

BARRICADING METHODS AND MATERIALS

A-Frames:

When using A-frames for defining a path-of-travel, not barricading trenches from vehicular travel, A-frames shall be placed end to end (no spacing between barricades allowed). This will help a person who is blind to negotiate a safe path-of-travel. Openings between A-frames will give confusing signals to a person who is blind and using a "long cane," "walking cane" or "white cane." If using A-frames, all must be connected in a way to ensure that individual A-frames do not move out of place or separate. As an example of an acceptable connection, A-frames may be connected by 2x4s that are attached to the base of the barricade systems.

Barrier Caution Tape:

Caution tape does not provide an adequate barricade and cannot be used to delineate path-of-travel (but can be used in other areas to highlight danger). It can be used in conjunction with barricades such as A-frames.

Fencing Material:

When using fencing material (*i.e.*, chain link, plastic, etc.) the bottom three inches minimum should be solid. This base will act as a guide to blind pedestrians using canes. Walking canes used by blind pedestrians could get caught in fencing. A safe design can be achieved by attaching a solid material (*i.e.*, wood, header bender board, sheet metal, solid rod or rail etc.) to the bottom portion of the fence. Chosen material should have a high visual contrast to the street/sidewalk surface.

Closed Crosswalks:

If a crosswalk is closed due to construction, then curb ramps leading into that crosswalk should also be appropriately barricaded. Temporary curb ramps must be installed in the direction of the crosswalk to replace barricaded ramps. It should be noted that curb ramps are not used solely by persons in wheelchairs. They are also indicators to persons who are blind that a crosswalk exists and that there is a safe path-of-travel to cross the street. Temporary curb ramps should direct blind pedestrians to and through the temporary path-of-travel.

Open Crosswalks:

If crosswalks are to remain open during the project, then curb ramp area should be kept free of debris, staging material, equipment, etc.

Path-of-Travel:

Any change of level in a path-of-travel which is over ¼ inch (½ inch maximum) height must be beveled at ~~45°~~ to provide a smooth, non-tripping transition.

2 to 1

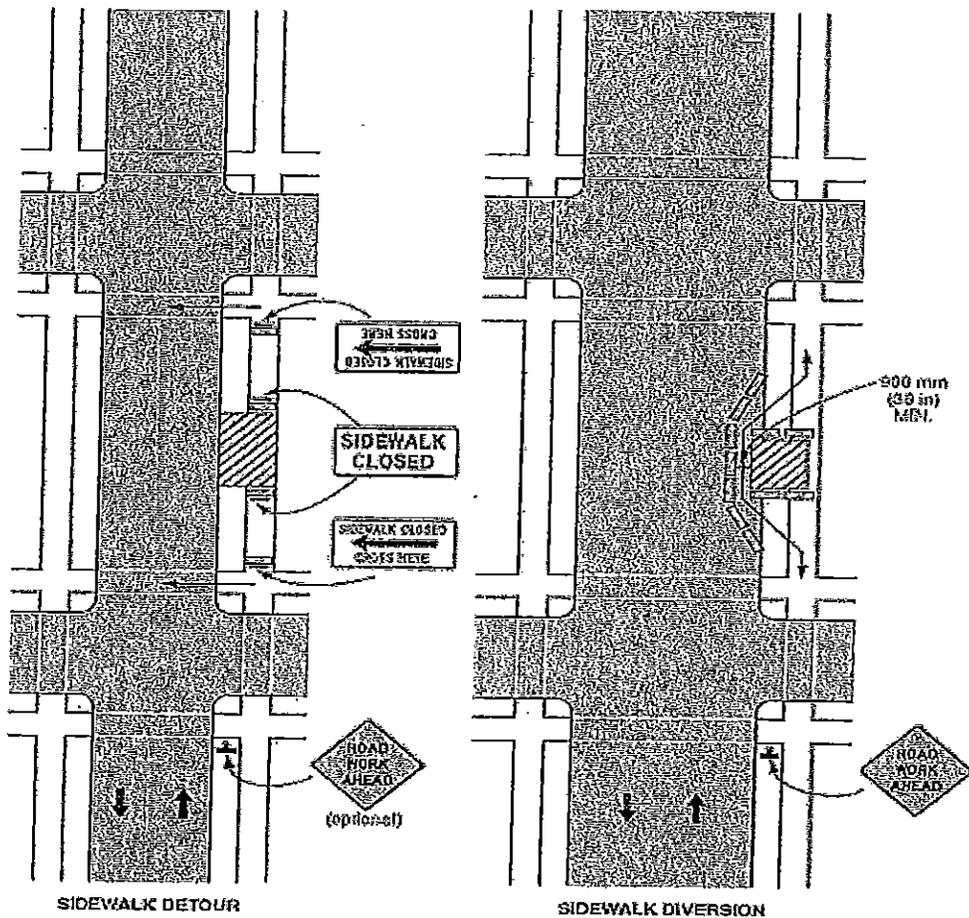
NOTE: With the unique nature of each project, certain issues may arise which have not been covered in the above guidelines. Each project will have to be reviewed on a case-by-case basis, to ensure that complete, safe, usable and accessible paths-of-travel are maintained during construction.

Compliance with the American' with Disabilities Act (ADA)

The Americans with Disabilities Act (ADA) is a civil rights law that mandates equal opportunity for individuals with disabilities. The ADA prohibits discrimination in access to public facilities, among other things. In compliance with the ADA, the City is in the process of updating its ADA Self Evaluation and Transition Plan to ensure that its facilities within the public right of way, as well as other City facilities, are accessible to people with disabilities. This includes pedestrian access to sidewalks and streets, including crosswalks, curb ramps, parking and other components of the right-of-way.

All persons working within the public right-of-way must comply with the requirements of the Americans with Disabilities Act (ADA). If their work in the public right-of-way will affects pedestrian access, the City, contractor or utility company is required to provide a properly signed accessible route of travel. In other words, all facilities, including those in the public right-of-way, must accommodate disabled pedestrians. The figure below, from the Manual of Uniform Traffic Control Devices, shows a typical sidewalk closure.

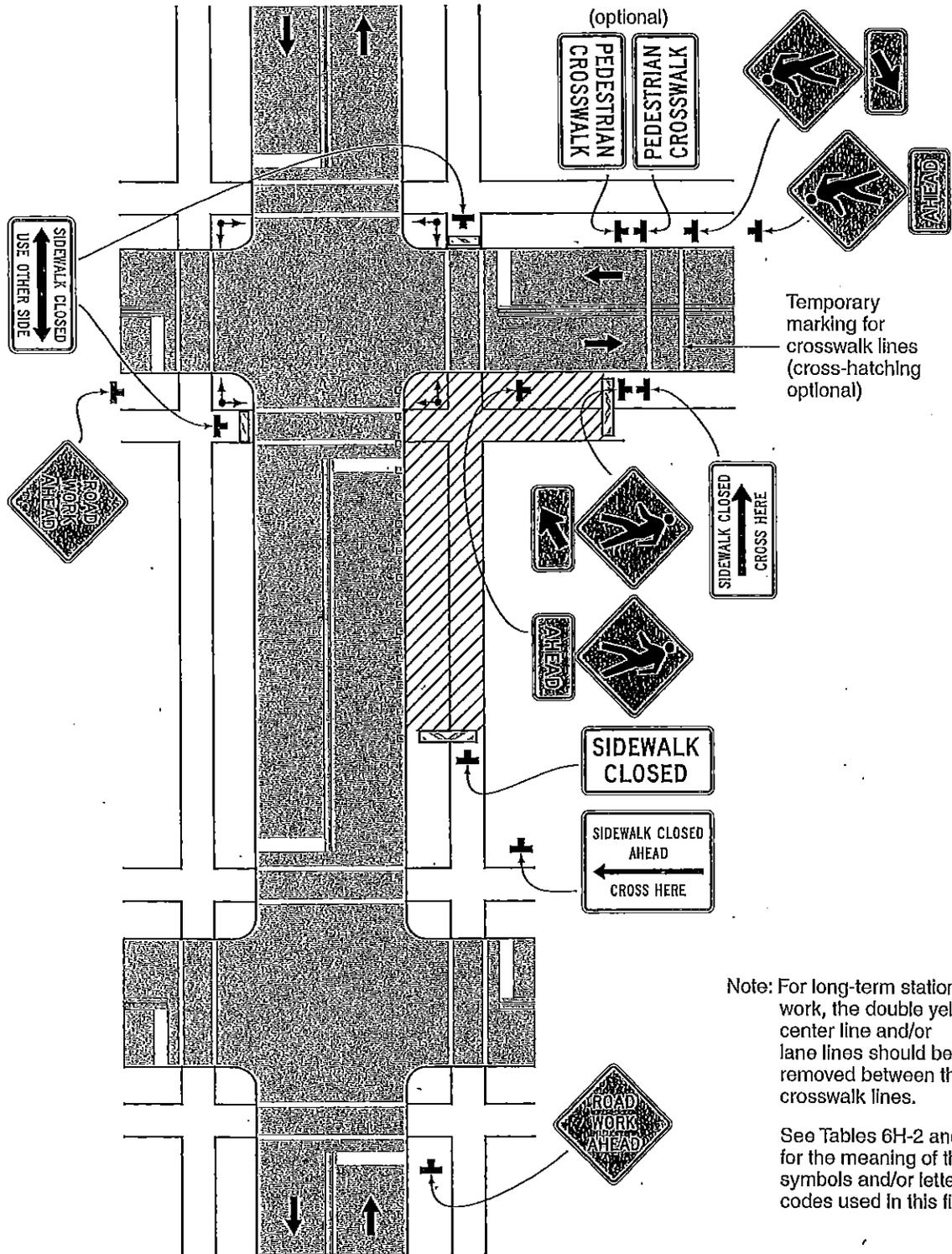
Figure 6H-28. Sidewalk Detour or Diversion (TA-28)



Typical Application 28

Note: See Tables 6H-2 and 6H-3 for the meaning of the symbols and/or letter codes used in this figure.

Figure 6H-29. Crosswalk Closures and Pedestrian Detours (TA-29)



Typical Application 29

PROCEDURE FOR ACCOMMODATING PEDESTRIANS IN WORK ZONES FOR CONSTRUCTION AND MAINTENANCE

A.1 STANDARD

Measures shall be taken to accommodate pedestrian traffic through and/or around Work Zones for Construction and Maintenance. The following guidelines shall be used to determine when conditions are such that these measures shall be implemented:

1. When the work involved is expected to last for 1 hour or longer **and**, any of the following conditions:
2. When the width of an existing sidewalk is reduced.
3. When an existing pedestrian ramp is made unavailable for pedestrian use.
4. When an existing traffic signal control for pedestrians is made unavailable for pedestrian use.
5. When an object protrudes into the existing pedestrian access facility.
6. When any overhead work is to be conducted.

A.2 GUIDANCE

1. The accommodation of pedestrians through and/or around Work Zones for Construction and Maintenance shall be determined during the initial planning process for the project. If applicable, construction phasing shall be made to insure that pedestrian access can be accommodated. For contract work, bid items which are related specifically for pedestrian accommodation, shall be written in such a way that the Work Zone Traffic Control for the project reflect realistic costs for these accommodations.
2. For small construction and maintenance projects on local streets and where the work zone can be contained within one block, the determination for the need for pedestrian access considerations shall be made by a trained, certified, or highly experienced person.
3. For large construction and maintenance projects where the work zone is greater than one block, or when work zone is on any collector or arterial street, the determination for the need for pedestrian access considerations shall be made by the City Traffic Engineer or his/her designee.

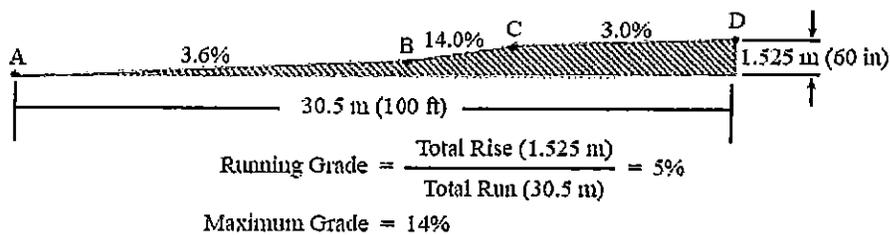
B.1 STANDARD

The design of temporary pedestrian access facilities for construction and/or maintenance work zones shall conform with the latest version of the **MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES FOR STREETS AND HIGHWAYS (MUTCD), CHAPTER 6D. PEDESTRIAN AND WORKER SAFETY**, and applicable supplements to this chapter by **CALTRANS**. This design shall also be made under the direction and authorization of a licensed Civil or Traffic Engineer, as verified by signature and registration, and shall be approved by the City

B.2 GUIDANCE

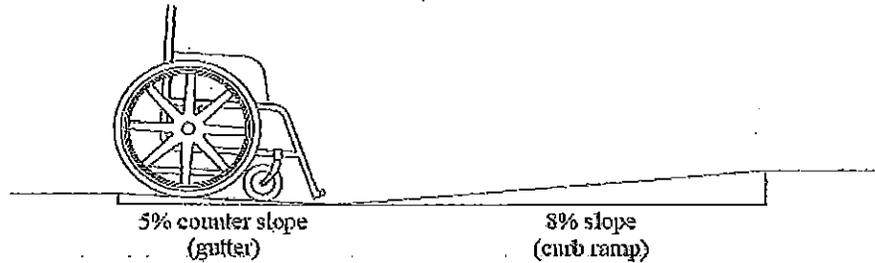
1. In complying with the Standards and Guidance found in the MUTCD and this standard, the design of pedestrian pathways through work zones shall be in compliance with the requirements of the Americans with Disabilities Act (ADA).
2. Adequate provisions shall be made for all pedestrians, including those with disabilities. The following three concepts shall be considered in the planning for pedestrians in work zones:
 - a. Pedestrians shall not be led into conflicts with work site vehicles, equipment, and operations.
 - b. Pedestrians shall not be led into conflicts with vehicles moving through or around the work site.
 - c. Pedestrians shall be provided with a reasonably safe, convenient, and accessible path that replicates as nearly as practical the most desirable characteristics of the existing sidewalk(s) or footpath(s). Where pedestrians who have visual disabilities encounter work sites that require them to cross the roadway to find an accessible route, instructions may be provided using an audible information device. Accessible pedestrian signals with passive detectors may be needed to enable pedestrians with visual disabilities to cross wide or heavily traveled roadways.
3. Pedestrian routes shall not be impacted for the purposes of any non-construction activities such as for parking of vehicles or equipment.
4. Design for pedestrian access shall include the following considerations:
 - a. The maximum allowable running grade without handrails shall be 5.0%. The maximum grade with handrails and level landings shall be 8.33%. Grade is the slope parallel to the direction of travel and is calculated by dividing the rise in elevation by the horizontal distance covered. Running grade is the average grade along a continuous grade. Maximum grade is a shorter section which exceeds the running grade, and is measured in 24 inch intervals (the approximate length of a wheelchair wheelbase). The following diagram illustrates these concepts:

Maximum grades can make a sidewalk difficult to traverse, even if the overall running grade is moderate.

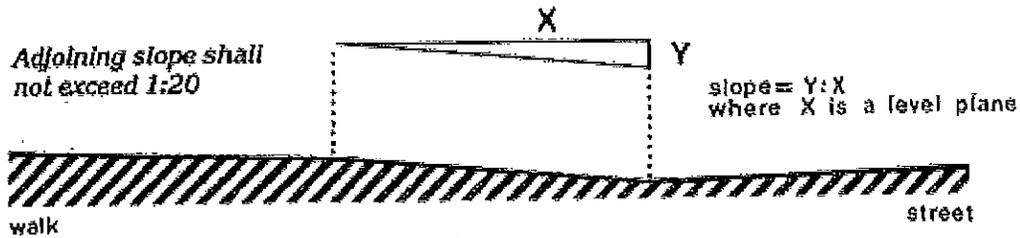


The maximum allowable rate of change of grade shall be 13% and is illustrated in the diagram below. The rate of change of grade is the change in grade over a given distance. This grade is determined by measuring the grade and the distance over which it occurs for each 24 inch segment.

The gutter slopes counter to the slope of the curb ramp to promote drainage.

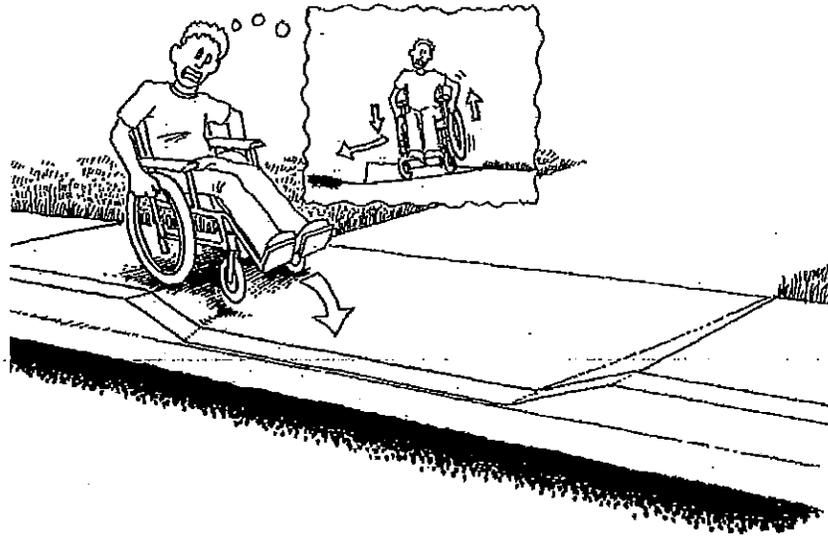


- b. The maximum allowable running cross-slope shall be 2.0%. The following diagram illustrates the concept of cross-slope. Cross-Slope is the slope measured perpendicular to the direction of travel and is measured only at specific points. Running cross-slope is the average cross-slope of a contiguous section of walkway. Maximum cross-slopes are points within this contiguous section that exceed the running cross-slope. Rate of change of cross-slope is the change in cross-slope over a given distance at 24 inch intervals and is expressed in percent.

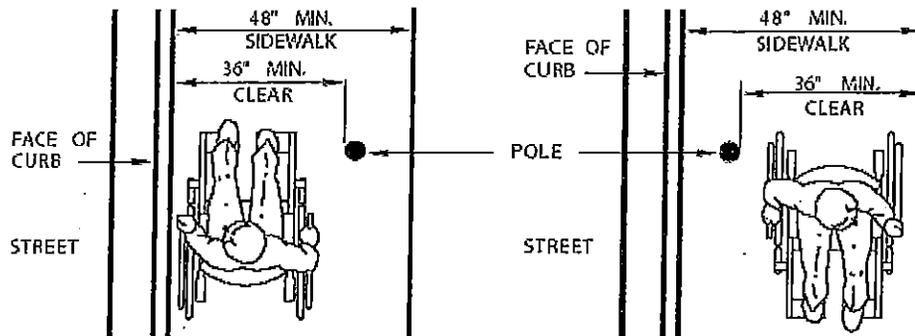


The following diagram illustrates the concept of rate of change of cross-slope:

When cross-slopes change rapidly over a short distance, wheelchair use becomes extremely unstable.



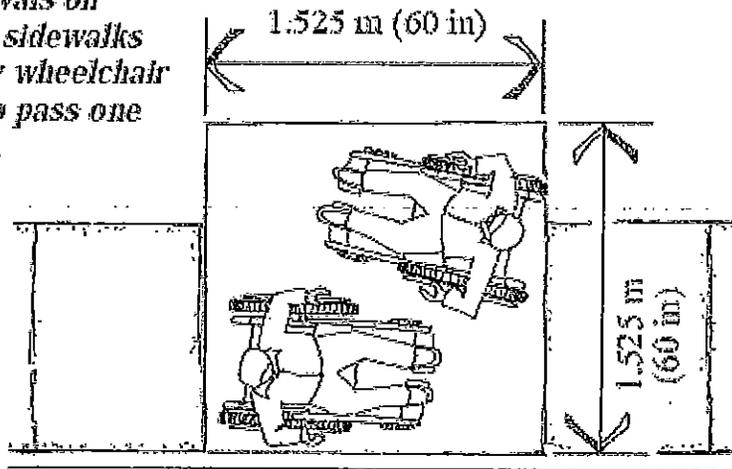
- c. The minimum allowable clear width for all pedestrian facilities shall be 48 inches, except as follows: 1. A minimum width of 36 inches is allowable for a length of 24 inches maximum. This narrow width must be separated by a minimum of 48 inches in length where the width conforms to the 48 inch minimum. 2. When, because of right-of way restrictions, natural barriers or other existing conditions when the City determines that compliance with the 48 inch width would create an unreasonable hardship, the clear width may be reduced to 36 inches.



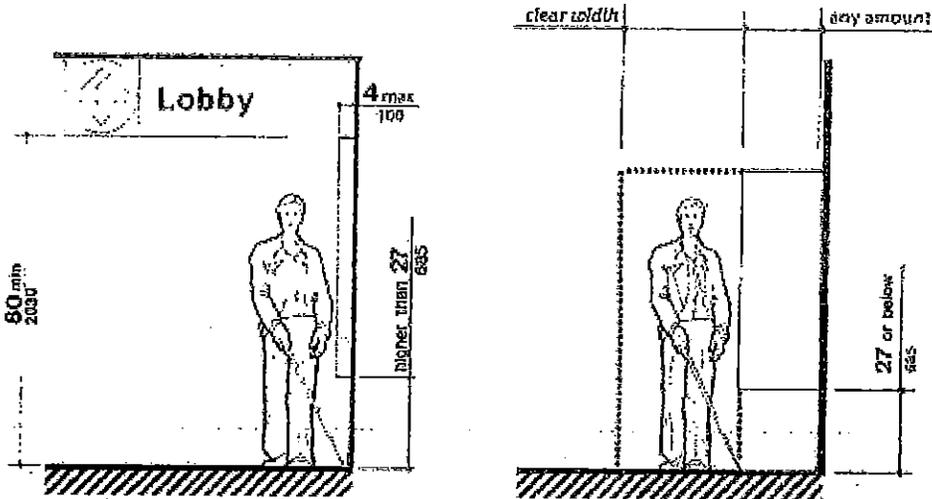
(a) SIDEWALK OBSTRUCTIONS

- d. Passing Spaces and maneuvering spaces shall be a minimum of 60 inches wide and 60 inches in length, and at intervals not to exceed 200 feet. The following diagram illustrates this:

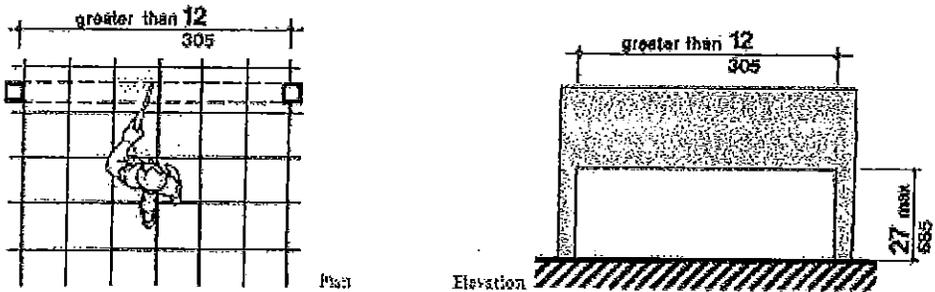
Passing spaces should be included at intervals on narrow sidewalks to allow wheelchair users to pass one another.



- e. There shall be no objects, machinery, personnel, or anything resulting from the construction or maintenance project that shall be overhead of a pedestrian walkway. If it becomes necessary for the satisfactory completion of the project, the walkway shall be detoured appropriately, or scaffolding shall be constructed to protect pedestrians from the potential of falling objects.



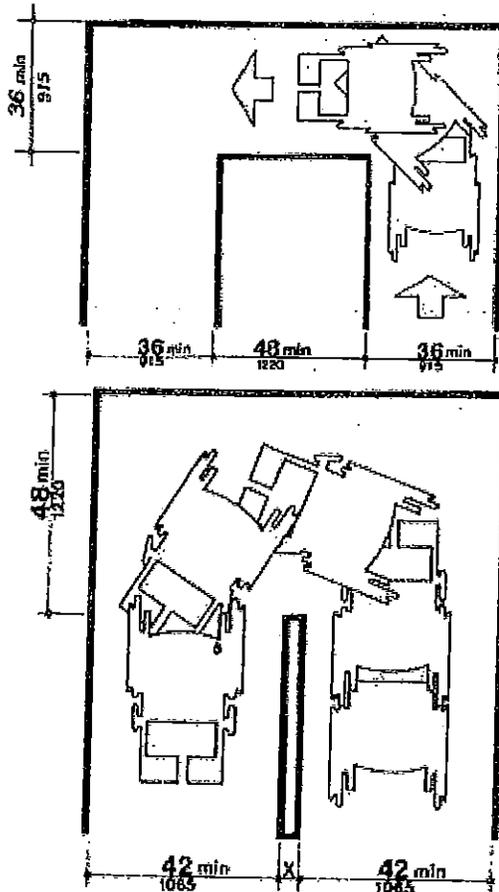
Example of protruding object adjacent to line of travel.



Example of overhead protruding object.

- h. The design of pedestrian barricades used to define the pedestrian path through the work zone, shall be firm and stable. They should allow a pedestrian the ability to lean against it with no resulting movement. They should provide positive guidance along the base perimeter for blind pedestrian using a cane.
- i. All surfaces in pedestrian access facilities shall be firm, stable, and slip-resistant.
- j. All Crosswalks shall be approved by the City Traffic Engineer. The use of audible and/or vibrotactile signals may be required, and shall be left to the discretion of the City. All crosswalks shall be marked and signed according to the requirements in the MUTCD.
- k. Sight Distance evaluations shall be required in the design of all Work Zone Traffic Control Plans. Sight distances shall meet all applicable standards. This evaluation shall be made under the direction of a licensed Engineer and shall be approved by The City

1. When necessary in the construction of pedestrian walkways within a work zone and when the State minimum width of 48 inches is deemed unattainable and infeasible, the following turning radius requirements shall be adhered to:



NOTE: Dimensions shown apply when $x < 48$ in (1220 mm).

References:

- Title 24 California Code of Regulations
- FHWA Designing Sidewalks and Trails for Access, July 1999
- ADA Accessibility Guidelines, Chapter 4 Accessible Routes, July 23, 2004
- ADA Standards for Accessible Design, July 1, 1994