward parking only Road width - small Long parking space is required to extend along the road Maximum parking area required per vehicle Rear visibility is significantly reduced when exiting



(a) 30° forward parking (small)

Figure 9-12. Parking space layout

(H1018)Road Structure Act(Earthworks, pavements and road structures)

(H1018)Road Structure Act(Earthworks, pavements and road structures)

Road Structure Act

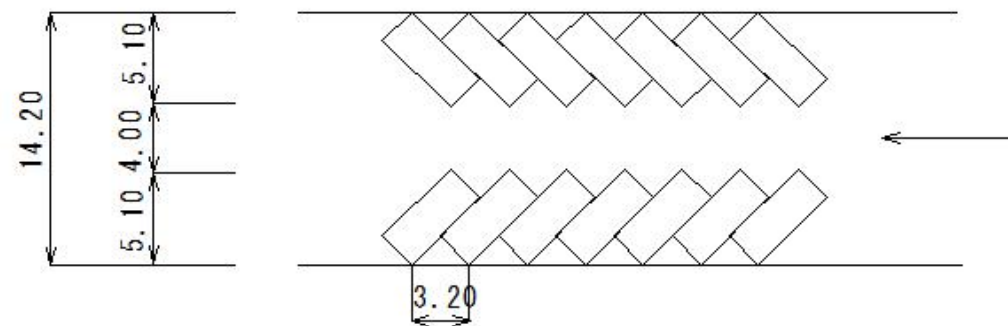
9 Road ancillary facilities

9-4 Car parking lot

9-4-1 Car parking lot

Table 9-5. Evaluation of parking methods

Angle and method	Evaluation
45° (Forward parking) (Back-up parking) (Cross-type parking)	Can be used both forward and backward Forward parking is easier Intersection parking: less parking space required per car



(b) 45° forward parking (small)

Figure 9-12. Parking space layout

(H1019)Road Structure Act(Earthworks, pavements and road structures)

(H1019)Road Structure Act(Earthworks, pavements and road structures)

Road Structure Act

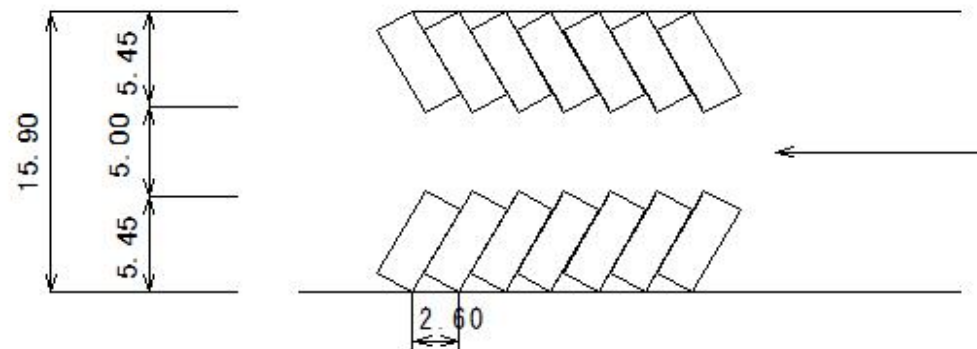
9 Road ancillary facilities

9-4 Car parking lot

9-4-1 Car parking lot

Table 9-5. Evaluation of parking methods

Angle and method	Evaluation
60° (Forward parking) (Backward parking)	Can be used in both forward and reverse Best maneuverability Road width needs to be widened Requires less parking space per vehicle



(e) 60° forward parking (small)
Figure 9-12. Parking space layout

(H1020)Road Structure Act(Earthworks, pavements and road structures)

(H1020)Road Structure Act(Earthworks, pavements and road structures)

Road Structure Act

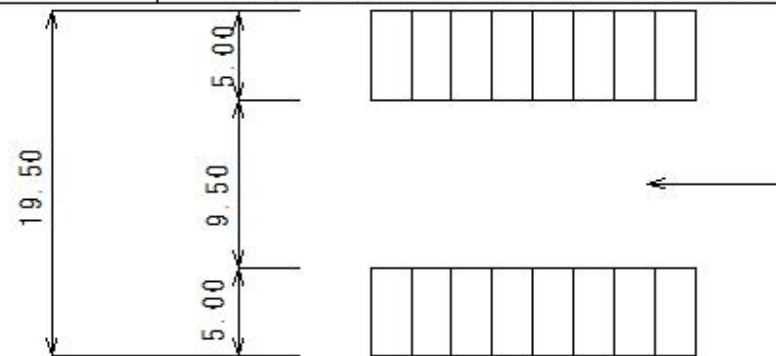
9 Road ancillary facilities

9-4 Car parking lot

9-4-1 Car parking lot

Table 9-5. Evaluation of parking methods

Angle and method	Evaluation
90°	Can be used both forward and backward Backward parking is common Requires the least amount of space Increase the width of the parking space by about 0.25m Requires the least amount of space



(g) 90° forward parking (small)

Figure 9-12. Parking space layout

(H1021)Road Structure Act(Earthworks, pavements and road structures)

(H1021)Road Structure Act(Earthworks, pavements and road structures)

Road Structure Act

9 Road ancillary facilities

9-4 Car parking lots

9-4-1 Car parking lots

Table 9-6 Standard values for car parking lot specifications

Vehicle type	Parking angle (°)	Parking methods	Road width AW (m) Upper AW1 Lower AW2	Parking width perpendicular to the road Sd (m)	Parking width parallel to the road Sw (m)	Unit parking width W (m)	Required parking area per car A (m ²)	Object symbols in Figure 9-12		
Small cars	30	Forward parking	4.00	4.50	4.50	6.50	29.3	(a)	(a) 30° forward parking (small)	H1023
	45	Forward parking	4.00	5.10	3.20	7.10	22.8	(b)	(b) 45° forward parking (small)	H1024
	45° intersect	Forward parking	4.00	4.30	3.20	6.30	20.2	(c),(d)	(c) 45° cross parking type A (small)(d) 45° cross parking	H1025
		60	Forward parking	5.00	5.45	2.60	7.95	20.7	(e)	(e) 60° forward parking (small)
	60	Reverse parking	4.50	5.45	2.60	7.70	20.0	(f)	(f) 60° backward parking (small)	H1028
	90	Forward parking	9.50	5.00	2.25	9.75	21.9	(g)	(g) 90° forward parking (small)	H1029
	90	Reverse parking	6.00	5.00	2.25	8.00	18.0	(h)	(h) 90° backward parking (small)	H1030

(H1022)Road Structure Act(Earthworks, pavements and road structures)

(H1022)Road Structure Act(Earthworks, pavements and road structures)

Road Structure Act

9 Road ancillary facilities

9-4 Car parking lots

9-4-1 Car parking lots

Table 9-6 Standard values for car parking lot specifications

Vehicle type	Parking angle (°)	Parking methods	Road width AW (m) Upper AW1 Lower AW2	Parking width perpendicular to the road Sd (m)	Parking width parallel to the road Sw (m)	Unit parking width W (m)	Required parking area per car A (m ²)	Object symbols in Figure 9-12			
Large vehicle	30	Forward parking	4.00	9.30	6.50	19.30	125.5	(i)	(i) 30° parking (large)	H1031	
	45	Forward parking	6.00	11.50	4.60	25.00	115.0	(j)	(j) 45° parking (large)	H1032	
		Forward parking	7.00								
	60	60	Forward parking	6.50	12.90	3.75	31.40	117.8	(k)	(k) 60° parking (large)	H1033
			Forward parking	11.00							
90	90	Forward parking	7.50	13.00	3.25	43.00	139.8	(l)	(L) 90° parking (large)	H1034	
parallel	Forward parking	19.00									
	parallel	Reverse parking	11.00	3.25	19.00	6.25	118.8	(m)	(m) Parallel parking (large)	H1035	
		Forward parking	6.00								
Large special vehicle	parallel	Reverse parking	6.00	3.50	25.00	6.50	162.5	(n)	(n) Parallel parking (large special)	H1036	

(H1023)Road Structure Act(Earthworks, pavements and road structures)

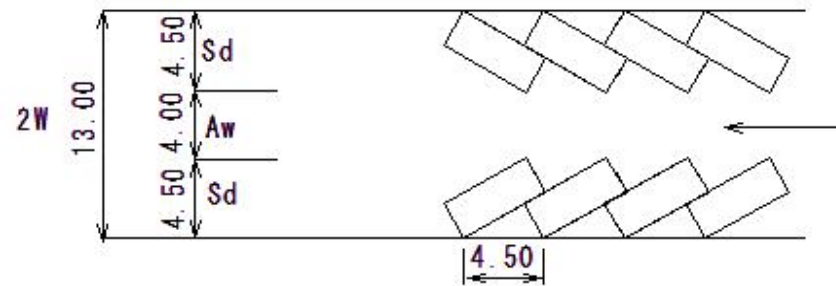
(H1023)Road Structure Act(Earthworks, pavements and road structures)

Road Structure Act

9 Road ancillary facilities

9-4 Car parking lot

9-4-1 Car parking lot



(a) 30° forward parking (small)

Figure 9-12. Parking space layout

(H1024)Road Structure Act(Earthworks, pavements and road structures)

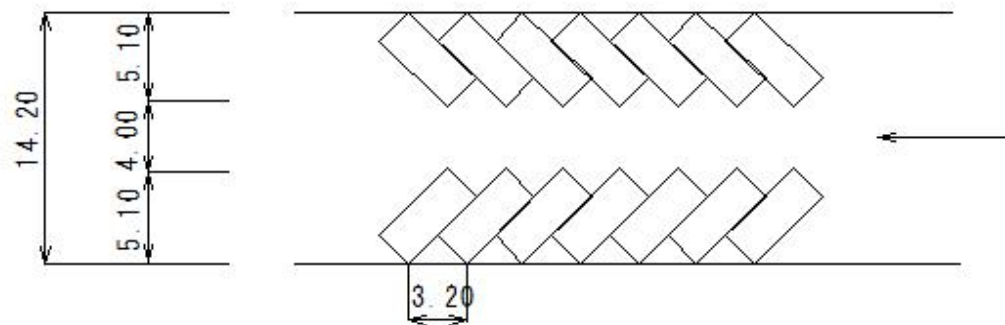
(H1024)Road Structure Act(Earthworks, pavements and road structures)

Road Structure Act

9 Road ancillary facilities

9-4 Car parking lot

9-4-1 Car parking lot



(b) 45° forward parking (small)

Figure 9-12. Parking space layout

(H1025)Road Structure Act(Earthworks, pavements and road structures)

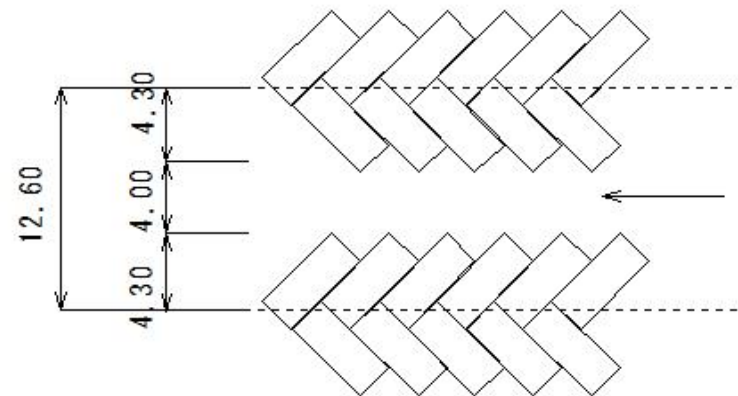
(H1025)Road Structure Act(Earthworks, pavements and road structures)

Road Structure Act

9 Road ancillary facilities

9-4 Car parking lot

9-4-1 Car parking lot



(c) 45° cross parking type A (small)

Figure 9-12. Parking space layout

(H1026)Road Structure Act(Earthworks, pavements and road structures)

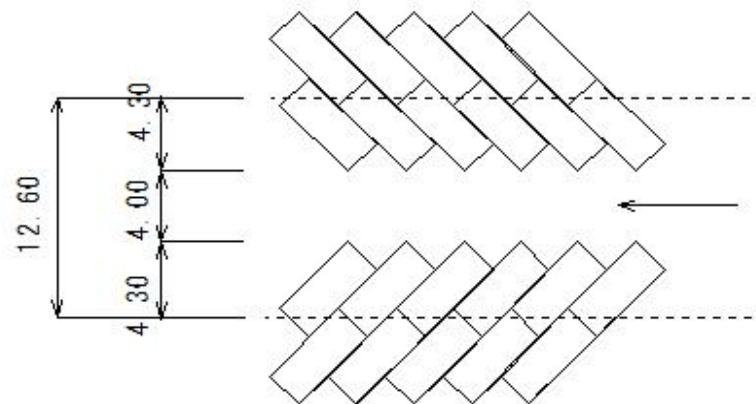
(H1026)Road Structure Act(Earthworks, pavements and road structures)

Road Structure Act

9 Road ancillary facilities

9-4 Car parking lot

9-4-1 Car parking lot



(d) 45° cross parking type B (small)

Figure 9-12. Parking space layout

(H1027)Road Structure Act(Earthworks, pavements and road structures)

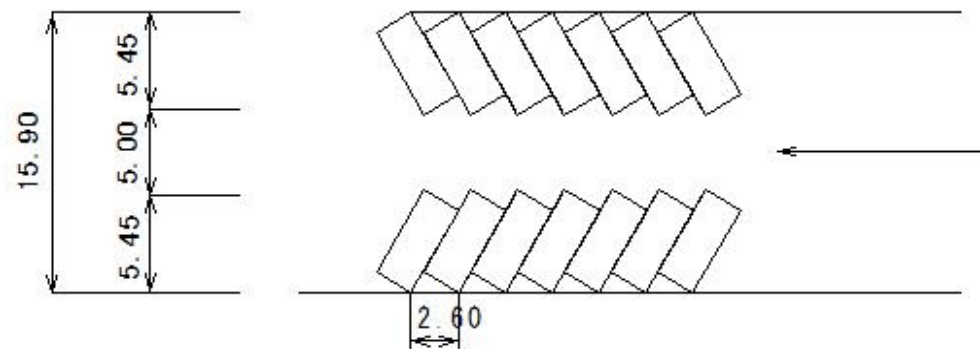
(H1027)Road Structure Act(Earthworks, pavements and road structures)

Road Structure Act

9 Road ancillary facilities

9-4 Car parking lot

9-4-1 Car parking lot



(e) 60° forward parking (small)
Figure 9-12. Parking space layout

(H1028)Road Structure Act(Earthworks, pavements and road structures)

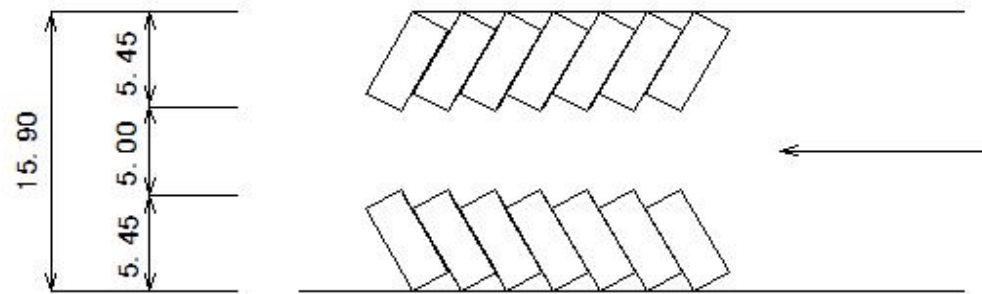
(H1028)Road Structure Act(Earthworks, pavements and road structures)

Road Structure Act

9 Road ancillary facilities

9-4 Car parking lot

9-4-1 Car parking lot



(f) 60° back parking (small)

Figure 9-12. Parking space layout

(H1029)Road Structure Act(Earthworks, pavements and road structures)

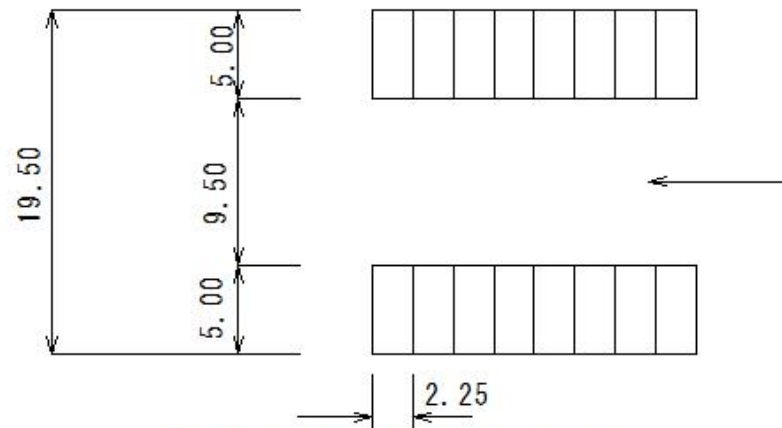
(H1029)Road Structure Act(Earthworks, pavements and road structures)

Road Structure Act

9 Road ancillary facilities

9-4 Car parking lot

9-4-1 Car parking lot



(g) 90° forward parking (small)

Figure 9-12. Parking space layout

(H1031)Road Structure Act(Earthworks, pavements and road structures)

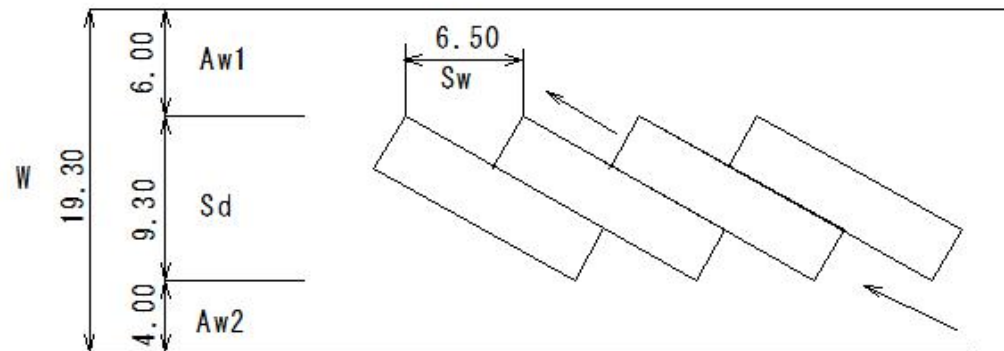
(H1031)Road Structure Act(Earthworks, pavements and road structures)

Road Structure Act

9 Road ancillary facilities

9-4 Car parking lot

9-4-1 Car parking lot



(i) 30° parking (large)

Figure 9-12. Parking space layout

(H1032)Road Structure Act(Earthworks, pavements and road structures)

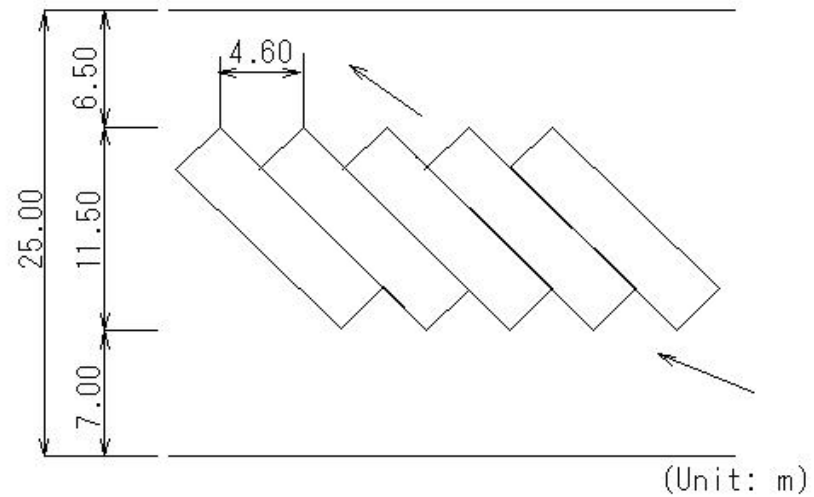
(H1032)Road Structure Act(Earthworks, pavements and road structures)

Road Structure Act

9 Road ancillary facilities

9-4 Car parking lot

9-4-1 Car parking lot



(j) 45° parking (large)

Figure 9-12. Parking space layout

(H1033)Road Structure Act(Earthworks, pavements and road structures)

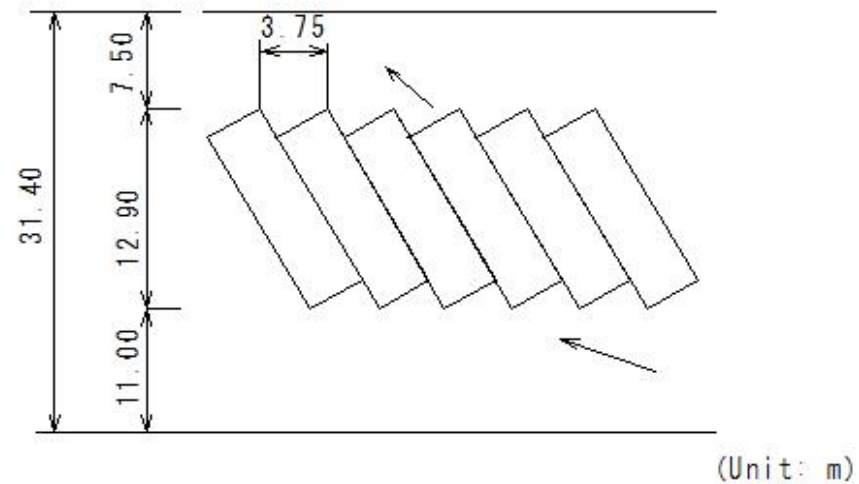
(H1033)Road Structure Act(Earthworks, pavements and road structures)

Road Structure Act

9 Road ancillary facilities

9-4 Car parking lot

9-4-1 Car parking lot



(k) 60° parking (large)

Figure 9-12. Parking space layout

(H1034)Road Structure Act(Earthworks, pavements and road structures)

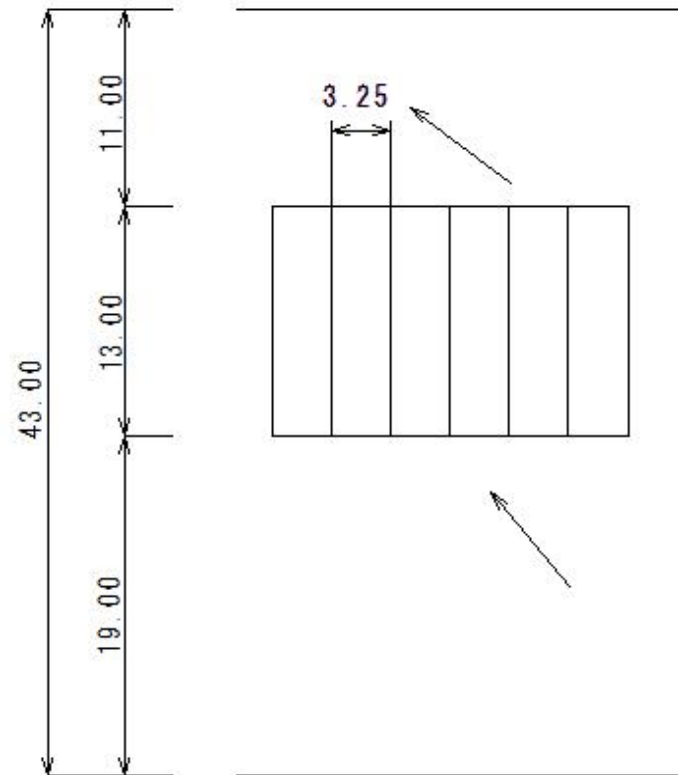
(H1034)Road Structure Act(Earthworks, pavements and road structures)

Road Structure Act

9 Road ancillary facilities

9-4 Car parking lot

9-4-1 Car parking lot



(I) 90° parking (large)

(Unit: m)

Figure 9-12. Parking space layout

(H1035)Road Structure Act(Earthworks, pavements and road structures)

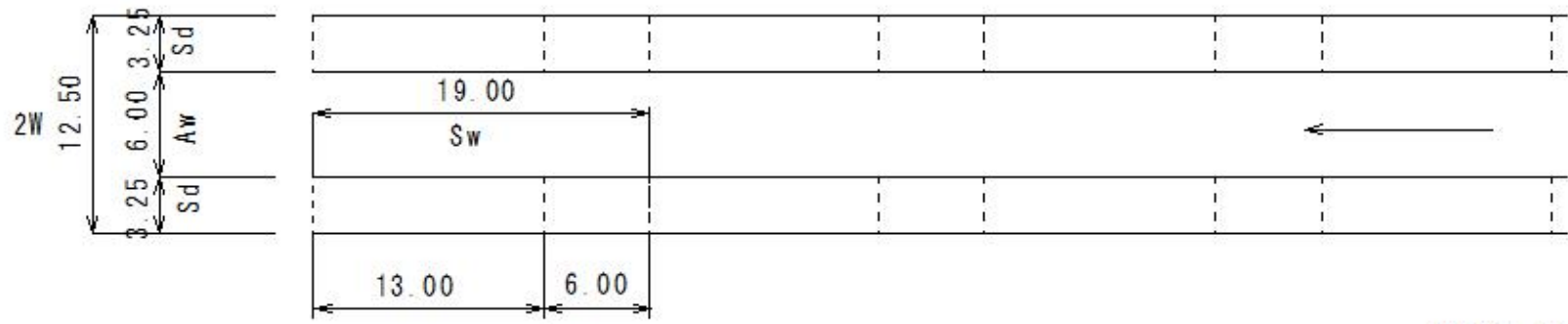
(H1035)Road Structure Act(Earthworks, pavements and road structures)

Road Structure Act

9 Road ancillary facilities

9-4 Car parking lot

9-4-1 Car parking lot



(Unit: m)

(m) Parallel parking (large)

Figure 9-12. Parking space layout

(H1036)Road Structure Act(Earthworks, pavements and road structures)

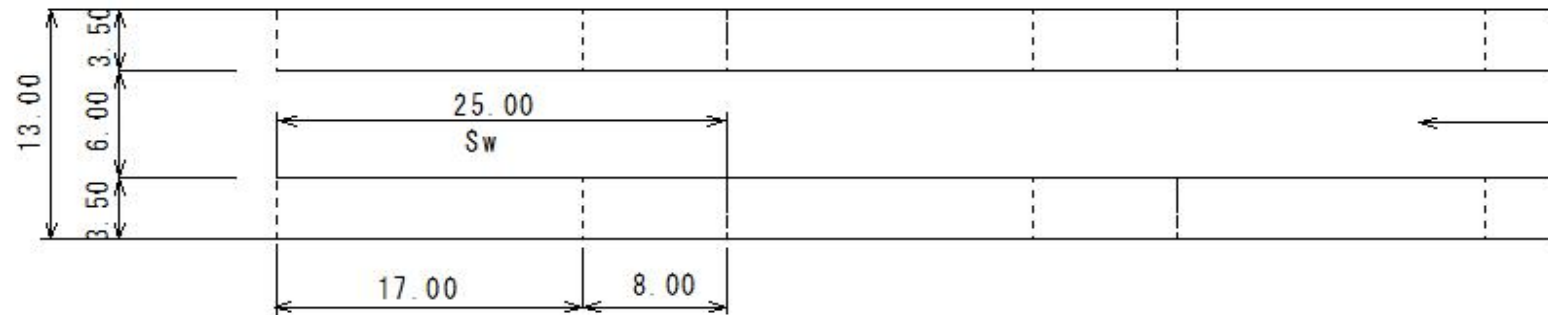
(H1036)Road Structure Act(Earthworks, pavements and road structures)

Road Structure Act

9 Road ancillary facilities

9-4 Car parking lot

9-4-1 Car parking lot



(Unit: m)

(n) Parallel parking (large special)

Figure 9-12. Parking space layout

(H1037)Road Structure Act(Earthworks, pavements and road structures)

(H1037)Road Structure Act(Earthworks, pavements and road structures)

Road Structure Act

9 Road ancillary facilities

9-4 Car parking lot

9-4-2. Bicycle parking

(1) Size of parking space

① Low arrangement: one row on one side

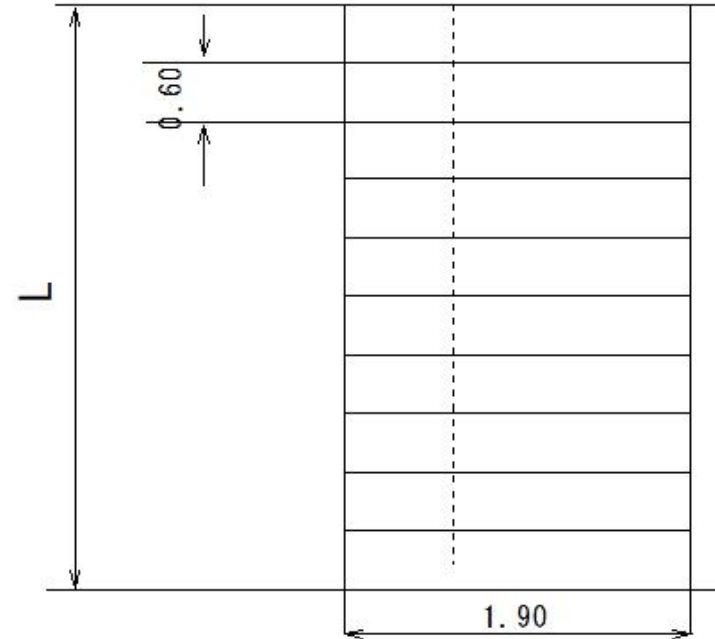
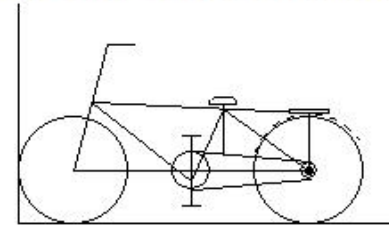


Figure 9-13. Bicycle parking methods (unit: m)

(H1038)Road Structure Act(Earthworks, pavements and road structures)

(H1038)Road Structure Act(Earthworks, pavements and road structures)

Road Structure Act

9 Road ancillary facilities

9-4 Car parking lot

9-4-2. Bicycle parking

(1) Size of parking space

② Low arrangement: 1 row on both sides

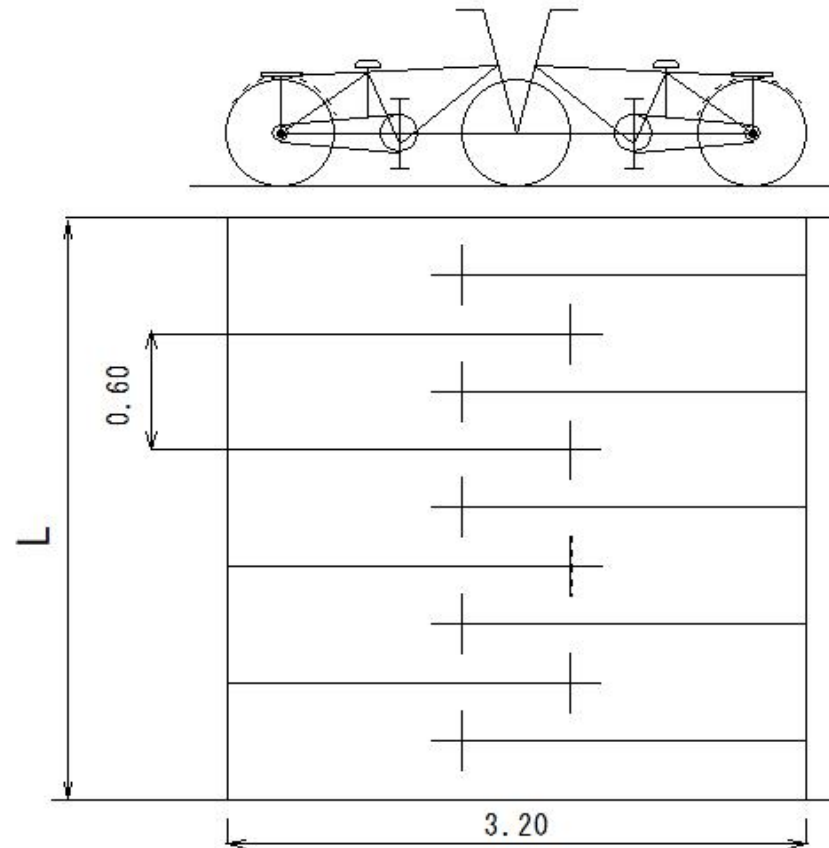


Figure 9-13. Bicycle parking methods (unit: m)

(H1039)Road Structure Act(Earthworks, pavements and road structures)

(H1039)Road Structure Act(Earthworks, pavements and road structures)

Road Structure Act

9 Road ancillary facilities

9-4 Car parking lot

9-4-2. Bicycle parking

③ High-low arrangement: 1 row on one side

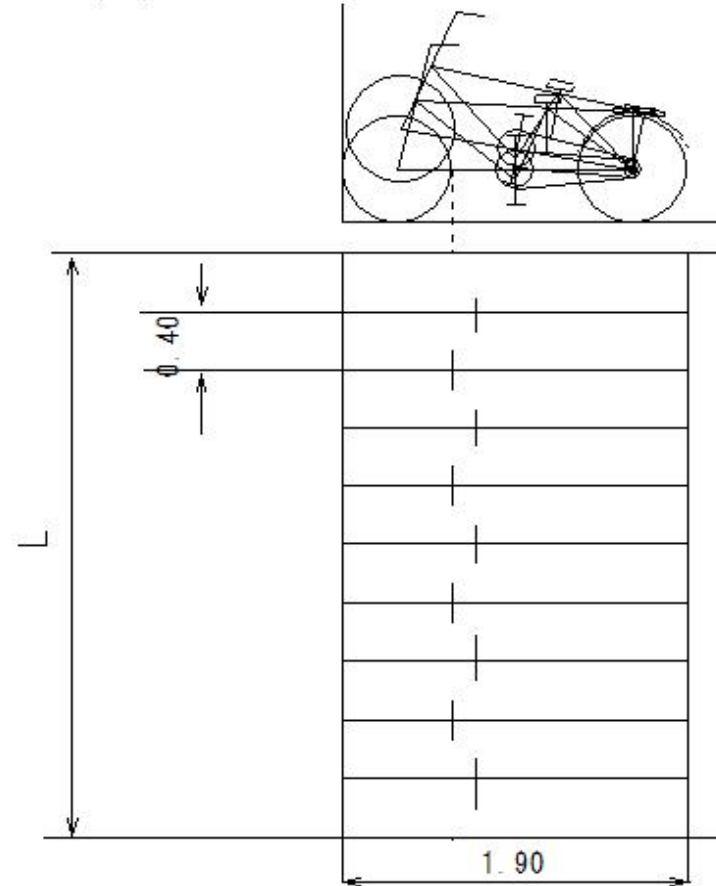


Figure 9-13. Bicycle parking methods (unit: m)

(H1040)Road Structure Act(Earthworks, pavements and road structures)

(H1040)Road Structure Act(Earthworks, pavements and road structures)

Road Structure Act

9 Road ancillary facilities

9-4 Car parking lot

9-4-2. Bicycle parking

④ Height arrangement: 1 row on both sides

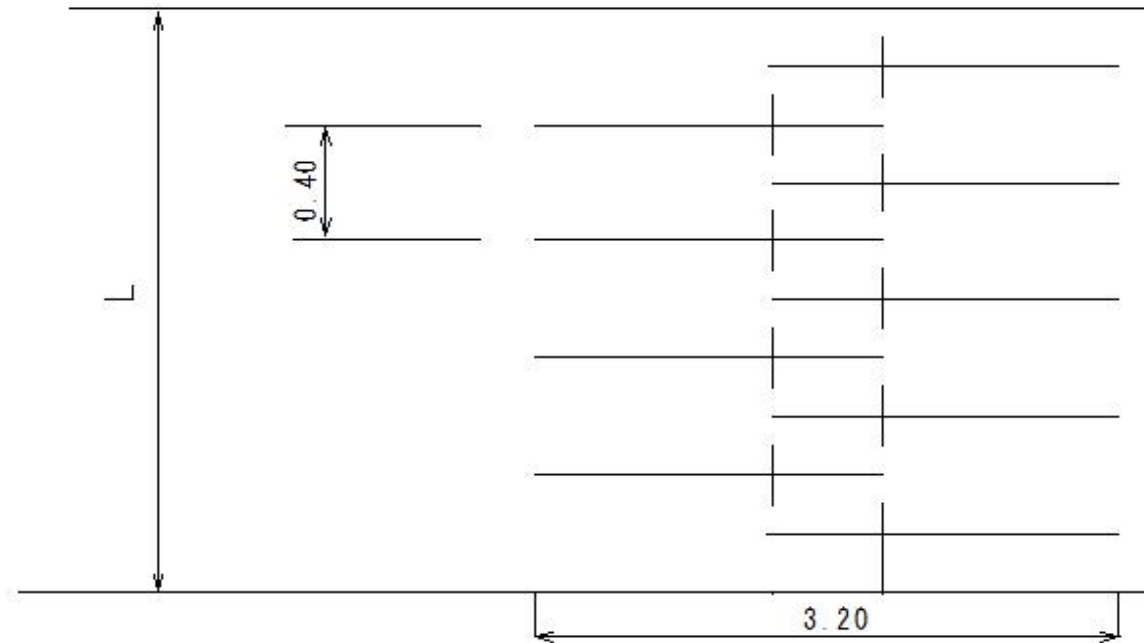
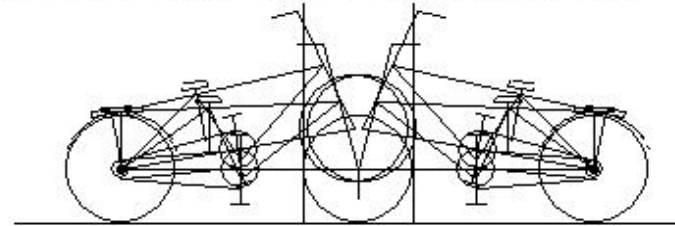


Figure 9-13. Bicycle parking methods (unit: m)

(H1041)Road Structure Act(Earthworks, pavements and road structures)

(H1041)Road Structure Act(Earthworks, pavements and road structures)

Road Structure Act

9 Road ancillary facilities

9-4 Car parking lot

9-4-2. Bicycle parking

(1) Size of parking space

⑤ Diagonal arrangement: 1 row on one side, 30°

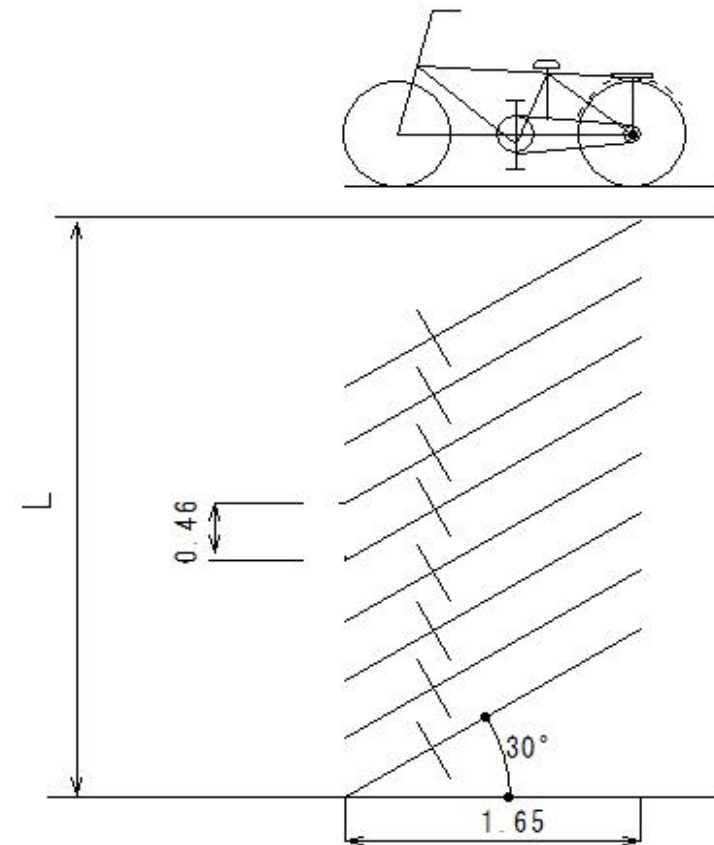


Figure 9-13. Bicycle parking methods (unit: m)

(H1042)Road Structure Act(Earthworks, pavements and road structures)

(H1042)Road Structure Act(Earthworks, pavements and road structures)

Road Structure Act

9 Road ancillary facilities

9-4 Car parking lot

9-4-2. Bicycle parking

(1) Size of parking space

⑥ Diagonal arrangement: 1 row on one side, 45°

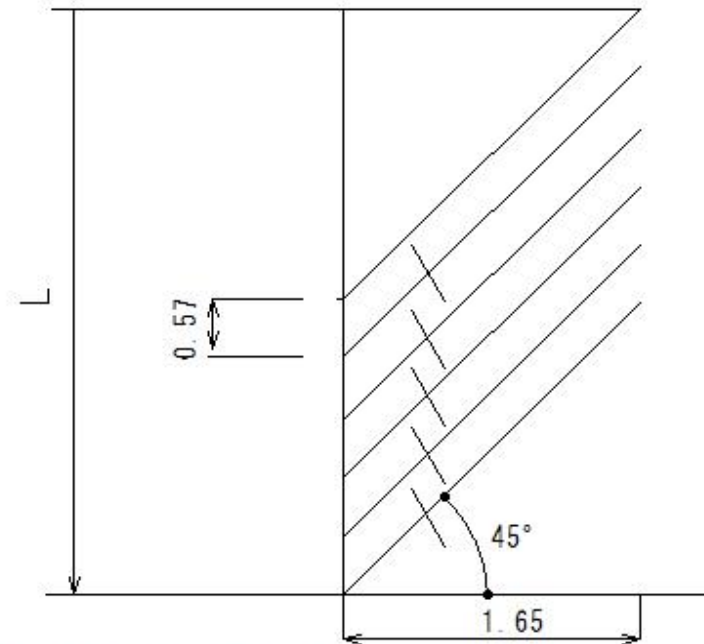
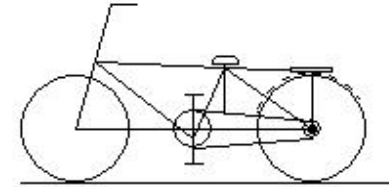


Figure 9-13. Bicycle parking methods (unit: m)

(H1043)Road Structure Act(Earthworks, pavements and road structures)

(H1043)Road Structure Act(Earthworks, pavements and road structures)

Road Structure Act

9 Road ancillary facilities

9-4 Car parking lot

9-4-2. Bicycle parking

(1) Size of parking space

Table 9-7. Standard required area
per bicycle parking space (unit: m²)

Arrangement	1 row on one side	1 row on both sides
Low arrangement	1.14	0.98
High-low arrangement 90°	0.78	0.69
Diagonal arrangement 30°	0.80	
Diagonal arrangement 45°	0.82	

(H1044)Road Structure Act(Earthworks, pavements and road structures)

(H1044) Road Structure Act (Earthworks, pavements and road structures)

Road Structure Act

9 Road ancillary facilities

9-4 Car parking lot

9-4-2. Bicycle parking

(2) Storage method

a. Main line passage type: Used when the site is rectangular

1. One-side storage

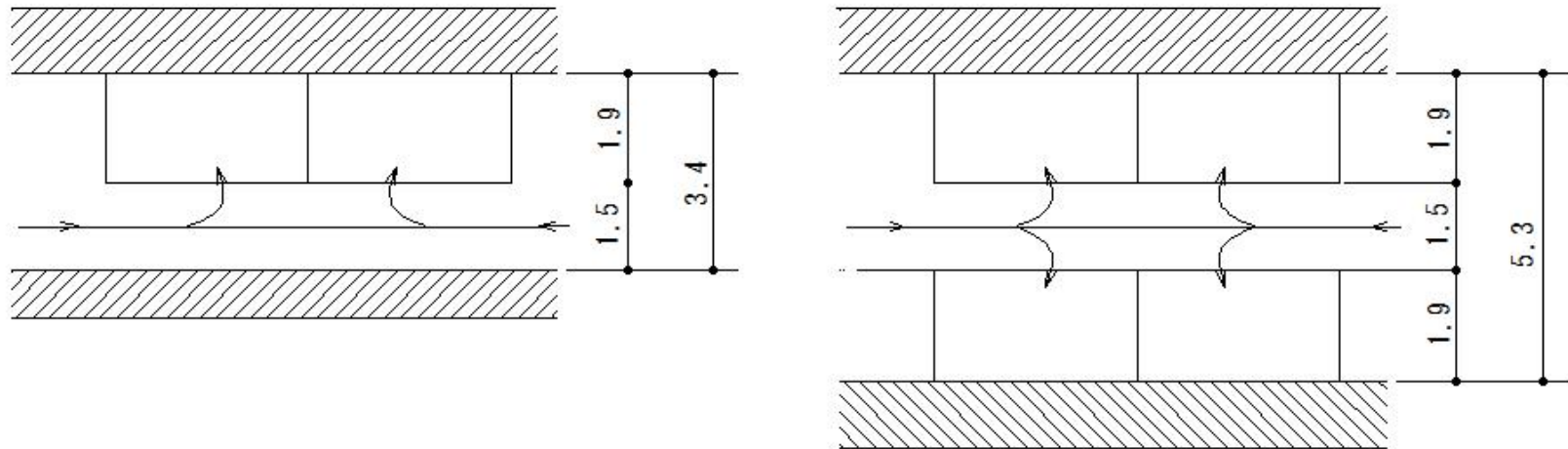


Figure 9-14. Storage method for parking spaces (main line passage type)

(H1045)Road Structure Act(Earthworks, pavements and road structures)

(H1045)Road Structure Act(Earthworks, pavements and road structures)

Road Structure Act

9 Road ancillary facilities

9-4 Car parking lot

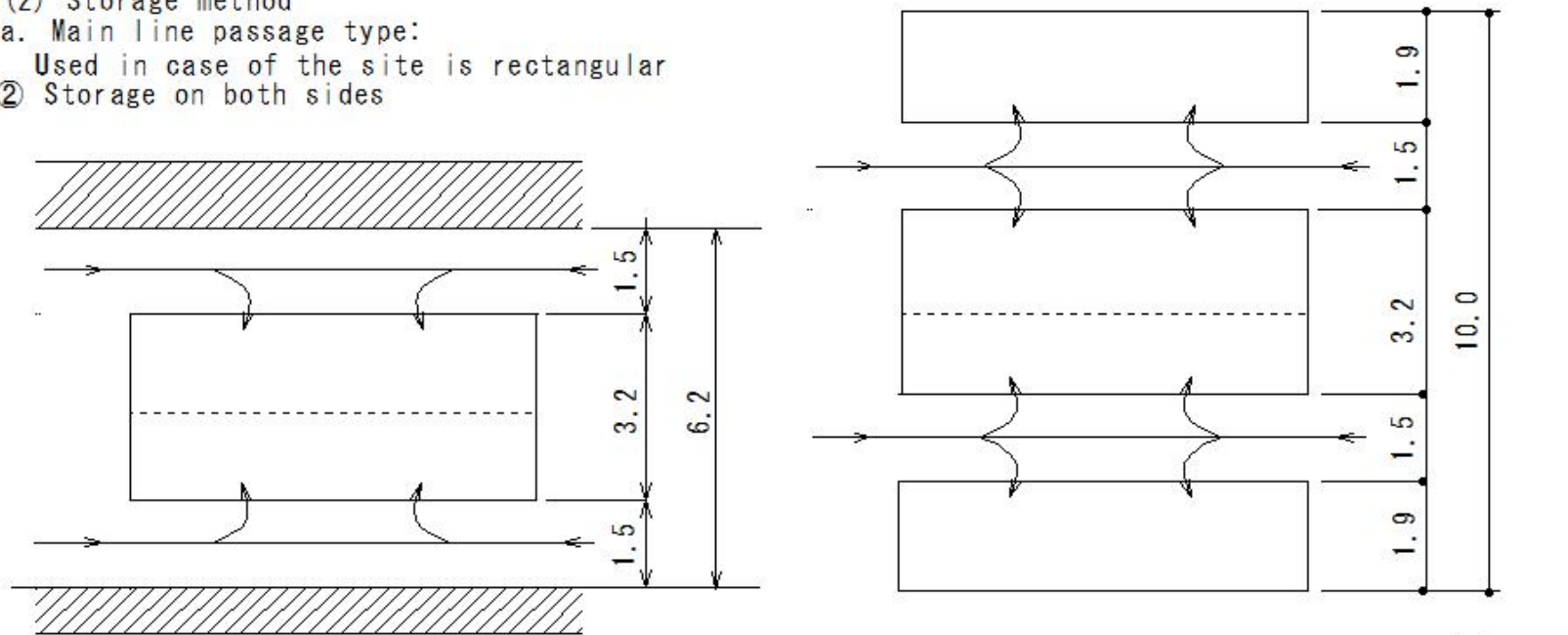
9-4-2. Bicycle parking

(2) Storage method

a. Main line passage type:

Used in case of the site is rectangular

② Storage on both sides



Unit: m

Figure 9-14. Storage method for parking spaces (main line passage type)

(H1046)Road Structure Act(Earthworks, pavements and road structures)

(H1046)Road Structure Act(Earthworks, pavements and road structures)

Road Structure Act

9 Road ancillary facilities

9-4 Car parking lot

9-4-2. Bicycle parking

(2) Storage method

b. Main line, branch passage type - used when the site is close to a square

② Storage on both sides

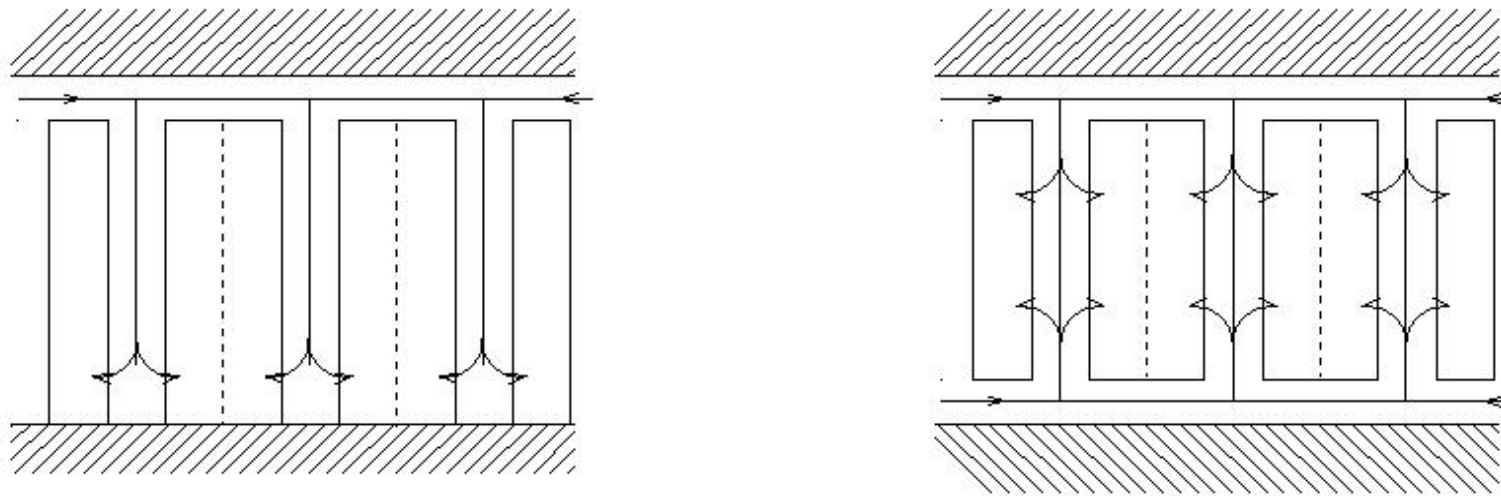


Figure 9-14. Storage method for parking spaces (main line passage type)

(H1047)Road Structure Act(Earthworks, pavements and road structures)

(H1047)Road Structure Act(Earthworks, pavements and road structures)

Road Structure Act

9 Road ancillary facilities

9-4 Car parking lot

9-4-3. Bus stops

(3) Location of bus stops

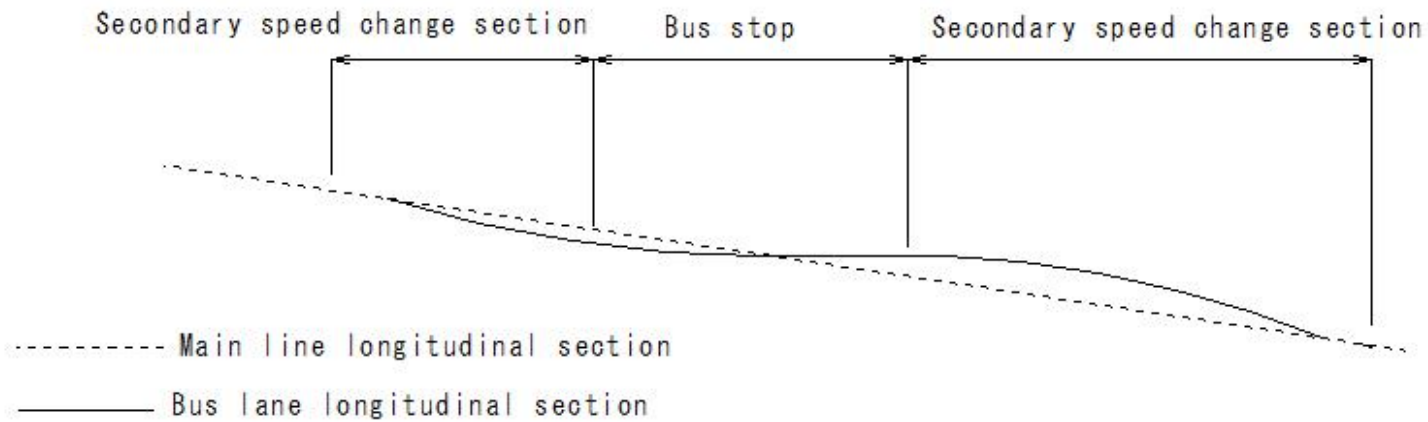


Figure 9-16. Longitudinal alignment near bus stops

(H1048)Road Structure Act(Earthworks, pavements and road structures)

(H1048)Road Structure Act(Earthworks, pavements and road structures)

Road Structure Act

9. Accessory facilities for roads

9-4. Car parking

9-4-3. Bus stops

(4) Structure of bus stops on first and second class roads

Table 9-8. Length of bus stops (first and second class)

Design speed of main line (km/h)		120	100	80	60	50
Taper length l1" (m)	l1" (m)	70	60	50	45	40
Deceleration lane length l1 (m)	l1 (m)	180	160	140	105	75
Secondary deceleration lane length l2 (m)	l2 (m)	50(40)	50(40)	40(30)	30	20
Bus stop lane length l3 (m)	l3 (m)	30(20)	30(20)	20(15)	15	15
Secondary acceleration lane length l4 (m)	l4 (m)	40(30)	40(30)	30(25)	25	20
Acceleration lane length l5 (m)	l5 (m)	220	190	160	115	70
Taper length l5" (m)	l5" (m)	70	60	50	45	40
Length of bus stop lane l (m)	l(m)	520	470	390	290	200

(H1049)Road Structure Act(Earthworks, pavements and road structures)

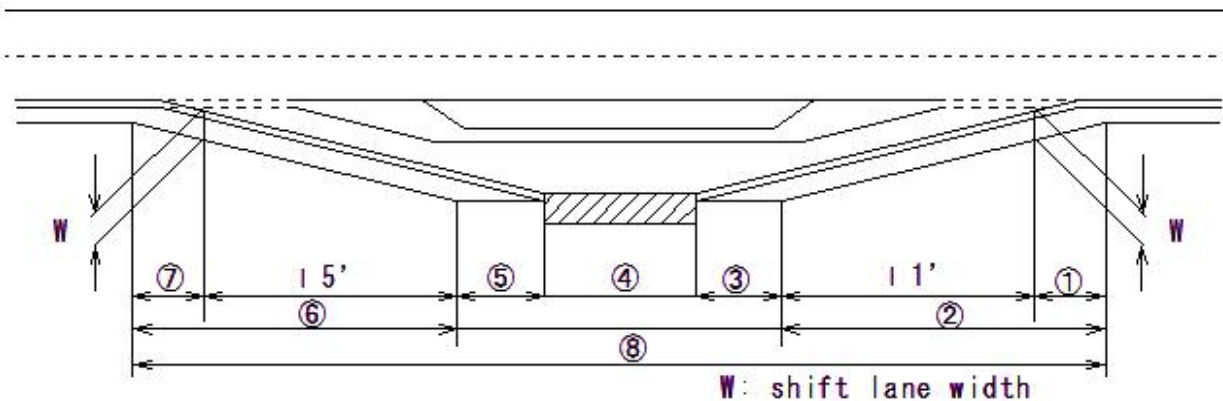
(H1049)Road Structure Act(Earthworks, pavements and road structures)

Road Structure Act

9 Road ancillary facilities

9-4 Car parking lot

(4) Structure of bus stops on first and second class roads



① Taper length 11' (m)

② Deceleration lane length 11 (m)

③ Secondary deceleration lane length 12 (m)

④ Bus stop lane length 13 (m)

⑤ Secondary acceleration lane length 14 (m)

⑥ Acceleration lane length 15 (m)

⑦ Taper length 15' (m)

⑧ Bus stop lane 1

Figure 9-17. Names of bus stop sections (first and second class roads: direct speed change lanes)

(H1050)Road Structure Act(Earthworks, pavements and road structures)

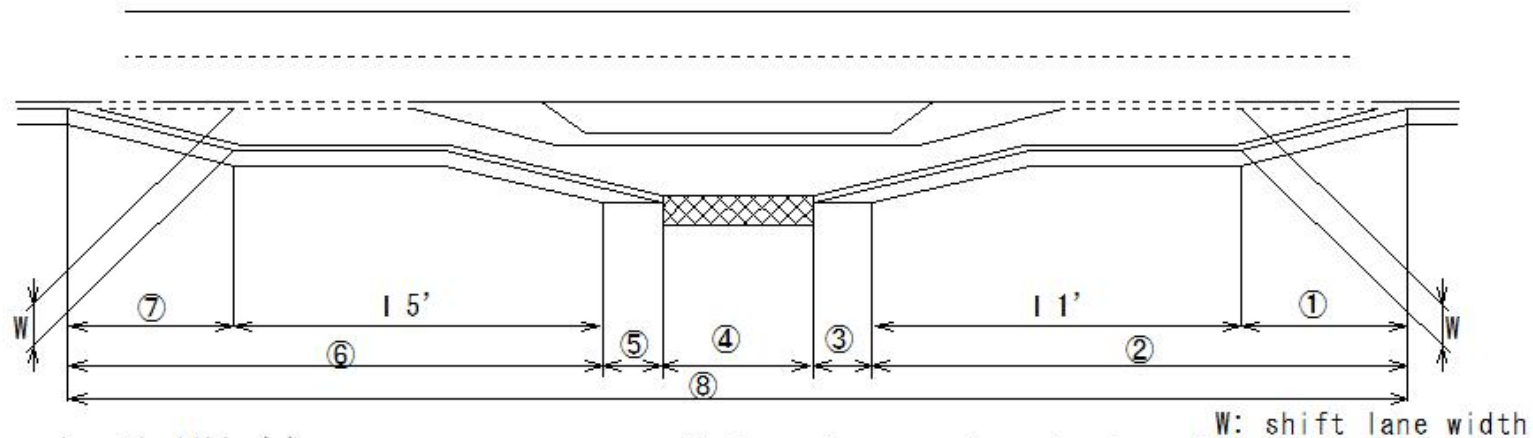
(H1050)Road Structure Act(Earthworks, pavements and road structures)

Road Structure Act

9 Road ancillary facilities

9-4 Car parking lot

(4) Structure of bus stops on first and second class roads



- ① Taper length 11' (m)
 - ② Deceleration lane length 11 (m)
 - ③ Secondary deceleration lane length 12 (m)
 - ④ Bus stop lane length 13 (m)
 - ⑤ Secondary acceleration lane length 14 (m)
 - ⑥ Acceleration lane length 15 (m)
 - ⑦ Taper length 15' (m)
 - ⑧ Bus stop lane 1
- W: shift lane width

Figure 9-17. Names of bus stop sections (first and second class roads: direct speed change lanes)

(H1051)Road Structure Act(Earthworks, pavements and road structures)

(H1051)Road Structure Act(Earthworks, pavements and road structures)

Road Structure Act

9. Accessory facilities for roads

9-4. Car parking

9-4-3. Bus stops

(5) Length of bus stops (3rd and 4th types)

Table 9-9 Length of bus stops (Type 3, Type 4)

Design speed V (km/h)	3rd type road				4th type road		
	80	60	50	40	60	50	40
Deceleration lane length I1 (m)	35(95)	25	20	20	20	15	12
Bus stop lane length I2 (m)	15	15	15	15	15	15	15
Acceleration lane length I3 (m)	40(140)	30	25	25	25	20	13
Length of bus stop lane I (m)	90(250)	70	60	60	60	50	40
Weaving length (m)	80	50	40	30	50	40	30

() indicates value in case of partial entry/exit restriction

(H1052)Road Structure Act(Earthworks, pavements and road structures)

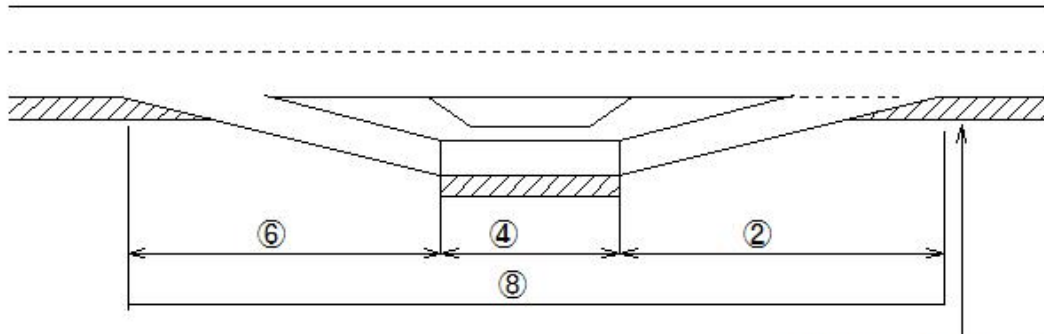
(H1052)Road Structure Act(Earthworks, pavements and road structures)

Road Structure Act

9 Road ancillary facilities

9-4 Car parking lot

(5) Length of bus stop lane (Type 3, Type 4)



in case of shoulder of bus stop lane is omitted

- ② Deceleration lane length 11 (m)
- ④ Bus stop lane length 13 (m)
- ⑥ Acceleration lane length 15 (m)
- ⑧ Bus stop lane l

Figure 9-19. Names of parts of bus stop lane (Type 3, Type 4 roads)

(H1053)Road Structure Act(Earthworks, pavements and road structures)

(H1053)Road Structure Act(Earthworks, pavements and road structures)

Road Structure Act

9 Road ancillary facilities

9-4 Car parking

9-4-4 Emergency parking lanes

(2) Layout of emergency parking lanes

Table 9-10 Installation intervals of emergency parking lanes

Road classification		Installation intervals (m)
Type 1	1st, 2nd, 3rd, 4th grade	300
Type 2	1st, 2nd grade	300
Type 3	1st grade	500
	2nd, 3rd, 4th grade	500 (only if necessary)

(H1054)Road Structure Act(Earthworks, pavements and road structures)

(H1054)Road Structure Act(Earthworks, pavements and road structures)

Road Structure Act

9. Accessory facilities for roads

9-4. Car parking

9-4-4. Emergency parking lanes

(2) Location of emergency parking lanes

Table 9-11. Coasting distance of broken-down vehicles (passenger cars)

Speed (km/h)	Coasting distance (m)	
	Uphill gradient 3%	Gradient 0%
80	450	850
70	350	700
60	300	600
50	200	400
40	100	300
30	50	150

(H1055)Road Structure Act(Earthworks, pavements and road structures)

(H1055)Road Structure Act(Earthworks, pavements and road structures)

Road Structure Act

9. Accessory facilities for roads

9-4. Car parking

9-4-4. Emergency parking lanes

(3) Dimensions of emergency parking lanes

Table 9-12 Emergency parking lane's slip-in length and effective length

Road classification		slippage length	Effective length
Type 1	1,2,3,4 grades	20	20
Type 2	1,2 grades	20	20
Type 3	1 grade	20	20
	2,3,4 grades	10	15

(H1056)Road Structure Act(Earthworks, pavements and road structures)

(H1056)Road Structure Act(Earthworks, pavements and road structures)

Road Structure Act

9 Road ancillary facilities

9-4 Car parking lot

9-4-4. Emergency parking bay

(3) Dimensions of emergency parking bay

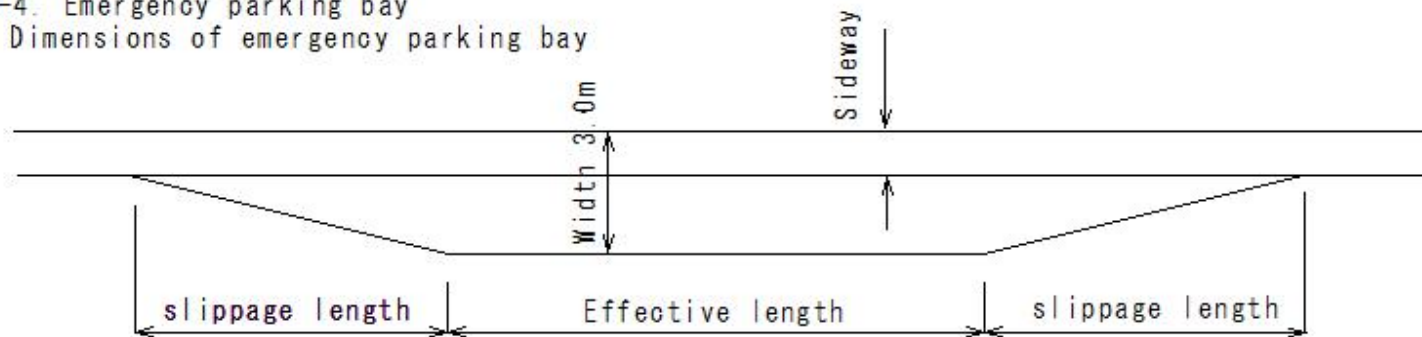


Figure 9-20. Emergency parking bay plan

(H1057)Road Structure Act(Earthworks, pavements and road structures)

(H1057)Road Structure Act(Earthworks, pavements and road structures)

Road Structure Act

9 Road ancillary facilities

9-4 Car parking lot

9-4-4. Emergency parking bay

(3) Dimensions of emergency parking bay

Table 9-13. Design vehicle length

(Unit: m)

Vehicle type	Small vehicle	Standard vehicle	Semi-trailer combination vehicle
Overall length	4.7	12.0	16.5

(H1058)Road Structure Act(Earthworks, pavements and road structures)

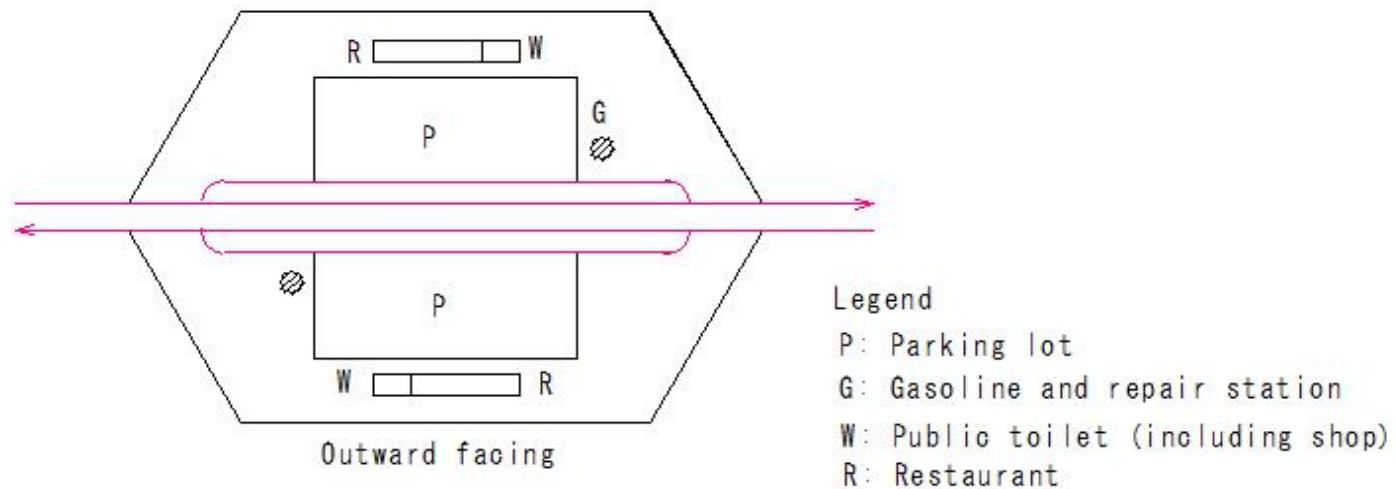
(H1058)Road Structure Act(Earthworks, pavements and road structures)

Road Structure Act

9 Road ancillary facilities

9-4 Car parking lot

9-4-5. Rest facilities



(a) Separated on both sides

Figure 9-21. Basic form of service area

(H1059)Road Structure Act(Earthworks, pavements and road structures)

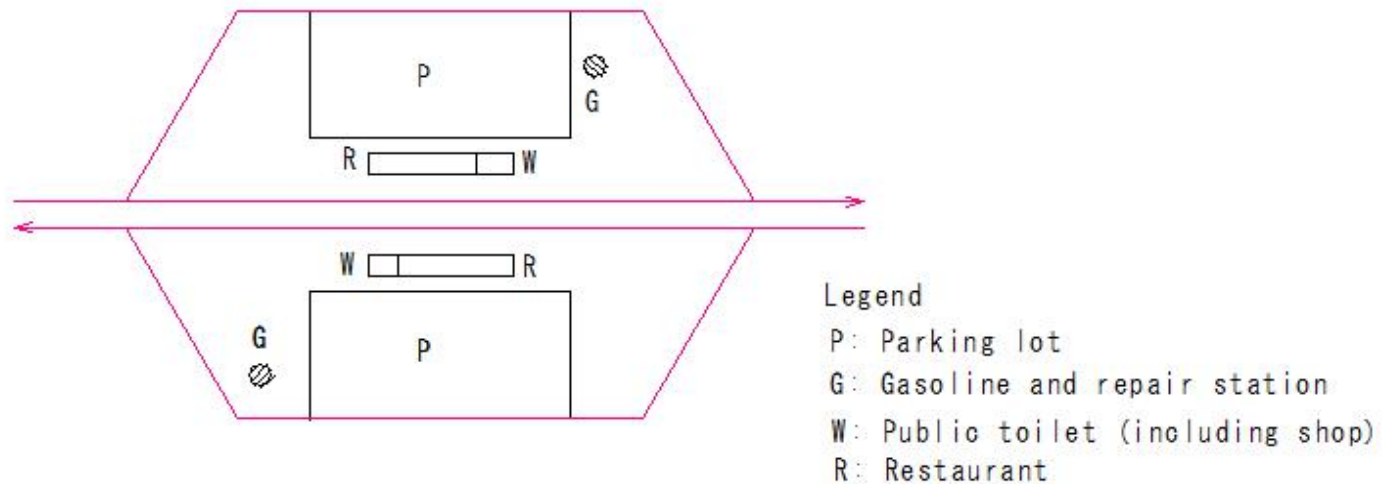
(H1059)Road Structure Act(Earthworks, pavements and road structures)

Road Structure Act

9 Road ancillary facilities

9-4 Car parking lot

9-4-5. Rest facilities



Inward-facing type

(a) Separated on both sides

Figure 9-21. Basic form of service area

(H1060)Road Structure Act(Earthworks, pavements and road structures)

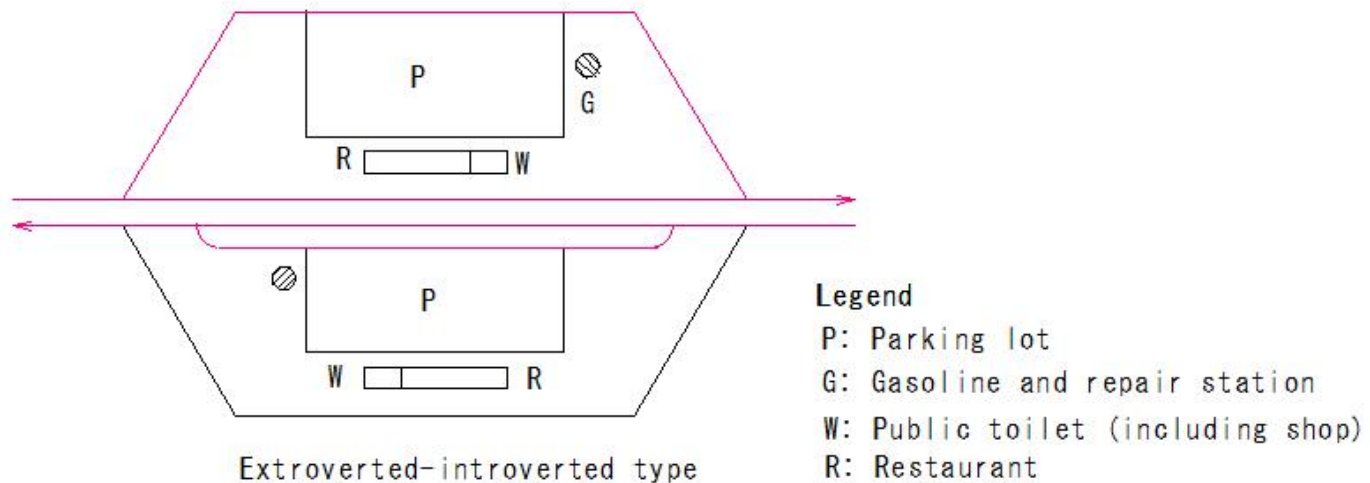
(H1060)Road Structure Act(Earthworks, pavements and road structures)

Road Structure Act

9 Road ancillary facilities

9-4 Car parking lot

9-4-5. Rest facilities



Extroverted-introverted type

(a) Separated on both sides

Figure 9-21. Basic form of service area

(H1061)Road Structure Act(Earthworks, pavements and road structures)

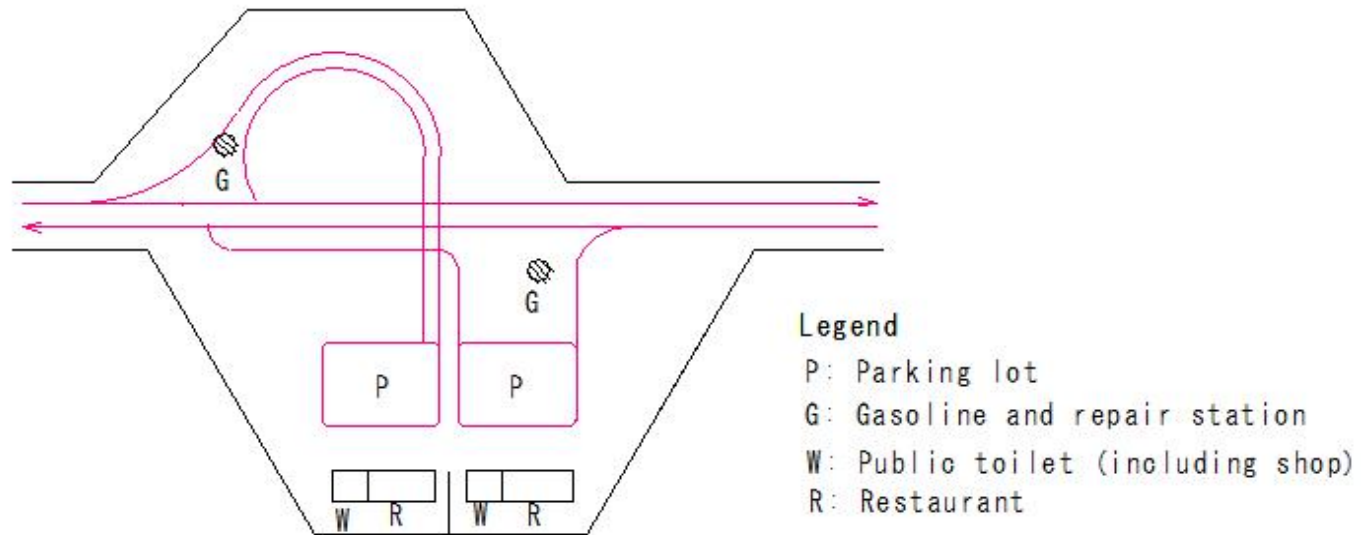
(H1061)Road Structure Act(Earthworks, pavements and road structures)

Road Structure Act

9 Road ancillary facilities

9-4 Car parking lot

9-4-5. Rest facilities



(b) One-sided aggregated type

Figure 9-21. Basic form of service area

(H1062)Road Structure Act(Earthworks, pavements and road structures)

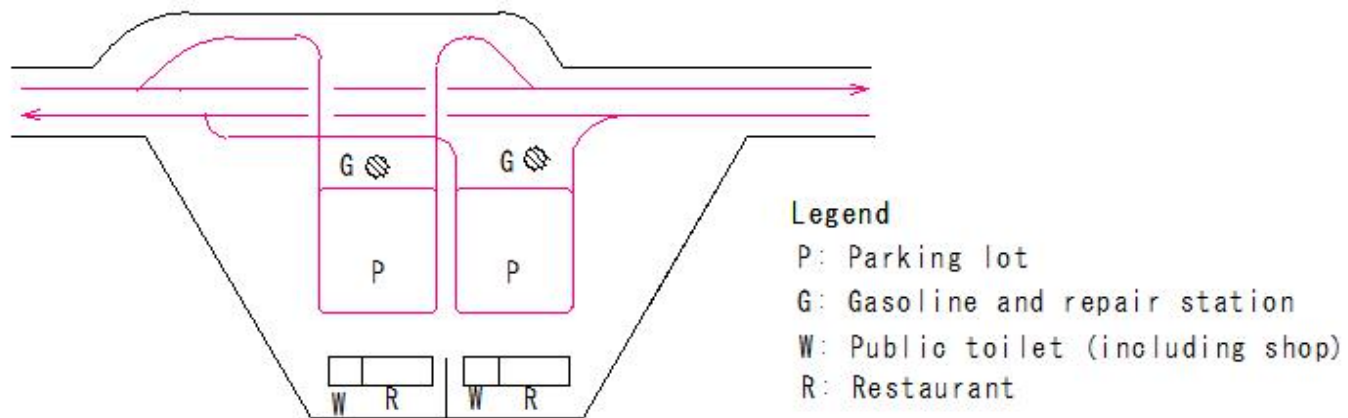
(H1062)Road Structure Act(Earthworks, pavements and road structures)

Road Structure Act

9 Road ancillary facilities

9-4 Car parking lot

9-4-5. Rest facilities



(b) One-sided aggregated type

Figure 9-21. Basic form of service area

(H1063)Road Structure Act(Earthworks, pavements and road structures)

(H1063)Road Structure Act(Earthworks, pavements and road structures)

Road Structure Act

9 Road ancillary facilities

9-4 Car parking lot

9-4-6. Emergency shelter

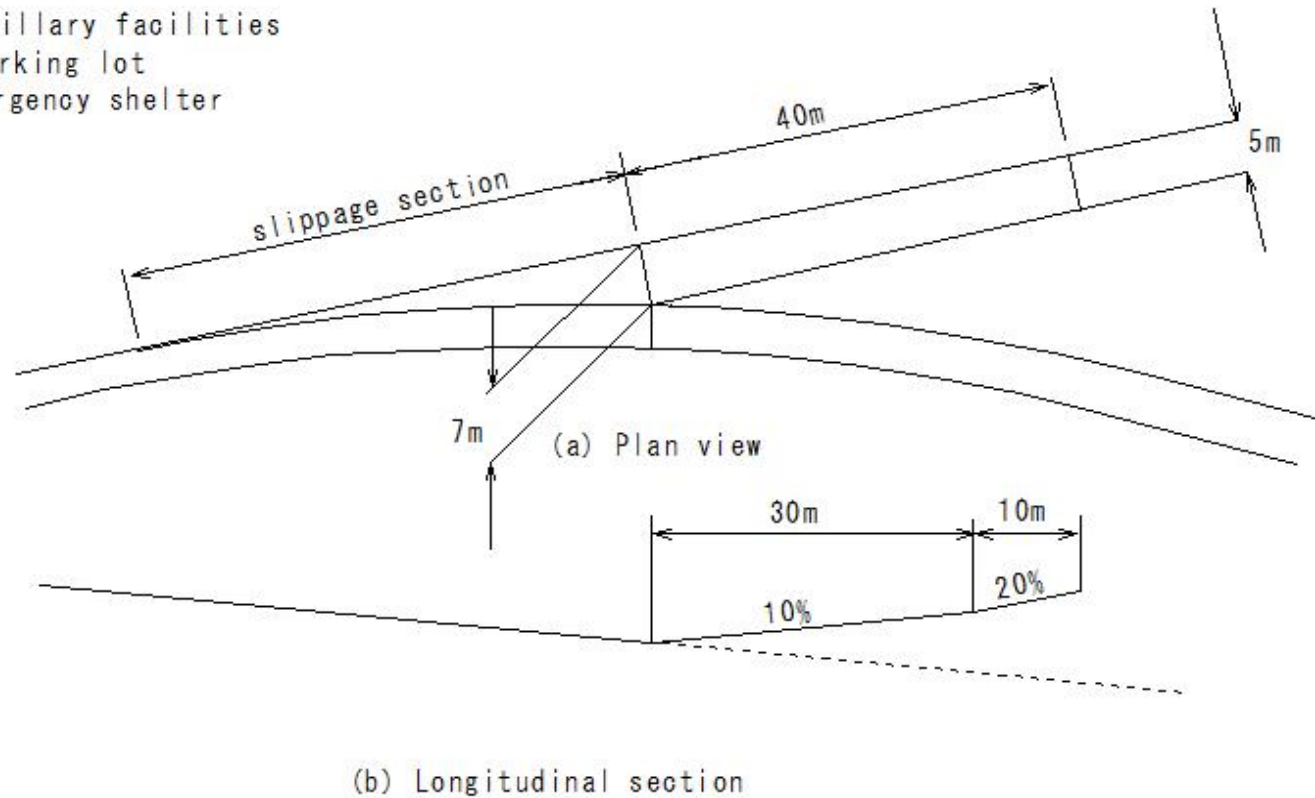


Figure 9-22. Example of emergency shelter

(H1064)Road Structure Act(Earthworks, pavements and road structures)

(H1064) Road Structure Act (Earthworks, pavements and road structures)

Road Structure Act

9 Road ancillary facilities

9-5 Snow protection facilities and snow removal/melting facilities

9-5-1 Snow protection facilities

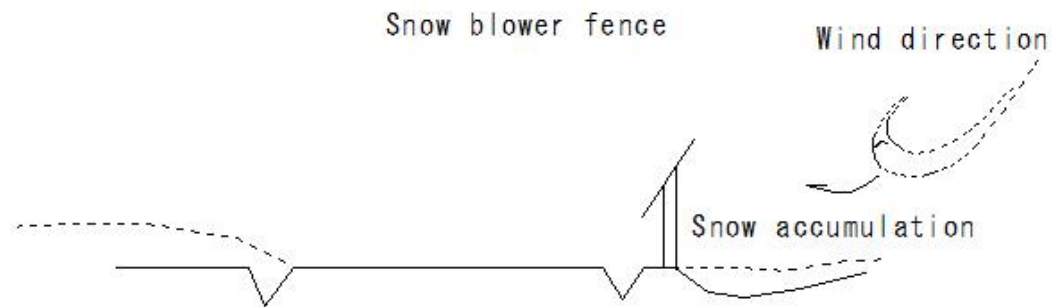


Figure 9-23 Snow blower fence

(H1065)Road Structure Act(Earthworks, pavements and road structures)

(H1065)Road Structure Act(Earthworks, pavements and road structures)

Road Structure Act

9 Road ancillary facilities

9-5 Snow protection facilities and snow removal/melting facilities

9-5-1 Snow protection facilities

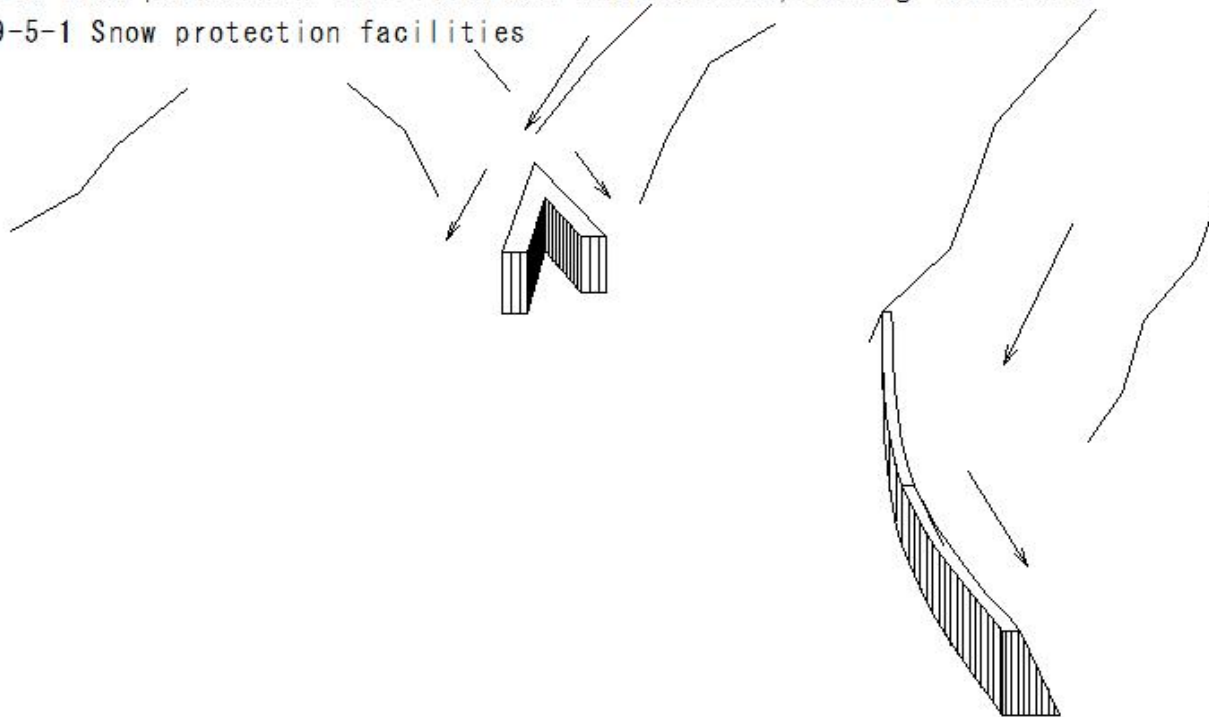


Figure 9-24 Guidance work

(H1066)Road Structure Act(Earthworks, pavements and road structures)

(H1066)Road Structure Act(Earthworks, pavements and road structures)

Road Structure Act

9 Road ancillary facilities

9-6. Protection facilities against falling rocks, etc.

9-6-1. Facilities for preventing falling rocks, etc.

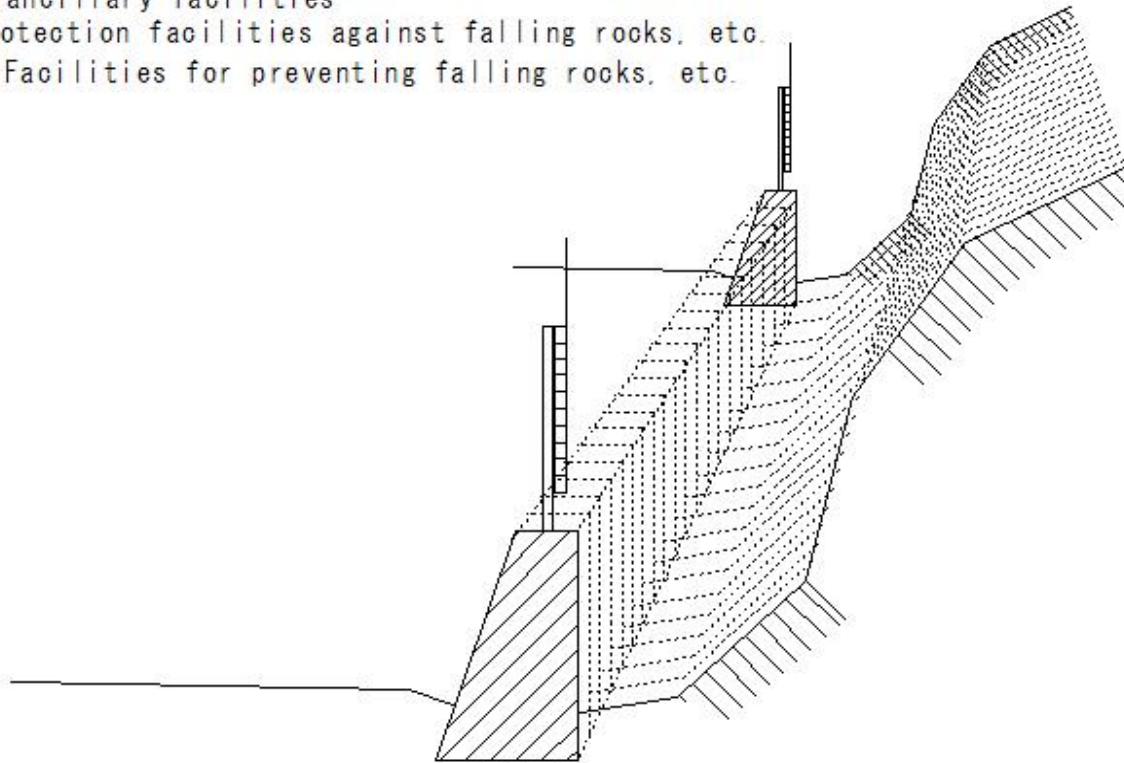


Figure 9-25. Examples of measures to prevent falling rocks

(H1067)Road Structure Act(Earthworks, pavements and road structures)

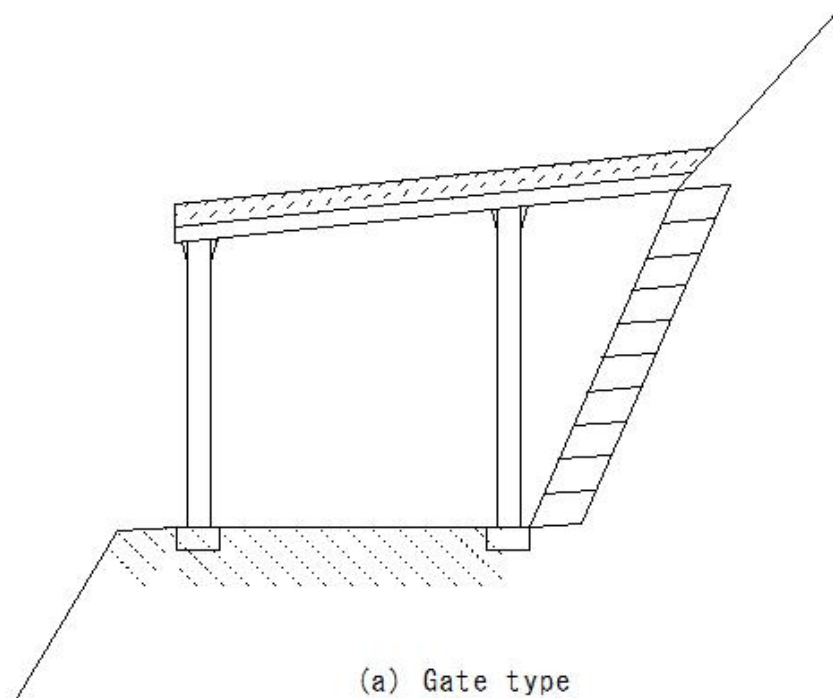
(H1067)Road Structure Act(Earthworks, pavements and road structures)

Road Structure Act

9 Road ancillary facilities

9-6. Protection facilities against falling rocks, etc.

9-6-1. Facilities for preventing falling rocks, etc.



(a) Gate type

Figure 9-26. Examples of falling rock covers

(H1068)Road Structure Act(Earthworks, pavements and road structures)

(H1068)Road Structure Act(Earthworks, pavements and road structures)

Road Structure Act

9 Road ancillary facilities

9-6. Protection facilities against falling rocks, etc.

9-6-1. Facilities for preventing falling rocks, etc.

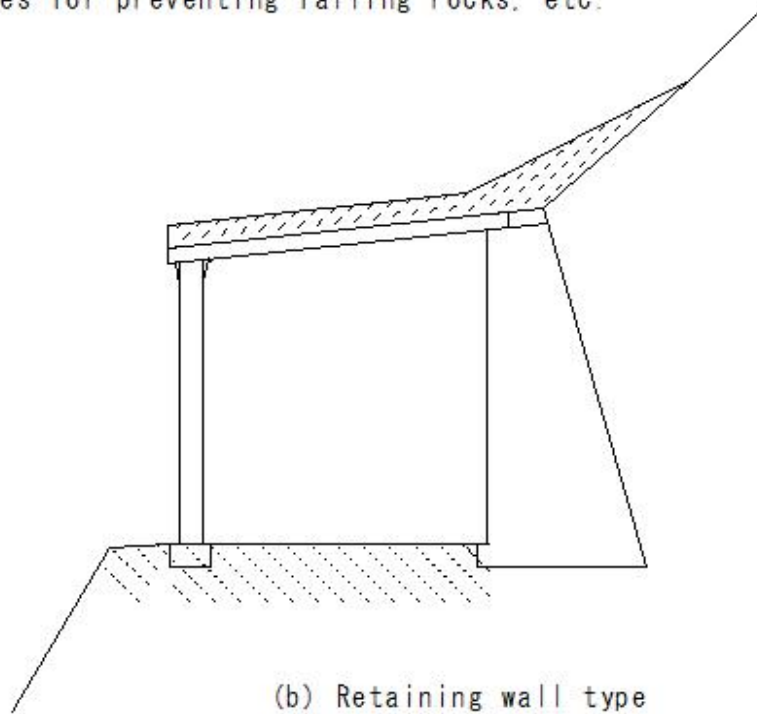


Figure 9-26. Examples of falling rock covers

(H1069)Road Structure Act(Earthworks, pavements and road structures)

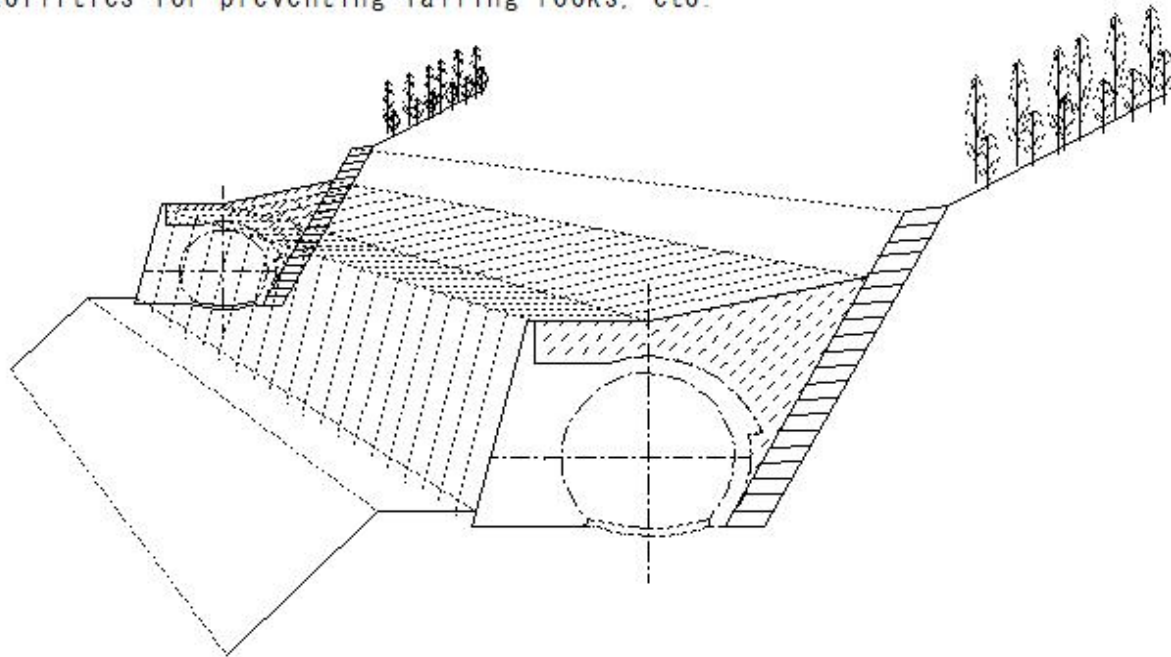
(H1069)Road Structure Act(Earthworks, pavements and road structures)

Road Structure Act

9 Road ancillary facilities

9-6. Protection facilities against falling rocks, etc.

9-6-1. Facilities for preventing falling rocks, etc.



(c) Tunnel type

Figure 9-26. Examples of falling rock covers

(H1070)Road Structure Act(Earthworks, pavements and road structures)

(H1070)Road Structure Act(Earthworks, pavements and road structures)

Road Structure Act

9 Road ancillary facilities

9-6. Protection facilities against falling rocks, etc.

9-6-2 Wave breakers, sand control facilities, etc.

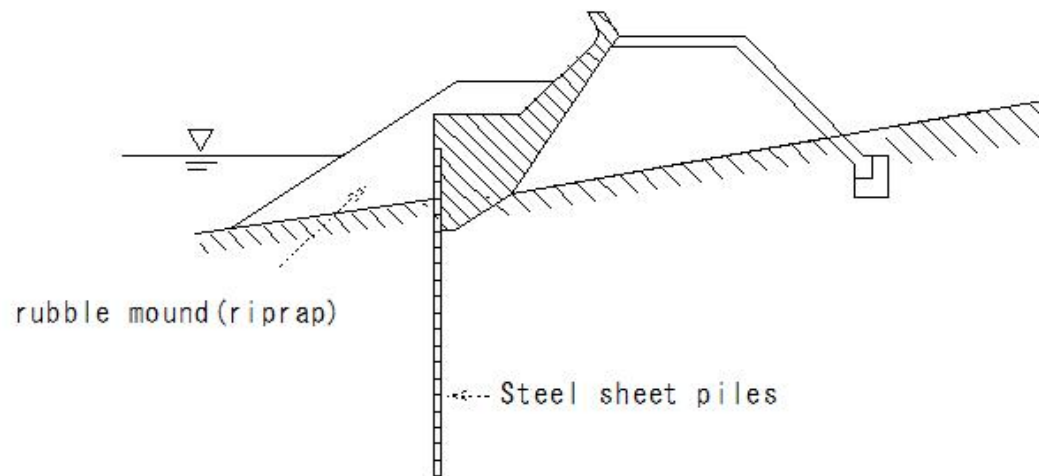


Figure 9-27 Wave breakers

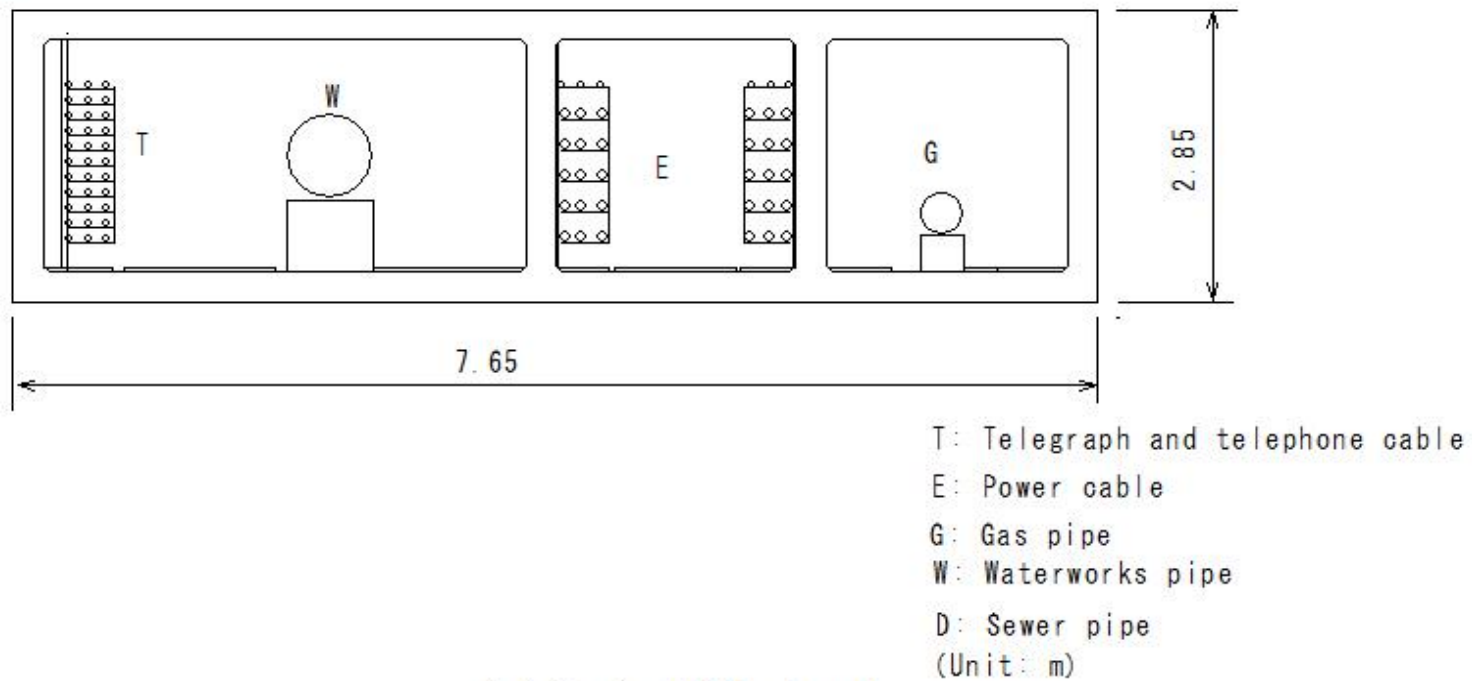
(H1071)Road Structure Act(Earthworks, pavements and road structures)

(H1071)Road Structure Act(Earthworks, pavements and road structures)

Road Structure Act

9 Road ancillary facilities

9-7 Utility tunnel



(a) Trunk utility tunnel

Figure 9-28 Example of utility tunnel

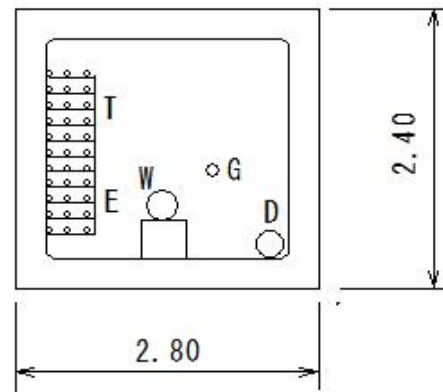
(H1072)Road Structure Act(Earthworks, pavements and road structures)

(H1072)Road Structure Act(Earthworks, pavements and road structures)

Road Structure Act

9 Road ancillary facilities

9-7 Utility tunnel



T: Telegraph and telephone cable

E: Power cable

G: Gas pipe

W: Waterworks pipe

D: Sewer pipe

(Unit: m)

(b) Supply pipe utility duct

Figure 9-28 Example of utility tunnel

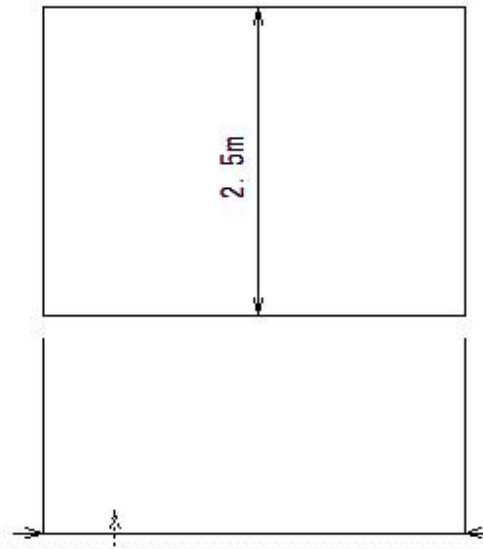
(H1073)Road Structure Act(Bicycle-only roads, etc.)

(H1073)Road Structure Act(Bicycle-only roads, etc.)

Road Structure Act

10 Bicycle-only roads and other pedestrian-only roads

10-1 Bicycle-only roads, etc.



Bicycle-only roads or bicycle-pedestrian-only roads (excluding areas necessary for establishing road facilities)

(H1074)Road Structure Act(Bicycle-only roads, etc.)

(H1074)Road Structure Act(Bicycle-only roads, etc.)

Road Structure Act

10 Bicycle-only roads and other pedestrian-only roads

10-1 Bicycle-only roads, etc.

10-1-2 Width and construction limits of bicycle-only roads, etc.

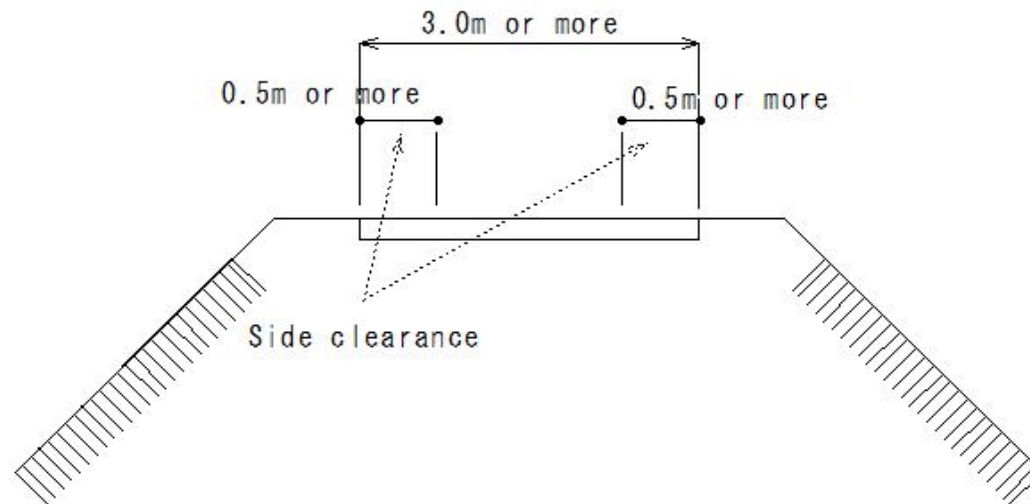


Figure 10-1 Width and construction limits of bicycle-only roads, etc.

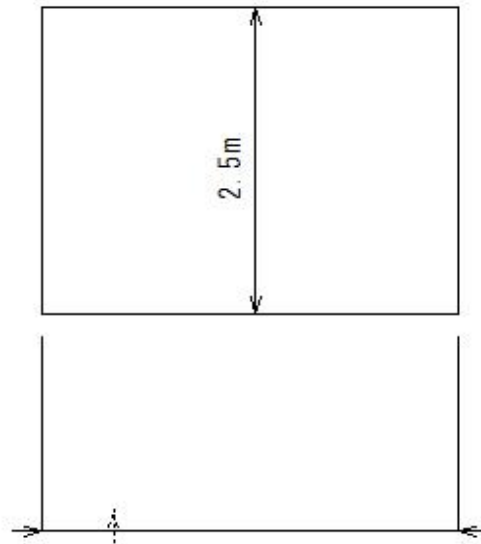
(H1075)Road Structure Act(Bicycle-only roads, etc.)

(H1075)Road Structure Act(Bicycle-only roads, etc.)

Road Structure Act

10 Bicycle-only roads and other pedestrian-only roads

10-2 Pedestrian-only roads



Pedestrian-only roads (excluding areas necessary for providing road facilities)