



**COUNTY OF LOS ANGELES  
DEPARTMENT OF PUBLIC WORKS  
BUILDING AND SAFETY DIVISION**

**COMMERCIAL  
ACCESSIBILITY  
PLAN REVIEW LIST**

**GENERAL PROJECT INFORMATION**

PLAN CHECK NO. \_\_\_\_\_ DISTRICT NO \_\_\_\_\_  
JOB ADDRESS \_\_\_\_\_ CITY \_\_\_\_\_ ZIP \_\_\_\_\_

NOTE: Numbers in the parenthesis ( ) refer to sections of the 2011 edition of the Los Angeles County Building Code, Table (T) & Building Code Manual (BCM).

**INSTRUCTIONS**

- Corrections with circled item numbers apply to this plan check.
- In the left-hand margin of the circled corrections, please indicate the sheet number and detail or note number on the plans where the corrections are made. Resubmit marked original plans and two corrected sets of plans, calculations and this plan review list.
- Incomplete, unclear, or faded drawings or calculations will not be accepted.
- Incorporate all comments as marked on checked set of plans and calculations and these correction sheets.

**SITE DEVELOPMENT & ACCESSIBLE ROUTE OF TRAVEL**

1. Accessible Route of Travel is defined as “a continuous unobstructed path connecting all accessible elements and spaces in an accessible building or facility that can be negotiated by a person with a disability using a wheelchair and that is also safe for and usable by persons with other disabilities, and that is consistent with the definition of “Path of travel”. (1102B)
2. Site development and grading shall be designed to provide access to all entrances and exterior ground floor exits, and access to normal paths of travel, and where necessary to provide access, shall incorporate pedestrian ramps, curb ramps, etc. (1127B.1)
3. At least one accessible route within the boundary of the site shall be provided from public transportation stops, accessible parking and accessible passenger loading zones and public streets or sidewalks to the accessible building entrance they serve. The accessible route shall, to the maximum extent feasible, coincide with the route for the general public. (1114B.1.2)
4. The accessible route of travel shall be the most practical direct route between accessible building entrances, accessible site facilities, and the accessible entrance to the site. If access is provided for pedestrians from a pedestrian tunnel or elevated walkway, entrances to the building from each tunnel or walkway must be accessible. (1127B.1)
5. When more than one building or facility is located on a site, accessible routes of travel complying with Section 1114B.1.2 shall be provided between buildings and accessible site facilities, accessible elements, and accessible spaces that are on the same site. (1127B.1)
6. When a building or portion of a building is required to be accessible or adaptable, an accessible route of travel complying with Sections 1102B, 1114B, 1124B, 1133B.3, 1133B.5, 1133B.7 and 1133B.8.6 shall be provided to all portions of the building, to accessible building entrances, and between the building and the public way. All walks, halls, corridors, aisles, skywalks, tunnels and other spaces that are part of an accessible route shall comply with the applicable provisions of the code. (1114B.1.2)
7. Except within an individual dwelling unit, an accessible route of travel shall not pass through kitchens, storage rooms, restrooms, closets or other spaces used for similar purposes. (1114B.1.2)
8. At least one accessible route shall connect the following: (1114B.1.2)
  - a. Accessible buildings, facilities, elements, and spaces that are on the same site.
  - b. Accessible building or facility entrances with all accessible spaces and elements and with all accessible dwelling units within the building or facility.
  - c. The accessible route shall, to the maximum extent feasible coincide with the route for the general public.
  - d. Accessible entrance of each accessible dwelling unit with those exterior and interior spaces and facilities that serve the accessible dwelling unit.

9. Where more than one route of travel is provided, all routes shall be accessible. Unless otherwise indicated, the minimum clear width of an accessible route shall not be less than 36 inches except at doors complying with Section 1133B.2 or obstructions complying with Figure 11B-10. If a person in a wheelchair must make a turn around an obstruction the minimum clear width of the accessible route shall be as shown in Figure 11B-5E(a) and (b). (1114B.1.2)

**ACCESSIBLE PARKING**

Note: when provided, vehicle charging stations and spaces shall be made accessible.

10. Each lot or parking structure where parking is provided for the public as clients, guests, or employees, shall provide accessible parking as required by Section 1129B. (1129B.1)
11. Provide disabled parking spaces as required by Table 11B-6 for \_\_\_\_\_ parking lot/structure. (1129B.1)

Total # of parking spaces provided	Minimum # of accessible spaces required
1-25	1
26-50	2
51-75	3
76-100	4
101-150	5
151-200	6
201-300	7
301-400	8
401- 500	9
501-1000	2% of total
1001 & over	20 plus one for each 100 or fraction thereof over 1,001

12. At facilities providing medical care and other services for persons with mobility impairments, parking spaces complying with Section 1129B shall be provided in accordance with Table 11B-6, except as follows: (1129B.2)
- a. Outpatient units and facilities: 10 percent of the total number of parking spaces provided serving each such outpatient unit or facility. (1129B.2.1)
- b. Units and facilities that specialize in treatment or services for persons with mobility impairments: 20 percent of the total number of parking spaces provided serving each such unit or facility. (1129B.2.2)

13. Accessible parking spaces serving a particular building shall be located on the shortest accessible route of travel from adjacent parking to an accessible entrance (as near as practical to an accessible entrance). (1129B.1)
14. In parking facilities that do not serve a particular building, accessible parking shall be located on the shortest accessible route of travel to an accessible pedestrian entrance of the parking facility. (1129B.1)
15. In buildings with multiple accessible entrances with adjacent parking, accessible parking spaces shall be dispersed and located closest to the accessible entrances. (1129B.1)
16. Where single accessible parking spaces are provided, they shall be 14 feet wide and lined to provide a 9-foot parking area and a 5-foot loading and unloading access aisle on the passenger side of the vehicle. The words "NO PARKING" shall be painted on the ground within each 5-foot loading and unloading access aisle. This notice shall be painted in white letters not less than 12 inches high and located so that it is visible to traffic enforcement officials. (1129B.3.1, Fig 11B-18B)
17. When more than one accessible parking space is provided in lieu of providing a 14-foot-wide space for each parking space, two spaces can be provided within a 23-foot-wide area lined to provide a 9-foot parking area on each side of a 5-foot loading and unloading access aisle in the center. The words "NO PARKING" shall be painted on the ground within each 5-foot loading and unloading access aisle. This notice shall be painted in white letters not less than 12 inches high and located so that it is visible to traffic enforcement officials. (1129B.3.1, Fig 11B-18A & 18C)
18. One in every eight accessible spaces, but not less than one, shall be served by an access aisle 96 inches wide minimum placed on the side opposite the driver's side when the vehicle is going forward into the parking space and shall be designated "van accessible". All such spaces may be grouped on one level of a parking structure. (1129B.3.2, Fig. 11B-18A, 18B, & 18C)
19. The minimum length of an accessible parking space shall be 18 feet. (1129B.3.1, Fig 11B-18A, 18B, & 18C)
20. Accessible parking spaces shall be located so persons with disabilities are not compelled to wheel or walk behind parking spaces other than their own accessible parking spaces. (1129B.3.3)
21. Ramps shall not encroach into any accessible parking space or the adjacent access aisle. (1129B.3.3)
22. Surface slopes of accessible parking spaces and access aisles shall be the minimum possible and shall not exceed one unit vertical in 50 units horizontal (2 percent slope) in any direction. (1129B.3.4)
23. In each parking area, a bumper or curb shall be provided if required to prevent encroachment of cars over the required width of walkways. (1129B.3.3, Fig 11B-18A, 18B, & 18C)

24. Pedestrian ways which are accessible to people with disabilities shall be provided from each such parking space to related facilities, including curb cuts or ramps as needed. (1129B.3.3, Fig 11B-18A, 18B, & 18C)
25. Provide minimum vertical clearance of 8 feet 2 inches at accessible parking spaces and along at least one vehicle access route to such spaces from site entrances and exits. (1129B.3.5)
26. Each parking space reserved for persons with disabilities shall be identified by a reflectorized sign permanently posted immediately adjacent to and visible from each stall or space, consisting of the International Symbol of Accessibility in white on a dark blue background. The sign shall not be smaller than 70 square inches in area and, when in a path of travel, shall be posted at a minimum height of 80 inches from the bottom of the sign to the parking space finished grade. Signs to identify accessible parking spaces may be centered on a wall at the interior end of the parking space. (1129B.4, Fig 11B-18A, 18B, & 18C)
27. An additional sign or additional language below the symbol of accessibility shall state "Minimum Fine \$250." (1129B.4)
28. Van accessible parking spaces shall have an additional sign or additional language stating "Van Accessible" below the symbol of accessibility.(1129B.4)
29. An additional sign shall also be posted in a conspicuous place at each entrance to off-street parking facilities, or immediately adjacent to and visible from each accessible stall or space. The sign shall be not less than 17 inches by 22 inches in size with 1 inch high minimum lettering, which clearly and conspicuously states the following: (1129B.4)
 

"Unauthorized vehicles parked in designated accessible spaces not displaying distinguishing placards or special license plates issued for persons with disabilities will be towed away at the owner's expense. Towed vehicles may be reclaimed at \_\_\_\_\_ or by telephoning \_\_\_\_\_" (Blank spaces are to be filled in with appropriate information as a permanent part of the sign.)
30. The surface of each accessible parking space or stall shall have a surface identification duplicating either of the following schemes: (1129B.4, Fig 11B-18A, 18B, & 18C)
  - a. By outlining or painting the stall or space in blue and outlining on the ground in the stall or space in white or suitable contrasting color a profile view depicting a wheelchair with occupant; OR
  - b. By outlining a profile view of a wheelchair with occupant in white on blue background. The profile view shall be located so that it is visible to a traffic enforcement officer when a vehicle is properly parked in the space and shall be 36 inches high by 36 inches wide.
31. All entrances to and vertical clearances within parking structures shall comply with Section 1129B.3, Item 5 where required for accessibility to accessible parking spaces. (1130B.1)

32. When direct access is provided for pedestrians from a parking garage to a building, each direct entrance from the garage to the building must accessible. (1130B.2)

### **PASSENGER DROP-OFF & LOADING ZONES**

33. When provided, passenger drop-off and loading zones shall be located on an accessible route of travel. (1131B.1)
34. Where provided, one passenger drop-off and loading zone shall provide an access aisle at least 60 inches wide and 20 feet long adjacent and parallel to the vehicle pull-up space. Vehicle standing spaces and access aisles shall be level with surface slopes not exceeding one unit vertical in 50 units horizontal (2 percent slope) in all directions. If there are curbs between the access aisle and the vehicle pull-up space, then a curb ramp shall be provided. (1131B.2.1, Fig 11B-24)
35. Provide minimum vertical clearance of 114 inches at accessible passenger loading zones and along at least one vehicle access route to such areas from site entrances and exits. (1131B.2.2)
36. Valet parking facilities shall provide a passenger loading zone complying with Section 1131B.2 and shall be located on an accessible route of travel to the entrance of the facility. The parking space requirements of Section 1129B through 1130B apply to facilities with valet parking. (1131B.3)
37. Where provided, bus stop pads shall have a firm, stable surface with a minimum clear length of 96 inches (measured from the curb or roadway edge) and a minimum clear width of 60 inches (measured parallel to the vehicle roadway) to the maximum extent allowed by legal or site constraints. Bus stop pads shall connect to streets, sidewalks or pedestrian paths as part of an accessible route. Newly constructed bus stop pads must provide a square curb surface between the pad and the road or other detectable warning approved by Department of State Architect in accordance with Section 1133B.8.5. Bus stop pads shall be at the same slope as the roadway in the direction parallel to roadway and a maximum one unit vertical in 50 units horizontal (2 percent slope) perpendicular to roadway. (1121B.2.1)
38. Where provided, bus stop shelters shall be installed so as to permit a wheelchair user to enter the shelter from the public way and access a clear floor area of 30 inches by 48 inches, completely within the shelter. Such shelters shall be connected by an accessible route to the boarding area. (1121B.2.1)

### **WALKS & SIDEWALKS**

39. Walks and sidewalks subject to these regulations shall have a continuous common surface, not interrupted by steps or by abrupt changes in level exceeding ½ inch. (1133B.7.1)
40. Walks and sidewalks shall be 48 inches minimum in width. (1133B.7.1, Fig 11B-27(a))

41. Changes in level up to ¼ inch may be vertical and without edge treatment. (1124B.2)
42. Changes in level between ¼ inch and ½ inch shall be beveled with a slope no greater than one unit vertical in 2 units horizontal (50 percent slope). (1124B.2)
43. Changes in level greater than ½ inch shall be accomplished by means of a curb ramp, ramp, or elevator that complies with Section 1127B.5, 1133B.5, or 1116B.1, respectively. (1124B.2)
44. Walk and sidewalk surfaces shall be slip-resistant as follows: (1133B.7.1)
  - a. Surfaces with less than 6 percent slope shall be at least a slip -resistant as that described as a medium salted finish. (1133B.7.1.1)
  - b. Surfaces with a 6 percent or greater slope shall be slip-resistant. (1133B.7.1.2)
45. When the slope in the direction of travel of any walk exceeds one unit vertical in 20 units horizontal (5 percent slope), it shall comply with the provisions of Section 1133B.5. (1133B.7.3)
46. Walk and sidewalk surface cross slopes shall not exceed one unit vertical in 50 units horizontal (2 percent slope). (1133B.7.1.3)
47. All walks with continuous gradients shall have level areas at least 5 feet in length at intervals of 400 feet maximum. (1133B.7.5)
48. Walks, sidewalks, and pedestrian ways shall be free of gratings whenever possible. For gratings located in the surface of any of these areas, grid openings in gratings shall be limited to ½ inch in the direction of traffic flow. If gratings have elongated openings, they shall be placed so that the long dimension is perpendicular to the dominant direction of travel. (1133B7.2, Fig 11B-7E(a))
52. The slope of curb ramps shall not exceed one unit vertical in 12 units horizontal (8.33 percent slope). (1127B.5.3)
53. Transitions from ramps to walks, gutters, or streets shall be flush and free of abrupt changes. (1127B.5.3)
54. Maximum slopes of adjoining gutters, road surface immediately adjacent to the curb ramp or accessible route, shall not exceed one unit vertical in 20 units horizontal (5 percent slope) within 4 feet of the bottom of the curb ramp. The slope of the fanned or flared sides of curb ramps shall not exceed one unit vertical in 10 units horizontal (10 percent slope). (1127B.5.3)
55. A level landing 4 feet deep shall be provided at the upper end of each curb ramp over its full width to permit safe egress from the ramp surface, or the slope of the fanned or flared sides of the curb ramp shall not exceed one unit vertical in 12 units horizontal (8.33 percent slope). (1127B.5.4)
56. The surface of each curb ramp and its flared sides shall comply with Section 1124B, Ground and Floor Surfaces, and shall be of contrasting finish from that of the adjacent sidewalk. (1127B.5.5)
57. All curb ramps shall have a grooved border 12 inches wide at the level surface of the sidewalk along the top and each side approximately ¾ inch on center. All curb ramps constructed between the face of the curb and the street shall have a grooved border at the level surface of the sidewalk. (1127B.5.6, Fig. 11B-19A & 19B)
58. Curb ramps shall have a detectable warning that extends the full width and depth of the curb ramp, excluding the flared sides, inside the grooved border. Detectable warnings shall be slip resistant and consist of raised truncated domes with a diameter of nominal 0.9 inch at the base tapering to 0.45 inch at the top, a height of nominal 0.2 inch, and a center-to-center spacing of nominal 2.35 inches, in compliance with Figure 11B-23A. "Nominal" here shall be in accordance with Section 12-11A and B-102, State Referenced Standards Code. The detectable warning shall contrast visually with adjoining surfaces, either light-on-dark or dark-on-light. The material used to provide contrast shall be an integral part of the walking surface. The domes may be constructed in a variety of methods, including cast-in-place or stamped, or may be part of a prefabricated surface treatment. Only approved DSA-AC detectable warning products and directional surfaces shall be installed as provided in the California Code of Regulations (CCR), Title 24, Part 1, Articles 2, 3, and 4. (1127B.5.7)
59. Curb ramps shall be located or protected to prevent their obstruction by parked vehicles. (1127B.5.8)

## **CURB RAMPS**

Curb Ramp is defined as “a sloping pedestrian way, intended for pedestrian traffic, which provides access between a walk or sidewalk and a surface located above or below an adjacent curb face as differentiated from a ramp”. (1102B)

49. Curb Ramps shall be constructed at each corner of street intersections where a pedestrian way crosses a curb. The preferred and recommended location for curb ramps is in the center of the crosswalk or each street corner. Where it is necessary to locate a curb ramp in the center of the curb return and the street surfaces are marked to identify pedestrian crosswalks, the lower end of the curb ramp shall terminate within such crosswalk areas. (1127B.5.1, Fig 11B-20C & 11B-22)
50. Provide a curb ramp at \_\_\_\_\_ (1127B.5.1)
51. Curb ramps shall be a minimum of 4 feet in width and shall lie, generally, in a single sloped plane, with a minimum of surface warping and cross slope. (1127B.5.2)

## **PEDESTRIAN GRADE SEPARATIONS (OVERPASSES AND UNDERPASSES)**

60. Pedestrian ramps on pedestrian grade separations shall comply with the requirements of Section 1133B.5 for ramps. (1128B)

61. Cross slopes of walking surfaces shall be the minimum possible and shall not exceed one unit vertical in 50 units horizontal (2 percent slope). The slope of any appreciably warped walking surface shall not exceed 1 unit vertical in 12 units horizontal (8.33 percent slope) in any direction. (1128B)
62. Where pedestrian grade separations cross streets or other vehicular traffic ways, and where a street level crossing can reasonably and safely be used by persons with disabilities, there shall be provided conforming curb ramps and a usable pathway. (1128B)

### **RAMPS (EXTERIOR OR INTERIOR)**

63. Any path of travel shall be considered a ramp if its slope is greater than one unit vertical in 20 units horizontal (5 percent slope). (1133B.5.1)
64. The maximum slope of a ramp shall be one unit vertical in 12 units horizontal (8.33 percent slope). The maximum rise for any run shall be 30 inches. The least possible slope shall be used for any ramp. (1133B.5.3)
65. The cross slope of ramp surfaces shall be no greater than one unit vertical in 50 units horizontal (2 percent slope). (1133B.5.3.1)
66. Ramps shall have a minimum clear width of 48 inches, unless required to be wider by some other provision of this code. (1133B.5.2)
67. Ramps serving entrances to buildings where the ramp is the only exit discharge path and it serves an occupant load of 300 or more shall have a minimum clear width of 60 inches. (1133B.5.2)
68. Level landings shall be provided at the top and bottom of each ramp. (1133B.5.4.1, Fig 11B-38 & 39)
69. Intermediate landings shall be provided at intervals not exceeding 30 inches of vertical rise and at each change of direction. (1133B.5.4.1, Fig 11B-38 & 39)
70. Top landings shall be not less than 60 inches wide and shall have a length of not less than 60 inches in the direction of ramp run. Landings at the bottom of ramps shall have a dimension in the direction of ramp run of not less than 72 inches. (1133B.5.4.2, Fig 11B-38 & 39)
71. Doors in any position shall not reduce the minimum dimension of the landing to less than 42 inches and shall not reduce the required width by more than 3 inches when fully open. (1133B.5.4.4, Fig 11B-39(b))
72. Doors at ramp landings shall comply with the maneuvering clearance requirements of Section 1133B.2.4.2, and the requirements of Section 1133B.5.4.4. (1133B.5.4.3, Fig 11B-39)
73. All ramp landings shall be level with maximum slope in any direction not to exceed one unit vertical in 50 units horizontal (2 percent slope). (1133B.5.4.1, 1102B)
74. At bottom and intermediate landings, the width shall be at least the same as required for the ramp. (1133B.5.4.5, Fig 11B-38 & 39)
75. Intermediate and bottom landings at a change of direction in excess of 30 degrees shall have a dimension in the direction of ramp run of not less than 72 inches to accommodate the handrail extension. (1133B.5.4.6, Fig 11B-38)
76. Other intermediate landings shall have a dimension in the direction of ramp run of not less than 60 inches. (1133B.5.4.7, Fig 11B-38)
77. Handrails are required on ramps that provide access if the ramp slope exceeds one unit vertical in 20 units horizontal (5 percent slope), except that at exterior door landings, handrails are not required on ramps less than 6 inches rise or 72 inches in length. (1133B.5.5.1)
78. Handrails shall be placed on each side of each ramp, shall be continuous the full length of the ramp, shall be 34 to 38 inches above the ramp surface to the top of the handrails, shall extend a minimum of 1 foot beyond the top and bottom of the ramp, and shall parallel the floor or ground surface. Handrails shall always be continuous and the ends of handrails shall be either rounded or returned smoothly to the floor, wall or post. (1133B.5.5.1, Fig 11B-27(b) & (c))
79. The grip portion of handrails shall be not less than 1-1/4 inches nor more than 1-1/2 inches in cross sectional nominal dimension, or the shape shall provide an equivalent gripping surface, and all surfaces shall be smooth with no sharp corners. Handrails shall not rotate within their fittings. (1133B.5.5.1, Fig 11B-36)
80. Handrail projecting from a wall shall have a space of 1-1/2 inches between the wall and the handrail. (1133B.5.5.1, Fig 11B-36)
- a. Handrails may be located in a recess if the recess is a maximum of 3 inches deep and extends at least 18 inches above the top of the rail. (1133B.5.5.1, Fig 11B-36)
- b. Any wall or other surface adjacent to handrails shall be free of sharp or abrasive elements. Edges shall have a minimum radius of 1/8 inch. (1133B.5.5.1, Fig 11B-36)
- c. Handrails may project into the required clear width a distance of 3 1/2 inches maximum from each side of a ramp at the handrail height. (1133B.5.5.1)
81. In existing buildings or facilities where the extension of the handrail in the direction of the ramp run would create a hazard, the extension may be turned 90 degrees to the run of the ramp. (1133B.5.5.1.1, 1133B.4.2.4)
82. Where the ramp surface is not bounded by a wall, or where handrails &/or guards are attached to the ramp surface with posts or similar elements, provide "continuous and uninterrupted barriers" along the length of the ramp in compliance with one of the following requirements. (1133B.5.6)
- a. A guide curb a minimum of 2 inches in height above the ramp surface; OR (1133B.5.6.1)

- b. A wheel guide rail centered 3 inches, plus or minus 1 inch above the ramp surface.(1133B.5.6.2)
- 83. Ramps more than 30 inches above the adjacent ground shall be provided with guards that comply with Section 1013. Such guards shall be continuous from the top of the ramp to the bottom of the ramp.(1133B.5.7)

## **ENTRANCES & EXITS**

Exit, is defined as "that portion of a means of egress system which is separated from other interior spaces of a building or structure by fire-resistance-rated construction and opening protectives as required to provide a protected path of egress travel between the exit access and the exit discharge. Exits include exterior exit doors at the level of exit discharge, vertical exit enclosures, exit passageways, exterior exit stairways, exterior exit ramps and horizontal exits." (1002.1)

Public Way, is defined as "a street, alley or other parcel of land open to the outside air leading to a street, that has been deeded, dedicated or otherwise permanently appropriated to the public for public use and which has a clear width and height of not less than 10 feet." (1002.1)

- 84. All entrances and exterior ground floor exit doors to buildings and facilities shall be made accessible to persons with disabilities. (1133B.1.1.1.1)
- 85. Revolving doors shall not be used as a required entrance for persons with disabilities. (1133B.2.3.3)
- 86. During periods of partial or restricted use of a building or facility, the entrances used for primary access shall be accessible to and usable by persons with disabilities. (1133B.1.1.1.2)
- 87. Recessed doormats shall be adequately anchored to prevent interference with wheelchair traffic. (1133B.1.1.1.3, Fig 11B-25)
- 88. All gates, including ticket gates, shall meet all applicable accessibility specifications of doors. (1133B.1.1.1.4)
- 89. Every required exit doorway shall be capable of opening at least 90 degrees, shall have a minimum clear opening of 32 inches, and shall be of a size as to permit the installation of a door not less than 3 feet in width and 6 feet 8 inches in height. (1133B.2.2)
- 90. The space between two consecutive door openings in a vestibule, serving other than a required exit stairway, shall provide a minimum of 48 inches of clear space from any door opening into such vestibule when the door is positioned at an angle of 90 degrees from its closed position. Doors in a series shall swing either in the same direction or away from the space between the doors. See Figures 11B-30 & 11B-31. (1133B.2.4.4)

## **DOORS**

- 91. Door handles, pulls, latches, locks, and other operating devices on doors required to be accessible shall not require tight grasping, tight pinching or twisting of the wrist to operate. Manually operated bolts or surface bolts are not permitted. The unlatching of any door or leaf shall not require more than one operation. (1008.1.9.1, 1008.1.9.4, 1008.1.9.5)
- 92. Latching and locking doors that are hand activated and which are in a path of travel shall be operable by lever-type hardware, panic bars, push-pull activating bars, U-shaped handles, or other hardware designed to provide passage without requiring the ability to grasp the opening hardware. (1133B.2.5.2)
- 93. Hand-activated door opening hardware shall be centered between 30 inches and 44 inches above the floor. (1133B.2.5.2)
- 94. When installed, doorways shall have a minimum clear opening of 32 inches with the door open 90 degrees. (1133B.1.1.1.1, Fig 11B-5B & 11B-33)
- 95. For hinged doors, the opening width shall be measured with the door positioned at an angle of 90 degrees from its closed position. (1133B.2.3, Fig 11B-5B)
- 96. Where a pair of doors is utilized, at least one of the doors shall provide a clear, unobstructed opening width of 32 inches with the leaf positioned at an angle of 90 degrees from its closed position. (1133B.2.3.1)
- 97. When an automatic or power assisted door operator is utilized to operate a pair of doors, at least one of the doors shall provide a clear, unobstructed opening width of 32 inches with the door positioned at an angle of 90 degrees from its closed position. Automatic doors shall comply with BHMA A156.10 or BHMA A156.19. (1133B.2.3.2)
- 98. Minimum maneuvering clearances at doors shall be as shown in Figure 11B-26A, 11B-26B, & 11B-26C. The floor or ground area within the required clearances shall be level and clear. (1133B.2.4.2)
- 99. There shall be a level and clear floor or landing on each side of a door. The level area shall have a length in the direction of door swing of at least 60 inches and the length opposite the direction of door swing of 48 inches as measured at right angles to the plane of the door in the closed position. (1133B.2.4.2, & Fig 11B-25)
- 100. The width of the level area on the side to which the door swings shall extend 24 inches past the strike edge of the door for exterior doors and 18 inches past the strike edge for interior doors. Where the plane of the doorway is offset or located in an alcove a distance more than 8 inches measured from the plane of the doorway to the face of the wall, the door shall be provided with 60 inches maneuvering clearance for front approach. (1133B.2.4.3, 1133B.2.4.5, 1133B.2.5.3, Fig 11B-33(a))

101. Provide clear space of 12 inches past strike edge of the door on the opposite side to which the door swings if the door is equipped with both a latch and a closer. (Fig 11B-26(a))
102. The floor or landing shall be not more than ½ inch lower than the threshold of the doorway. (1133B.2.4.1)
103. The bottom 10 inches of all doors except automatic and sliding shall have a smooth, uninterrupted surface to allow the door to be opened by a wheelchair footrest without creating a trap or hazardous condition. Where narrow frame doors are used, a 10 inch high smooth panel shall be installed on the push side of the door, which will allow the door to be opened by a wheelchair footrest without creating a trap or hazardous condition. (1133B.2.6, Fig 11B-29)
104. The maximum force required to push or pull open a door shall comply with the following. Push or pull force for a hinged door shall be measured perpendicular to the door face at the door opening hardware or 30 inches from the hinged side, whichever is farther from the hinge. Push or pull force for a sliding or folding door shall be measured parallel to the door at the door pull or latch. Compensating devices or automatic door operators complying with Section 1133B.2.3.2 may be used to meet the maximum force limits. (1133B.2.5)
- Required fire doors shall have the minimum opening force allowable by the appropriate administrative authority, not to exceed 15 lbf.
  - Other than required fire doors, interior doors shall have a maximum opening force of 5 lbf.
  - Other than required fire doors, exterior doors shall have a maximum opening force of 5 lbf.
105. When the door has a closer, then the sweep period of the closer shall be adjusted so that from an open position of 70 degrees, the door will take at least 3 seconds to move to a point 3 inches from the latch, measured to the leading edge of the door. (1133B.2.5.1)
106. Where turnstiles and crowd control barriers are utilized in a facility for the purpose of providing fully controlled access, such as where an admission price is charged, a door or gate that is accessible to persons with disabilities shall be provided adjacent to each turnstile exit or entrance. This alternate passageway shall be maintained in an unlocked condition during business hours and the door or gate shall not activate a publicly audible alarm system. The door or gate may be latched where all gates are restricted and controlled by an attendant and a sign is posted stating, "All gates are restricted and controlled by an attendant." The accessible door or gate shall provide the same use pattern. Where posts, rails, or other pedestrian controls are utilized to create crowd control aisles or lanes, a minimum aisle width not less than indicated in Figure 11B-5E (a) and (b) with 32 inches of clear opening. (1133B.2.3.4)

## **FLOORS AND LEVELS**

- Level area is defined as "a specified surface that does not have a slope in any direction exceeding one unit vertical in 50 units horizontal (2 percent slope)." (1102B)
107. In buildings and facilities, floors of a given story shall be a common level throughout, or shall be connected by pedestrian ramps or passenger elevators. (1120B.1)
108. Ground and floor surfaces along accessible routes and in accessible rooms and spaces, including floors, walks, ramps, stairs, and curb ramps, shall be stable, firm, and slip-resistant. (1120B.2 & 1124B.1)
109. Changes in level up to ¼ inch may be vertical and without edge treatment. (1124B.2, Fig 11B-5E(c))
110. Changes in level between ¼ inch and ½ inch shall be beveled with a slope no greater than one unit vertical in 2 units horizontal (50 percent slope). (1124B.2, Fig 11B-5E(d))
111. Changes in level greater than ½ inch shall be accomplished by means of a curb ramp, ramp, or elevator. (1124B.2)
112. If carpet or carpet tile is used on a ground or floor surface, then it shall be securely attached; have a firm cushion, pad or backing or no cushion or pad; and have a level loop, textured loop, level cut pile, or level cut/uncut pile texture. The maximum pile height shall be ½ inch. Exposed edges of carpet shall be fastened to floor surfaces and have trim along the entire length of the exposed edge. Carpet edge trim shall comply with Section 1124B.2. (1124B.3, Fig 11B-7E)
113. If gratings are located on floors, then they shall have spaces no greater than ½ inch wide in one direction. If gratings have elongated openings, then they shall be placed so that the long dimension is perpendicular to the dominant direction of travel. (1124B.4, Fig 11B-7E)

## **CORRIDORS & AISLES**

114. Every corridor and hallway serving an occupant load of 10 or more shall not be less than 44 inches in width. (1133B.3.1)
115. Corridors and hallways serving an occupant load of less than 10 shall not be less than 36 inches in width. (1133B.3.1)
116. Corridors and hallways that are located on an accessible route and exceed 200 feet in length shall have a minimum clear width of 60 inches. If an accessible route has less than 60 inches clear width, then passing spaces at least 60 inches by 60 inches shall be located at intervals of 200 feet maximum. A "T" intersection of two corridors or walks is an acceptable passing place. (1133B.3.2, Fig 11B-34)
117. Circulation aisles and pedestrian ways shall be sized according to functional requirements and in no case shall be less than 36 inches in clear width. (1105B.3.6)
118. Every portion of every building in which are installed seats, tables, merchandise, equipment, or similar materials shall be provided with aisles leading to an exit. (1133B.6.1)

119. Every aisle shall be not less than 36 inches wide if serving only one side, and not less than 44 inches wide if serving both sides. (1133B.6.2)
120. Aisles shall comply with Figure 11B-5E(a) and (b) for circulation around obstructions. (1133B.6.2)

### **HAZARDS AND PROTRUDING OBJECTS**

121. Abrupt changes in level, except between a walk or sidewalk and an adjacent street or driveway, exceeding 4 inches in a vertical dimension, such as at planters or fountains located in or adjacent to walks, sidewalks, or other pedestrian ways, shall be identified by warning curbs projecting at least 6 inches in height above the walk or sidewalk surface to warn the blind of a potential drop off. (1133B.8.1)
122. When a guard or handrail is provided, no curb is required when a guide rail is provided centered 3 inches plus or minus 1 inch above the surface of the walk or sidewalk, the walk is 5 percent or less gradient or no adjacent hazard exists. (1133B.8.1, Fig 11B-27(c))
123. Objects projecting from walls with their leading edges between 27 inches and 80 inches above the finished floor shall protrude no more than 4 inches into walks, halls, corridors, passageways, or aisles. (1133B.8.6.1, Fig 11B-7A)
124. Objects mounted with their leading edges at or below 27 inches above the finished floor may protrude any amount into walks, halls, corridors, passageways, or aisles. (1133B.8.6.1, Fig 11B-7A)
125. Freestanding objects mounted on posts or pylons may overhang 12 inches maximum from 27 inches to 80 inches above the ground or finished floor. (1133B.8.6.1, Fig 11B-7B)
126. Protruding objects shall not reduce the clear width of an accessible route or maneuvering space. (1133B.8.6.1, Fig 11B-7D)
127. Walks, halls, corridors, passageways, aisles, or other circulation spaces shall have 80 inches minimum clear headroom. (1133B.8.6.2, Fig 11B-7A & 7C)
128. Any obstruction that overhangs a pedestrian way shall be a minimum of 80 inches above the walking surface as measured from the bottom of the obstruction. (1133B.8.2, Fig 11B-28)
129. Where a guy support is used parallel to a path of travel, including, but not limited to sidewalks, a guy brace, sidewalk guy or similar device shall be used to prevent an overhanging obstruction as defined. (1133B.8.2)

130. If a walk crosses or adjoins a vehicular way, and the walking surfaces are not separated by curbs, railings, or other elements between the pedestrian areas and vehicular areas, the boundary between the areas shall be defined by a continuous detectable warning which is 36 inches wide, complying with Section 1121B.3.1, Item 8(a). Only approved DSA/AC detectable warning products and directional surfaces shall be installed as provided in the California Code of Regulations, Title 24, Part 1, Articles 2, 3, and 4. (1133B.8.5)
131. Transit boarding platforms shall conform to the requirements of Section 1121B.3.1, Items 8(a) & 8(b). (1133B.8.3, 1133B.8.4)

### **STAIRWAYS**

132. Stairways shall have handrails on each side. Handrails shall be continuous along both sides of the stairway. Intermediate handrails shall be provided as required in Section 1012.8. (1133B.4.1.1)
133. The top of handrail gripping surface shall be mounted 34 to 38 inches above the nosing of the treads. (1133B.4.2.1, Fig 11B-35)
134. Handrails shall extend a minimum of 12 inches beyond the top nosing and 12 inches plus the tread width beyond the bottom nosing and ends shall be returned or terminate in newel posts or safety terminals. (1133B.4.2.2, 1133B.4.2.3, Fig 11B-35 & 37)
135. The handgrip portion of handrails shall be not less than 1-1/4 inches or more than 1-1/2 inches in cross-sectional nominal dimension or the shape shall provide an equivalent gripping surface. The handgrip portion of handrails shall have a smooth surface with no sharp corners. Gripping surfaces (top or sides) shall be uninterrupted by newel posts, other construction elements, or obstructions. Any wall or other surface adjacent to the handrail shall be free of sharp or abrasive elements. Edges shall have a minimum radius of 1/8 inch. (1133B.4.2.6, Fig 11B-36)
136. The orientation of at least one handrail shall be in the direction of the run of the stair and perpendicular to the direction of the stair nosing, and shall not reduce the minimum required width of stairs. (1133B.4.2.4)
137. Handrails projecting from a wall shall have a space of 1-1/2 inches between the wall and the handrail. Handrails may be located in a recess if the recess is a maximum of 3 inch deep and extends at least 18 inches above the top of the rail. Handrails shall not rotate in their fittings. (1133B.4.2.5, Fig 11B-36)



138. Interior stairs shall have the upper approach and lower tread marked by a stripe providing clear visual contrast. Exterior stairs shall have the upper approach and all treads marked by a stripe providing clear visual contrast. The stripe shall be a minimum of 2 inches wide to a maximum of 4 inches wide placed parallel to, and not more than 1 inch from, the nose of the step or upper approach. The stripe shall extend the full width of the step or upper approach and shall be of material that is at least as slip resistant as the other treads of the stair. A painted stripe shall be acceptable. (1133B.4.4, Fig 11B-35)
139. Stair treads shall be no less than 11 inches deep, measured from riser to riser. Stair riser heights shall be 7 inches maximum and 4 inches minimum. On any given flight of stairs, all steps shall have uniform riser height and uniform tread widths. (1133B.4.5)
140. All tread surfaces shall be slip-resistant. Weather exposed stairs and their approaches shall be designed so that water will not accumulate on the walking surfaces. Treads shall have smooth, rounded, or beveled exposed edges. (1133B.4.5.1, Fig 11B-35)
141. Risers shall be solid and shall be vertical or sloped from the underside of the leading edge of the tread above at an angle not more than 30 degrees from the vertical. Open risers are not permitted. (1133B.4.5.2, Fig 11B-35(a) and (b))
142. The radius of curvature at the leading edge (nosing) of the tread shall be no greater than ½ inch. Beveling of nosings shall not exceed ½ inch. Nosings shall not project more than 1-1/4 inches past the face of the riser below. Nosings that project beyond risers shall have the underside of the leading edge beveled at an angle not more than 30 degrees from the vertical. The transition from the nosing to the riser shall be free of abrupt edges. All projections shall be of uniform size, including nosings at landings. (1133B.4.5.3, Fig 11B-35(c))
143. Tactile floor identification signs that comply with Section 1117B.5.1 shall be located at each floor level landing in all enclosed stairways in buildings two or more stories in height to identify the floor level. At exit discharge level, the sign shall include a raised five-pointed star located to the left of the identifying floor level. The outside diameter of the star shall be the same as the height of the raised characters. (1133B.4.3)
146. The highest and lowest operable part of all controls, dispensers, receptacles, and other operable equipment shall be placed within one of the reach ranges specified in Sections 1118B.5 and 1118B.6. (1117B.6.3)
147. Controls and operating mechanisms shall be operable with one hand and shall not require tight grasping, punching, or twisting of the wrist. The force required to activate controls shall be no greater than 5 pounds. (1117B.6.4)
148. For accessible lavatories, faucet controls and operating mechanisms shall be operable with one hand and shall not require grasping, pinching, or twisting of the wrist. The force required to active faucet controls and operating mechanisms shall be no greater than 5 lbf. Lever-operated, push-type, and electronically controlled mechanisms are examples of acceptable designs. Self-closing valves are allowed if the faucet remains open for at least 10 seconds. (1115B.4.3)

### **SPACE ALLOWANCE & REACH RANGES**

149. The minimum clear floor or ground space required to accommodate a single, stationary wheelchair and occupant is 30 inches by 48 inches. The minimum clear floor or ground space for wheelchairs may be positioned for forward or parallel approach to an object. Clear floor or ground space for wheelchairs may be a part of the knee space required under some objects. (1117B.2.3, 1118B.4.1, Fig 11-B-5A)
150. One full-unobstructed side of the clear floor or ground space for a wheelchair shall adjoin or overlap an accessible route or adjoin another wheelchair clear floor space. If a clear floor or ground space is located in an alcove or otherwise confined on all or part of three sides, additional maneuvering clearances shall be provided. (1117B.2.4, 1118B.4.2, Fig 11-B-5A)
151. The space required for a wheelchair to make an 180-degree turn is a clear space of 60 inches diameter or a T-shaped space. (1118B.3, Fig 11B-12(a) & (b))
152. The minimum clear width required for a wheelchair to turn around an obstruction shall be 36 inches minimum where the obstruction is 48 inches or more in length; 42 inches minimum where the obstruction is less than 48 inches in length. (Fig 11B-5E)
153. The minimum clear width for single wheelchair passage shall be 32 inches at a point and 36 inches continuously. (1118B.1, Fig 11B-10)
154. The minimum width for two wheelchairs to pass is 60 inches. (1118B.2, Fig 11B-11)
155. If the clear floor space only allows forward approach to an object, the maximum high forward reach allowed shall be 48 inches. See Figure 11B-5C(a). The minimum low forward reach is 15 inches. If the high forward reach is over an obstruction, reach and clearances shall be as shown in Figure 11B-5C(b). (1118B.5)
144. Controls and operating mechanisms in accessible spaces, along accessible routes or as part of accessible elements and those in Section 1.9.1 are required to be accessible. (1117B.6.1)
145. Clear floor space complying with Section 1118B.4 that allows a forward or parallel approach by a person using a wheelchair shall be provided at controls, dispensers, receptacles, and other operable equipment. (1117B.6.2)

### **CONTROLS & OPERATING MECHANISMS**

156. If the clear floor space allows parallel approach by a person in a wheelchair, the maximum high side reach allowed shall be 54 inches and the low side reach shall be no less than 9 inches above the floor as shown in Figures 11B-5D(a) & (b). If the side reach is over and obstruction, the reach and clearances shall be as shown in Figure 11B-5D(c). (1118B.6)

### **EMPLOYEE WORK AREAS & WORK STATIONS**

Work Station is defined as “an area defined by equipment and/or work surfaces intended for use by employees only, generally for one or a small number of employees at a time...” (1102B)

157. Employee areas shall comply with the accessibility requirements of Chapter 11B. (1123B.1)

158. Specific workstations need only comply with aisle width and floors and levels, and entryways shall be 32 inches in clear width. Aisles shall not be less than 36 inches if serving only one side, and not less than 44 inches wide if serving both sides. (1123B.2, 1133B.6.2)

159. Employee work areas shall have a minimum of 36 inches clear width access. (1105B.3.2.3, 1105B.3.3.2)

### **FIXED OR BUILT-IN SEATING, TABLES & COUNTERS**

160. Where fixed or built-in seating, tables, or counters are provided in accessible public use or common use areas, five percent but never less than one must be accessible, as required in Section 1122B. (1122B.1)

161. If seating spaces for persons in wheelchairs are provided at fixed tables or counters, clear floor space complying with Section 1118B.4 shall be provided. Such clear floor space shall not overlap knee space by more than 19 inches. (1122B.2, Fig 11B-13)

162. If seating for persons in wheelchairs is provided at fixed tables or counters, knee spaces at least 27 inches high, 30 inches wide, and 19 inches deep shall be provided. (1122B.3, Fig 11B-13)

163. The tops of tables and counters shall be 28 inches to 34 inches from the floor or ground. (1122B.4)

164. Where a single counter contains more than one transaction station, such as a bank counter with multiple teller windows or a retail sales counter with multiple cash register stations, at least 5 percent, but never less than one of each type of station shall be located at a section of counter that is at least 36 inches long and no more than 28 to 34 inches high. (1122B.4)

### **SIGNS & IDENTIFICATION**

California’s standards for signage are more stringent than Section 4.30 of the ADA Standards for Accessible Design. (1117B.5)

The International Symbol of Accessibility shall be the standard used to identify facilities that are accessible to and usable by physically disabled persons as set forth in Title 24 and as specifically required in this Section. (1117B.5.8.1, Fig 11B-6)

165. The International Symbol of Accessibility shall consist of a white figure on a blue background. The blue shall be equal to Color No. 15090 in Federal Standard 595B. (1117B5.8.1.1)

166. All building and facility entrances that are accessible to and usable by persons with disabilities and at every major junction along or leading to an accessible route of travel shall be identified with a sign displaying the International Symbol of Accessibility and with additional directional signs to be visible to persons along approaching circulation paths. (1117B.5.8.1.2, 1127B.3)

167. Where permanent identification signs are provided for rooms and spaces of a building or site, raised characters shall be provided and shall be accompanied by Braille in conformance with Section 1117B.5.2 through 1117B.5.7. Signs shall be installed on the wall adjacent to the latch outside of the door. Where there is no wall space on the latch side, including at double leaf doors, signs shall be placed on the nearest adjacent wall, preferably on the right. Mounting height shall be 60 inches above the finished floor to the centerline of the sign. Mounting location shall be determined so that a person may approach within 3 inches of signage without encountering protruding objects or standing within the swing of a door. (1117B.5.1, 1117B.5.7)

168. When signs direct to or give information about permanent rooms and functional spaces of a building or site, they shall comply with Sections 1117B.5.2, 1117B.5.3, and 1117B.5.4. For other means of egress signs and identification see Chapter 10, Sections 1011.3, 1022.8, 1008.1.9.7, 1007.9, 1007.10, 1007.11 and 1007.4. (1117B.5.1.2)

169. When raised characters or when pictogram symbols are used, they shall conform to the following: (1117B.5.5)

a. Characters on signs shall be raised 1/32-inch minimum and shall be sans - serif uppercase characters accompanied by contracted (Grade 2) Braille complying with section 1117B.5.6. (1117B.5.5.1)

b. Raised characters or symbols shall be a minimum of 5/8 inch high and a maximum of 2 inches high. (1117B.5.5.2)

c. Pictorial symbol signs (pictograms) shall be accompanied by the verbal description placed directly below the pictogram. The outside dimension of the pictogram field shall be a minimum of 6 inches in height. (1117B.5.5.3)

d. Characters and Braille shall be in a horizontal format. Braille should be placed a minimum of 3/8-inch and a maximum of 1/2-inch directly below the tactile characters; flush left or centered. When tactile sign is multi-lined, all Braille shall be placed together below all lines of tactile text. (1117B.5.5.4)

170. Characters on signs shall have a width-to-height ratio of between 3:5 and 1:1 and a stroke width-to-height ratio between 1:5 and 1:10. (1117B.5.3)

171. Characters, symbols and their background shall have a non-glare finish. Characters and symbols shall contrast with their background, either light characters on a dark background or dark characters on a light background. (1117B.5.2)
172. Characters and numbers on signs required to be accessible by Section 1117B.5.1 Items 2 and 3 shall be sized according to the Table in Section 1117B.5.4. (1117B.5.4)
173. Contracted (Grade 2) Braille shall be used wherever Braille is required in other portions of these Standards. Dots shall be 1/10 inch on centers in each cell with 2/10-inch space between cells. Dots shall be raised a minimum of 1/40 inch above the background. (1117B.5.6)
174. Pole supported pedestrian traffic control buttons shall be identified with color coding consisting of a textured horizontal yellow band 2 inches in width encircling the pole, and a 1 inch wide dark border band above and below this yellow band. Color-coding should be placed immediately above the control button. Control buttons shall be located no higher than 48 inches above the surface adjacent to the pole. (1117B.5.9)
175. Provide plans, specifications and details for all signs and identification as specified in Section 1117B.5.1, when included in new construction, alterations, additions or renovations. (1117B.5.1 Item 4.1)

## **ELECTRICAL**

176. The highest operable part of all controls, dispensers, receptacles and other operable equipment shall be installed at an accessible location meeting the clearances and reach range requirements of Sections 1118B.5 and 1118B.6. (1117B.6.3)
177. Controls and switches intended to be used by the occupant of the room or area to control lighting and receptacle outlets, appliances, or cooling, heating, and ventilating equipment, shall be located no more than 48 inches measured from the top of the outlet box nor less than 15 inches measured from the bottom of the outlet box to the level of the finish floor or working platform. (1117B.6.5.1)
178. Electrical receptacle outlets on branch circuits of 30 amperes or less and communication system receptacles shall be located no more than 48 inches measured from the top of the receptacle outlet box or receptacle housing nor less than 15 inches measured from the bottom of the receptacle outlet box or receptacle housing to the level of the finish floor or working platform. (1117B.6.5.2)

## **NOTIFICATION APPLIANCES FOR THE HEARING IMPAIRED**

NOTE: If emergency warning systems are provided, they shall include both audible alarms and visual alarms complying with NFPA 72 and Chapter 9, Sections 907.5.2.1 and 907.5.2.3. (1114B.2.2)

179. Approved notification appliances for the hearing and visually impaired shall be installed in accordance with the provisions of NFPA 72 in the following areas:
- Restrooms
  - Corridors
  - Music practice rooms
  - Band rooms
  - Gymnasiums
  - Multipurpose rooms
  - Occupational shops
  - Occupied rooms where ambient noise impairs hearing of the fire alarm
  - Lobbies
  - Meeting rooms
  - Any other area for common use

## **ADDITIONAL MISCELLANEOUS REQUIREMENTS**

180. Qualified historical buildings shall comply with the State Historical Building Code, Part 8, Title 24, of the California Code of Regulations as printed in Volume 2 of Title 24. (1119B & 1135B.1)
181. When a commercial facility is located in a private residence, the portion of the residence used exclusively as a residence is not covered by Chapter 11B, except as required by 1111B.5, but that portion used both for the commercial facility and for residential purposes is covered by the new construction and alteration requirements of the code. (1101B.6.1)
182. The portion of the residence covered extends to those elements used to enter the commercial facility, including the homeowner's front sidewalk, if any, the door or entry way, and hallways; and those portions of the residence, interior or exterior, available to or to be used by employees or visitors of the commercial facility, including sanitary facilities. (1101B.6.2)

## **CLEANER AIR SYMBOL**

183. Strictly for publicly funded facilities or any facilities leased or rented by State of California, not concessionaries. This symbol shall be the standard used to identify a room, facility and paths of travel that are accessible to and usable by people who are adversely impacted by airborne chemicals or particulate(s) and/or the use of electrical fixtures and/or devices. When used, the symbol shall comply with Sections 1117B.5.11.1, 1117B.5.11.2, and 1117B.5.11.3. (1117B.5.11, Fig 11B-40)

