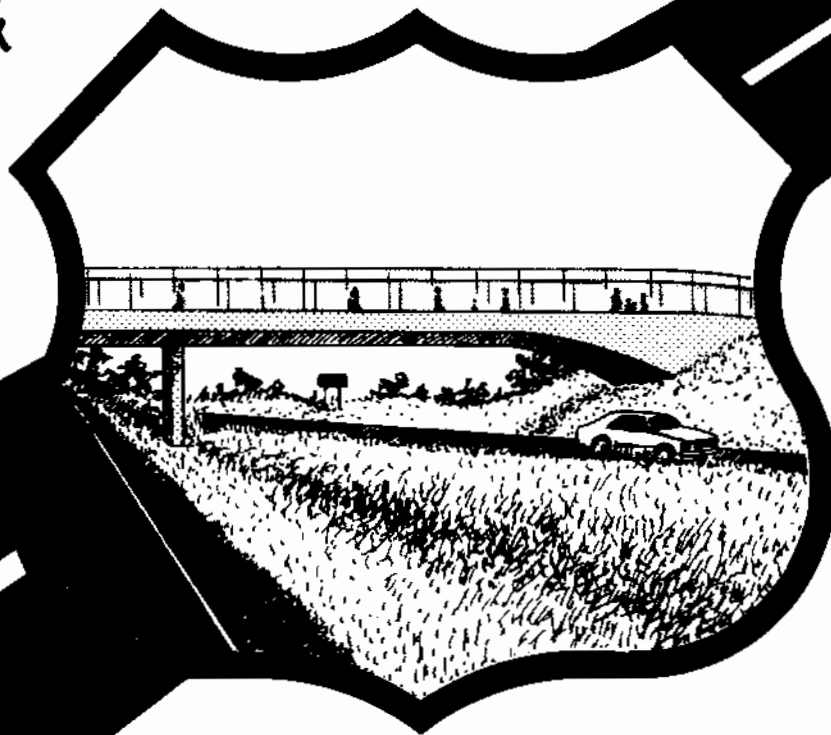


Report No. FHWA-RD-79-146

# THE FEASIBILITY OF ACCOMMODATING PHYSICALLY HANDICAPPED INDIVIDUALS ON PEDESTRIAN OVER AND UNDERCROSSING STRUCTURES

September 1980

Final Report  
*Appendix*



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Prepared for  
**FEDERAL HIGHWAY ADMINISTRATION**  
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## FOREWORD

This report describes the evaluation of a sampling of over- and undercrossing structures to identify major and minor access barriers for the physically handicapped. From this evaluation, it was determined that it is feasible to accommodate the physically handicapped on crossing structures. However, further research on specific design problems (ramp gradients, lengths, etc.) is needed before recommendations for the design or retrofitting of over- and undercrossing structures can be developed.

Research in pedestrian safety is included in the Federally Coordinated Program of Highway Research and Development as Task 1 of Project 1E, "Safety of Pedestrians and Abutting Property Occupants." Mr. John C. Fegan is the Project Manager.

One copy of this report is being distributed to each FHWA regional and division office.

for *D. Solomon*  
Charles F. Scheffey  
Director, Office of Research  
Federal Highway Administration

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The first national legislation directed at the elimination of architectural barriers has been enacted only within the past two decades. For the elderly and handicapped pedestrian, the legislation has had little impact up to now because it has been primarily directed at buildings and, in particular, at buildings financed in whole, or in part, with Federal funds. The sidewalks, streets, street crossings, public open spaces, parking lots, building sites, shopping centers, parks and recreation areas that are under the legal control of cities, towns, countries and local authorities remain substantially inaccessible.

This report is a review of Federal legislation and regulations which pertain to the provision of crossing structures for pedestrians and the accessibility of structures to handicapped individuals. A major information source for this review was the survey of legislation previously conducted by researchers of the Pedestrian Research Laboratory entitled, "Provisions for Elderly and Handicapped Pedestrians: Volume 2, Hazards, Barriers, Problems, and the Law. That review covered legislation enacted through the middle of 1977, plus certain significant laws passed later in 1977 and during 1978, is broader in scope than the present review. This report includes legislation enacted through May 31, 1979.

Several significant laws have contained reference to the needs and rights of elderly and handicapped citizens. Although none of these laws identify crossing structures specifically, they do refer to the removal of architectural barriers in public buildings and facilities. The "Architectural Barriers Act of 1968" as amended requires the establishment of minimum accessibility standards for buildings and facilities constructed with Federal funds. The requirements for the elimination of architectural barriers also include transportation systems, housing and community development (the Urban Mass Transportation Act of 1964 as amended, the Federal-Aid Highway Act of 1973 as amended, the Surface Transportation Assistance Act of 1978), and "services to assist physically and mental impaired older people to lead more independent lives" (The Older Americans Act of 1965 as amended). The Surface Transportation Assistance Act of 1978 includes specific reference to pedestrian provisions. It allows Federal aid highway funds to be used for construction or improvement of pedestrian walkways and grants authority to the states to purchase adequate rights-of-way to accommodate bicycle and pedestrian travel. The Federal-Aid Highway Act of 1973 initially permitted Federal-aid highway funds to be used for bicyclist and pedestrian travel.

#### Definitions

The American Association of State Highway and Transportation Officials' Policy on Design of Urban Highways and Arterial Streets 1973 defines over and undercrossings as follows: "A grade separation is defined as a crossing of two highways, or a highway and a railroad, at different levels. The terms "overpass" and "overcrossing" are used to designate the grade separation where the subject highway passes over an intersecting street or railroad. The terms "underpass" and "undercrossing" apply where the subject highway passes under

the street or railroad."<sup>1</sup> This definition is directed toward vehicular crossings and is somewhat limited when applied to the pedestrian situation. For the purposes of this report this definition has been expanded to include crossings over or under natural features such as rivers, crossings which pass through buildings and air-rights structures. The crossings themselves are those which accommodate vehicular, bicycle, and/or pedestrian traffic.

For the purposes of this report the definition of a handicapped individual will be "any person who (a) has a physical or mental impairment which substantially limits one or more of such person's major life activities; (b) has a record of such impairment, or (c) is regarded as having such impairment." This definition appears in the Rehabilitation Act Amendments of 1974,<sup>2</sup> U.S.C. 706(6). For further discussion of the definition of handicapped refer to the report, "Provisions for Elderly and Handicapped Pedestrians: Volume 2, Hazards, Barriers, Problems and the Law."

### Federal Legislation

1. Architectural Barriers Act (Public Law 90-480, 1968). An Act to Ensure that Certain Buildings Financed with Federal Funds are so Designed and Constructed as to be Accessible to the Physically Handicapped. August 12, 1968. (42 USC 4151 et seq.)

Congress recognized that approximately twenty-two million physically handicapped people were restricted in their movements and that these people were a valuable asset to society and must be afforded every opportunity to enter the mainstream of American life. Congress also realized that it had to mandate minimum accessibility standards since voluntary barrier-free standards had not assured disabled people total accessibility to and utilization of Federal Government facilities. The Architectural Barriers Act of 1968 states:

"... the term 'building' means any building or facility (other than (A) a privately owned residential structure and (B) any building or facility on a military installation designed and constructed primarily for use by able-bodied military personnel) the intended use for which either will require that such building or facility be accessible to the public, or may result in the employment or residence therein of physically handicapped persons ... to be constructed or altered by or on behalf of the United States, leased in whole or in part by the United States or to be financed in whole or in part by a grant or loan made by the United States subject to this Act."

Section 2 states the Administrator of General Services, in consultation with the Secretary of Health, Education, and Welfare, shall prescribe standards for the design, construction, and alteration of certain Federal buildings to insure whenever possible that physically handicapped persons will have ready access to, and use of, such buildings. The GSA has issued regulations as required (Regulations at 41 C.F.R. 101-19.6, effective September 12, 1969).

Section 5 states every building designed, constructed, or altered after the effective date of a standard issued under this Act which is applicable to such building, shall be designed, constructed, or altered in accordance with such standard.

Section 6 states the Administrator of General Services, with respect to standards issued under Section 2 of this Act, and the Secretary of Housing and Urban Development, with respect to standards issued under Section 3 of this Act, and the Secretary of Defense with respect to standards issued under Section 4 of this Act, and the United States Postal Service with respect to standards issued under Section 4a of this Act:

- (1) is authorized to modify or waive any such standard, on a case-by-case basis, upon application made by the head of the department, agency or instrumentality of the United States concerned upon a determination by the Administrator or Secretary, as the case may be, that such modification or waiver is clearly necessary, and
  - (2) shall establish a system of continuing surveys and investigations to insure compliance with such standards.
2. Rehabilitation Act of 1973 (Public Law 93-112) as amended through December 31, 1978. (29 USC 792)

Section 502 established the Federal Architectural and Transportation Barriers Compliance Board<sup>4</sup> which shall be composed as follows:

1. Eleven members shall be appointed by the President from among members of the general public of whom five shall be handicapped individuals.
2. The remaining 10 members shall be heads of each of the following departments or agencies (or their designees): Department of Health, Education, and Welfare, Department of Transportation, Department of Housing and Urban Development, Department of Labor, Department of the Interior, Department of Defense, Department of Justice, General Services Administration, Veterans Administration, and United States Postal Service.

It shall be the function of the Board to:

- (1) insure compliance with the standards prescribed pursuant to the Architectural Barriers Act of 1968, as amended, including but not limited to enforcing all standards under that Act, and insuring that all waivers and modifications of standards are based upon findings of fact and are not inconsistent with the provisions of such Act;
- (2) investigate and examine alternative approaches to the architectural, transportation, communication, and attitudinal barriers confronting handicapped individuals, particularly with respect to telecommunication devices, public buildings and monuments, parks and parkland, public transportation, and residential and institutional housing;
- (3) determine what measures are being taken by Federal, State, and local governments and by other public or nonprofit agencies to eliminate the barriers described in clause (2) above;
- (4) promote the use of the International Accessibility Symbol in all public facilities that are in compliance with the standards prescribed by the Administrator of the General Services Administration, the Secretary of Defense, and the Secretary of Housing and Urban Development pursuant to the Architectural Barriers Act of 1968;
- (5) make to the President and Congress reports on results of investigations and

recommendations for legislation and administration which it deems necessary or desirable to eliminate barriers;

- (6) establish minimum guidelines and requirements for the standards issued pursuant to the Architectural Barriers Act of 1968, as amended.

In carrying out its functions, the Board shall conduct investigations, hold public hearings, and issue orders as it deems necessary to insure compliance with other provisions of the applicable law. An order of compliance issued by the Board shall be a final order for purposes of judicial review. Any such order affecting any Federal department, agency, or instrumentality of the United States shall be final and binding on such department, agency, or instrumentality. An order of compliance may include the withholding or suspension of Federal funds with respect to any building or public conveyance or rolling stock found not to be in compliance with standards enforced under the Board's jurisdiction. Pursuant to Chapter 7 of Title 5, United States Code, any complaint or participant in a Board proceeding may obtain review of a final order issued by the Board.

In December 1977, the Board issued a citation against the Federal Highway Administration (FHWA) and the Department of Transportation (DOT) alleging that a pedestrian overpass paid for in part by Federal-aid highway funds, had not been built in accordance with the American National Standards Institute standards. The Board, through its Executive Director, claimed that this overpass was not in conformance with the Architectural Barriers Act; the FHWA asserted that the structure had been built in accordance with its approved construction criteria. Without determining if laws were violated and to end this dispute the parties entered into an Agreement which was accepted by the administrative law judge, who dismissed the citation, in March 1979. The Agreement set forth the following pertinent stipulations and provisions:

WHEREAS the Department of Transportation and the Federal Highway Administration desire to assure continued progress in making Federal-aid highway facilities accessible to physically handicapped persons; and

WHEREAS the Architectural and Transportation Barriers Compliance Board is charged with determining what measures are being taken to eliminate architectural and transportation barriers to physically disabled persons and insuring compliance with standards issued under the Architectural Barriers Act of 1968, as amended; and

WHEREAS the parties wish to cooperate in achieving their mutual goals; and

WHEREAS it is agreed by the parties that for purposes of this agreement the following terms shall bear the following definitions:

Overpasses and underpasses are pathways designated for pedestrians, which pass over and under, respectively, through lanes for motor vehicles, and which are constructed in whole or in part with Federal-aid funds.

Physically handicapped person is an individual who has a physical impairment that substantially limits one or more major life activities.

The FHWA agreed that until further regulations are issued, Federal funds would not be spent on structures unless the design met certain specific provisions of the ANSI standards.

The FHWA is working to develop standards for the design and construction of pedestrian overpasses and underpasses for accessibility and usability by physically handicapped persons, which standards will supplement and clarify the ANSI standards. The new standards will be consistent with DOT's 504 regulations, as they apply to overpasses and underpasses. Any variance in design from the standards or regulations, proposed for new projects must be approved by the Federal Highway Administrator or designee, after notifying the Executive Director and finding that the variance is clearly necessary.

In addition, the FHWA has agreed to continue or consider certain actions to enhance accessibility and usability of overpasses and underpasses. This will include research and development, feasible demonstration projects, exchanges of information and consultations with the Board, and exchanges of technical assistance.

The FHWA agreed to issue a notice urging States to develop an inventory identifying certain overpasses and underpasses. The States are asked to pinpoint in such inventory those most in need of modification, according to criteria such as steepness of grade, seriousness of hazard, potential frequency of use, and location. States are urged to establish a timetable for modification by altering intersections and correctly ramping existing facilities. The FHWA and the Board will jointly develop guidelines for the modifications and the State's progress will be reported and reviewed.

Further portions of the Agreement address training in the needs of physically handicapped persons and consultation with their representative groups. The Agreement provides for a procedure between FHWA and the Board for processing complaints regarding accessibility of overpasses and underpasses. The Board will not initiate proceedings against FHWA if they plan to modify the particular overpass or underpass, or the State in which it is located is making reasonable progress towards modifying on a priority basis its overpasses and underpasses. The agreement is viewed by the Board as a step to provide increased accessibility of highway overpasses and underpasses.

3. Department of Transportation law affecting transportation for elderly and handicapped persons.

United States Code, Title 23: Highways

23 USC 109(a)

The Secretary shall not approve plans and specifications for proposed projects on any Federal-aid system if they fail to provide for a facility ... that will be designed and constructed in accordance with standards best suited to accomplish the ... objectives and conform to the particular needs of each locality.

23USC 217(a)

To encourage the multiple use of highway ... States may ... on Federal-aid highway projects, include to the extent practicable, suitable, and feasible, the construction of separate ... and pedestrian walkways....

**23 USC 402(b) (1) (F)**

The Secretary shall not approve any State highway safety program under their section which does not ... provide adequate and reasonable access for the safe and convenient movement of physically handicapped persons, including those in wheelchairs, across curbs constructed or replaced on or after July 1, 1976, at all pedestrian crosswalks throughout the State.

Surface Transportation Assistance Act of 1978. Title I, Federal-aid Highway Act of 1978. Section 168 (a) Section 152 of Title 23, USC, is amended to read: "Each state shall conduct and systematically maintain an engineering survey of all public roads to identify hazardous locations, sections and elements, including roadside obstacles and unmarked or poorly marked roads, which may constitute a danger to motorists and pedestrians, assign priorities for the correction of such locations, sections and elements, and establish and implement a schedule of projects for their improvement."

Urban Mass Transportation Act of 1964, as amended, Public Law 88-365.<sup>5</sup> An amendment in 1970 Public Law 91-453, Section 16, declared that it is a "national policy that elderly and handicapped persons have the same right as other persons to utilize mass transportation facilities and services." Under Section 6, 1 1/2% of funds may be set aside and used to increase information and technology for elderly and handicapped mass transportation needs. Section 16(b) of this Act states that UMTA under the Secretary "may" set aside 2% of funds to finance programs:

- (1) to states for local public roads and for providing mass transportation services;
- (2) to private non-profit corporations which provide transportation services meeting the special needs of elderly and handicapped people.

Executive Order

On April 28, 1976, the President issued Executive Order 11914 (41 FR 17871) (29 USC 794) which states: The Secretary of Health, Education, and Welfare shall coordinate the implementation of Section 504 of the Rehabilitation Act of 1973, as amended, for all Federal departments and agencies empowered to extend financial assistance to any Federal program or activity.

The Executive Order directs the Secretary of HEW to establish certain standards and guidelines, as well as the procedures to guide other Federal departments or agencies in implementing Section 504. Standards and procedures and guidelines were issued by HEW on January 13, 1978, 43 FR 2132, to provide the framework for a comprehensive government effort to eliminate discrimination against the handicapped.

The Department of Transportation's final rule implementing Section 504 was published in the Federal Register of May 31, 1979. Section 27.75, Federal Highway Administration - Highways, states ...



- (2) Curb cuts. All pedestrian crosswalks constructed with Federal financial assistance shall have curb cuts or ramps to accommodate persons in wheelchairs.
- (3) Pedestrian overpasses, underpasses and ramps. Pedestrian overpasses, underpasses and ramps, constructed with Federal financial assistance, shall be accessible to handicapped persons, including having gradients no steeper than 10 percent, unless:
  - (i) Alternate safe means are provided to enable mobility-limited persons to cross the roadway at that location; or
  - (ii) It would be infeasible for mobility-limited persons to reach the overpasses, underpasses or ramps because of unusual topographical or architectural obstacles unrelated to the federally assisted facility.

American National Standards Institute Standard Specifications for Making Buildings and Facilities Accessible to and Usable by the Physically Handicapped, (American National Standards Institute Standard Specifications) A117.1-1961 (ANSI).

The ANSI specifications include general principles and considerations regarding barrier-free design, and address the specific problems and potentials of site development and buildings. They do not include specifications for walks, streets, or crossings.

The Standards have been widely followed in both federal and state statutes since their preparation in 1961. However, they no longer adequately meet the needs of today's handicapped population. For this reason, Syracuse University was awarded a contract by the Department of Housing and Urban Development to prepare revisions and additions to the ANSI Standards and to bring them up to the state-of-the-art to date and submit them to the American National Standards Institute. Although the revisions currently under preparation will update and expand the scope of the ANSI Standards, no reference is made specifically to over- or undercrossing structures.

## REFERENCES

1. American Association of State Highway and Transportation Officials, A Policy on Design of Urban Highways and Arterial Streets, Washington, D.C., 1973, p. 499.
2. Rehabilitation Act Amendments of 1974, P.L. 93-516.
3. "Architectural Barriers Act", P.L. 90-480, An Act to Ensure that Certain Buildings Financed with Federal Funds are so Designed and Constructed as to be Accessible to the Physically Handicapped, 1968.
4. Legislative Mandate of the Architectural and Transportation Compliance Board, 1977.
5. Urban Mass Transportation Assistance Act of 1964 as Amended in 1970, P.L. 91-453.
6. American National Standards Institute, Inc., American National Standards Specifications for Making Buildings and Facilities Accessible to and Usable by the Physically Handicapped, A117.1, (R71) New York, ANSI, 1961.

# DATA COLLECTION FORM

**B**  
appendix

Location:

Date:

Time:

Weather:

Portions of walkway are hidden from view (crime potential).	
Over/underpass is not close to public transportation stop.	
No sidewalk at end condition.	
Parked cars restrict approach.	
Parked cars obstruct view of approach.	
No accessible parking.	
No detectable pedestrian crosswalk to approach.	
Driver's view of pedestrian blocked.	
Pedestrian walkway on only one side.	
Walkway less than 48" (too narrow).	
Head room below 6'10".	
Walkway through "long" tunnel (over 40').	
Structure vibrates (traffic).	
Abrasive or perforated material on vertical surface adjacent to walkway.	
Objects project into walkway (signs, trees, etc.).	
Manhole covers and gratings in walkway.	
Highly reflective surface materials.	

Grooves and patterns (cast into walkways or caused by small paving units).	
Large, deep expansion joints.	
Uneven and irregular surfaces.	
Loose and soft surfaces (gravel, sand, etc.).	
Rough surfaces.	
Discontinuous surface materials.	
Debris from erosion on walkway.	
Disrepair (i.e., frost heaves, potholes, etc.).	
Disrepair from vandalism or accident (handrails, guardrails, etc.).	
Stairway is only means of access to structure.	
Stairway only on one side of structure.	
Poorly lighted steps, stairs, ramps.	
Treads less than 11" (too small).	
Projecting nosings.	
Open risers.	
Risers greater than 7" (too high).	
Curb greater than 6" (too high).	
Step (settlement) between approach and structure.	
Dangerous stair location.	
Only ramps provided.	

Only ramps provided on one side of structure.	
Pathway leading to over/under-crossing too steep and long.	
Ramp too long (exceeds 30 feet).	
Ramp too steep (slope greater than 1:12).	
Ramp too narrow (less than 48").	
Cross slope greater than 1:50 (too steep).	
No curb cuts.	
Helical ramp.	
Ramp layout inconvenient.	
Abrupt transition to connecting walkways.	
Ramp exits directly into street or parking area (less than 6' clearance at bottom of ramp).	
Bollards in the middle of entrance to the ramp.	
Steps in the middle of the ramp.	
Handrails higher than 36" (too high).	
Handrails lower than 32" (too low).	
No handrails.	
Handrails inadequate for comfortable grasp.	
Handrail material metal or aluminum (hot in hot weather, cold in cold).	
Handrails not continuous.	

Handrails don't extend far enough (1' at top and bottom of stairs and ramps).	
No handrails on ramps.	
Barricades not detectable (blind cane).	
Guardrails not continuous.	
Guardrails too low (less than 42").	
No pedestrian guardrails.	
Inadequate guardrails.	
Guardrail mesh hazardous.	
No detectable separation between bikeway and pedestrian way.	
No detectable separation between roadway and walkway.	
No detectable separation between walkway and parking lot.	
Unprotected sidewalks (cars, edges, etc.).	
Escalators.	
Elevators.	
Resting places not under cover (wind, rain, sun).	
Not enough places to stop and rest.	
No provision for scenic overlook.	
Benches that are too high, too low, too deep or shallow or with no armrest.	
No alternative route for flood condition structures.	

No pedestrian emergency provisions.	
Significant change of light level in tunnel at entrance.	
Interior lighting not adjusted to outside light conditions.	
Glare at end of tunnel.	
Tunnel too dark.	
Glare and flashing lights from vehicles.	
Poor illumination.	
No signage indicating location of rest areas.	
Street signs and signals too high, low or far.	
No special signage for the visually impaired.	
Traffic lights with short green cycle.	
Complicated instructions on signs.	
No warning of potential hazards.	
No orientation cue as to start of approach.	
Lack of orientation cues generally.	
Pathway junctions which are not at 90° angle or which curve.	
No detectable orientation cue as to start of channelization.	
Walkway not channelized.	

Traffic noise.	
High wind gusts present.	
Wind generated by traffic.	
Inadequate provision for rain water run off.	
Walkways and sidewalks not kept clear of snow, ice and debris.	



# BARRIERS MATRIX

**C**  
appendix

This appendix correlated environmental barriers with groups of people with various handicapping conditions. Environmental barriers are listed across the top of each sheet while the handicapping conditions are enumerated along the left hand column of the matrix. The list of handicapping conditions is four pages long; on the fifth page of the matrix it begins again, linking the list with the next group of environmental barriers.

For example, the effect of different environmental barriers on people with the handicapping condition, "Difficulty with environmental orientation" is found in matrix sections A1, B1, C1, etc. However, the different effects of the environmental barrier entitled, "Driver's view of pedestrian blocked" on all groups of people can be found in the matrix sections A1, A2, A3, and A4 (matrix section numbers are found in the top right hand corner of each page).

Key: N = No mobility problem I = Inconvenient D = Causes considerable difficulty B = An impossible barrier	Location and End Condition (LEC)							
	Portions of walkway are hidden from view (crime potential).	Overcrossing/undercrossing is not close to public transportation stop.	No sidewalk at end condition.	Parked cars restrict approach.	Parked cars obstruct view of approach.	No accessible parking.	No detectable pedestrian crosswalk to approach.	
Difficulty with environmental orientation.	I	I	D/B	N	I	N	I	
Understanding deficit.	N	I	D/B	I	I	N	I	
Limited attention span.	I	I	D	I	I	N	I	
Memory deficit.	I	I	I/D	I	I	N	I	
Decreased ability to sequence, judge time, direction, distance, size.	I	N	I/D	I	I	N	I	
Impaired night vision.	D	D	I/D	D	D	N	I	
Impaired cutaneous sensation detection.	I	I	N	I	I	N	I	
Chronic stooped posture.	I	I	I	I	I	N	I	
Difficulty in maintaining equilibrium.	I	D	I	I	I	D	I	
Moves at slow speed.	I	I	I	I	I	I	I	
Swaying, shuffling, uneven, erratic or staggering gait.	I	I	I/D	I	I	I	I	
Frequent need to rest during exercise.	I	D	I/D	I	I	D	I	

	Location and End Condition (LEC)							
	Portions of walkway are hidden from view (crime potential).	Overcrossing/undercrossing is not close to public transportation stop.	No sidewalk at end condition.	Parked cars restrict approach.	Parked cars obstruct view of approach.	No accessible parking.	No detectable pedestrian crosswalk to approach.	
Key: N = No mobility problem I = Inconvenient D = Causes considerable difficulty B = An impossible barrier								
Reduced tolerance to brisk exercise (need to move slowly).	I	I	I/D	N	N	N	N	
Limited ability to stand for long periods.	I	D	I	N	N	D	I	
Impaired bladder control.	N	N	N	N	N	N	N	
Extreme of size (dwarfism, gigantism, obesity, etc.).	N	N	I	I	N	N	N	
Cardiac Pacemaker affected by electrical interference.	N	N	N	N	N	N	N	
Uses powered or manual wheelchair.	I	I	B	D	I	D	D	
Uses walker, crutches, orthopedic cane.	I	I	D	I	I	I	I	
Prosthesis (including braces) for lower extremities.	I	I	D	I	I	I	I	
Decreased ability to tolerate smoke, dust, chemicals, pollens, cold winds.	N	N	N	N	N	N	N	
Limited ability to grasp, release or manipulate with upper extremities (arms, wrist, hands).	N	N	I	N	N	N	N	
Limited reach.	N	N	I	N	N	N	N	

Key: N = No mobility problem I = Inconvenient D = Causes considerable difficulty B = An impossible barrier	Location and End Condition (LEC)							
	Portions of walkway are hidden from view (crime potential).	Overcrossing/undercrossing is not close to public transportation stop.	No sidewalk at end condition.	Parked cars restrict approach.	Parked cars obstruct view of approach.	No accessible parking.	No detectable pedestrian crosswalk to approach.	
Limited manual dexterity.	N	N	N	N	N	N	N	
Inability to turn head.	I	N	N	I	D	I	I	
Decreased ability to stoop.	N	N	N	N	N	N	N	
Difficulty standing from sitting position, or in sitting down.	N	N	N	N	N	N	N	
Limited vertical motion with legs and feet.	I	I	I/D	I	I	I	I	
Limited horizontal motion with legs and feet.	I	I	D	I	I	I	I	
Decreased ability to tolerate heat and cold.	N	D	N	N	N	N	N	
Speech disorder.	N	N	N	N	N	N	N	
Loss of normal speed in motor coordination/slowed reflexes.	I	I	I/D	I	I	I	I	
Fear of crime.	D	I	N	N	N	N	N	
Fear of heights (vertigo).	N	N	N	N	N	N	N	
Agoraphobia.	N	N	N	N	N	N	N	
Claustrophobia.	I	N	N	N	N	N	N	
Fear of loud noises.	N	N	N	N	N	N	N	

Key: N = No mobility problem I = Inconvenient D = Causes considerable difficulty B = An impossible barrier	Location and End Condition (LEC)						
	Portions of walkway are hidden from view (crime potential).	Overcrossing/undercrossing is not close to public transportation stop.	No sidewalk at end condition.	Parked cars restrict approach.	Parked cars obstruct view of approach.	No accessible parking.	No detectable pedestrian crosswalk to approach.
Uses white cane for guidance (visually impaired).	D	I	I/D	I	I		D
Uses guide dog.	I	I	I/D	I	I		D
Limited ability to acquire or process visual stimuli.	D	I	D	I	I	I	I
Limited ability to perceive or process auditory stimuli.	D	N	N	N	N	I	I

Key: N = No mobility problem I = Inconvenient D = Causes considerable difficulty B = An impossible barrier	(LEC)	Walkways						
	Driver's view of pedestrian blocked.	Pedestrian walkway on only one side.	Walkway less than 48" (too narrow).	Headroom below 6'10".	Walkway through "long" tunnel (over 40').	Structure vibrates (traffic).	Abrasive or perforated material on vertical surface adjacent to walkway.	Objects project into walkway (signs, trees, etc).
Difficulty with environmental orientation.	N	I	N	N	D	N	N	N
Understanding deficit.	N	I	N	N	I	I	N	N
Limited attention span.	N	I	N	N	I	N	N	I
Memory deficit.	N	I	N	N	I	N	N	N
Decreased ability to sequence, judge time, direction, distance, size.	I	I	D	N	I	N	N	I
Impaired night vision.	D	I	I	N	D	N	I	D
Impaired cutaneous sensation detection.	I	I	N	N	N	N	I	N
Chronic stooped posture.	I	I	N	N	N	N	N	N
Difficulty in maintaining equilibrium.	I	I	D	N	I	I	N	I
Moves at slow speed.	I	I	N	N	N	N	N	N
Swaying, shuffling, uneven, erratic or staggering gait.	I	D	D	N	N	I	N	I
Frequent need to rest during exercise.	N	N	N	N	I	N	N	N

Key: N = No mobility problem I = Inconvenient D = Causes considerable difficulty B = An impossible barrier	(LEC)	Walkways						
	Driver's view of pedestrian blocked.	Pedestrian walkway on only one side.	Walkway less than 48" (too narrow).	Headroom below 6'10".	Walkway through "long" tunnel (over 40').	Structure vibrates (traffic).	Abrasive or perforated material on vertical surface adjacent to walkway.	Objects project into walkway (signs, trees, etc.).
Reduced tolerance to brisk exercise (need to move slowly).	N	N	N	N	I	N	N	N
Limited ability to stand for long periods.	N	N	N	N	I	N	N	N
Impaired bladder control.	N	N	N	N	I	N	N	N
Extreme of size (dwarfism, gigantism, obesity, etc.).	I	N	D	D	N	N	N	N
Cardiac Pacemaker affected by electrical interference.	N	N	N	N	N	N	N	N
Uses powered or manual wheelchair.	I	I	D	N	I	I	I	I
Uses walker, crutches, orthopedic cane.	I	I	I	N	I	I	I	I
Prosthesis (including braces) for lower extremities.	I	N	N	N	I	I	I	I
Decreased ability to tolerate smoke, dust, chemicals, pollens, cold winds.	N	N	N	N	N	N	N	N
Limited ability to grasp, release or manipulate with upper extremities (arms, wrist, hands).	N	N	N	N	N	N	N	N
Limited reach.	N	N	N	N	N	N	N	N

Key: N = No mobility problem I = Inconvenient D = Causes considerable difficulty B = An impossible barrier	(LEC)	Walkways						
	Driver's view of pedestrian blocked.	Pedestrian walkway on only one side.	Walkway less than 48" (too narrow).	Headroom below 6'10".	Walkway through "long" tunnel (over 40').	Structure vibrates (traffic).	Abrasive or perforated material on vertical surface adjacent to walkway.	Objects project into walkway (signs, trees, etc).
Limited manual dexterity.	N	N	N	N	N	N	N	N
Inability to turn head.	I	I	N	N	N	N	N	I
Decreased ability to stoop.	N	N	N	N	N	N	N	N
Difficulty standing from sitting position, or in sitting down.	N	N	N	N	N	N	N	N
Limited vertical motion with legs and feet.	I	N	N	N	I	N	I	I
Limited horizontal motion with legs and feet.	I	N	N	N	I	N	I	I
Decreased ability to tolerate heat and cold.	N	N	N	N	N	N	N	N
Speech disorder.	N	N	N	N	N	N	N	N
Loss of normal speed in motor coordination/slowed reflexes.	I	N	N	N	I	I	N	I
Fear of crime.	N	N	N	N	I/D	N	N	N
Fear of heights (vertigo).	N	N	N	N	N	N	N	N
Agoraphobia.	N	N	N	N	N	N	N	N
Claustrophobia.	N	N	I	N	D/B	N	N	N
Fear of loud noises.	N	N	N	N	N	I	N	N



Key: N = No mobility problem I = Inconvenient D = Causes considerable difficulty B = An impossible barrier	(LEC)	Walkways						
	Driver's view of pedestrian blocked.	Pedestrian walkway on only one side.	Walkway less than 48" (too narrow).	Headroom below 6'10".	Walkway through "long" tunnel (over 40').	Structure vibrates (traffic).	Abrasive or perforated material on vertical surface adjacent to walkway.	Objects project into walkway (signs, trees, etc.).
Uses white cane for guidance (visually impaired).	D	I	I	N	I	N	I	I
Uses guide dog.	D	I	I	N	I	N	I	I
Limited ability to acquire or process visual stimuli.	I	I	I	N	D	I	N	I/D
Limited ability to perceive or process auditory stimuli.	D	N	N	N	I/D	N	N	N

Key: N = No mobility problem I = Inconvenient D = Causes considerable difficulty B = An impossible barrier	Surface Materials							
	Manhole covers and gratings in walkway.	Highly reflective surface materials.	Grooves and patterns (cast into walkways or caused by small paving units).	Large, deep expansion joints.	Uneven and irregular surfaces.	Loose and soft surfaces (gravel, sand, etc.).	Rough surfaces.	Discontinuous surface materials.
Difficulty with environmental orientation.	N	I	N	N	N	N	N	N
Understanding deficit.	N	I	N	I/D	I	N	N	N
Limited attention span.	I	I	N	I	I	N	N	N
Memory deficit.	N	N	N	N	N	N	N	N
Decreased ability to sequence, judge time, direction, distance, size.	I	N	N	I/D	N	N	N	I
Impaired night vision.	D	I	I	D/B	I	I/D	I/D	I/D
Impaired cutaneous sensation detection.	N	N	N	N	N	I	I	I
Chronic stooped posture.	N	N	N	D/B	N	N	N	N
Difficulty in maintaining equilibrium.	I	N	N	B	I	I	I	I
Moves at slow speed.	N	N	N	I/D	N	N	N	N
Swaying, shuffling, uneven, erratic or staggering gait.	I	N	N	D/B	I	I/D	I/D	I/D
Frequent need to rest during exercise.	N	N	N	I/D	N	N	N	N

Key: N = No mobility problem I = Inconvenient D = Causes considerable difficulty B = An impossible barrier	Surface Materials							
	Manhole covers and gratings in walkway.	Highly reflective surface materials.	Grooves and patterns (cast into walkways or caused by small paving units).	Large, deep expansion joints.	Uneven and irregular surfaces.	Loose and soft surfaces (gravel, sand, etc.).	Rough surfaces.	Discontinuous surface materials.
Reduced tolerance to brisk exercise (need to move slowly).	N	N	N	I/D	N	N	N	N
Limited ability to stand for long periods.	N	N	N	N	N	N	N	N
Impaired bladder control.	N	N	N	N	N	N	N	N
Extreme of size (dwarfism, giantism, obesity, etc.).	N	N	N	D	N	N	N	N
Cardiac Pacemaker affected by electrical interference.	N	N	N	N	N	N	N	N
Uses powered or manual wheelchair.	D/I	N	I	B	D/I	I/D	I/D	I/D
Uses walker, crutches, orthopedic cane.	D/I	N	N	B	D/I	I/D	I/D	I/D
Prosthesis (including braces) for lower extremities.	I	N	N	D/B	I	I/D	I/D	I/D
Decreased ability to tolerate smoke, dust, chemicals, pollens, cold winds.	N	N	N	N	N	N	N	N
Limited ability to grasp, release or manipulate with upper extremities (arms, wrist, hands).	N	N	N	I/D	N	N	N	N
Limited reach.	N	N	N	I/D	N	N	N	N

Key: N = No mobility problem I = Inconvenient D = Causes considerable difficulty B = An impossible barrier	Surface Materials							
	Manhole covers and gratings in walkway.	Highly reflective surface materials.	Grooves and patterns (cast into walkways or caused by small paving units).	Large, deep expansion joints.	Uneven and irregular surfaces.	Loose and soft surfaces (gravel, sand, etc.).	Rough surfaces.	Discontinuous surface materials.
Limited manual dexterity.	N	N	N	I/D	N	N	N	N
Inability to turn head.	I	N	N	I/D	N	N	N	N
Decreased ability to stoop.	N	N	N	N	N	N	N	N
Difficulty standing from sitting position, or in sitting down.	N	N	N	N	N	N	N	N
Limited vertical motion with legs and feet.	I	N	N	I/D	I	I	I	I
Limited horizontal motion with legs and feet.	I	N	N	B	I	I	I	I
Decreased ability to tolerate heat and cold.	N	N	N	N	N	N	N	N
Speech disorder.	N	N	N	N	N	N	N	N
Loss of normal speed in motor coordination/slowed reflexes.	I	N	N	I/D	I	I	I	I
Fear of crime.	N	N	N	N	N	N	N	N
Fear of heights (vertigo)	D	N	N	N	N	N	N	N
Agoraphobia.	N	N	N	N	N	N	N	N
Claustrophobia.	N	N	N	N	N	N	N	N
Fear of loud noises.	N	N	N	N	N	N	N	N

	Surface Materials							
	Manhole covers and gratings in walkway.	Highly reflective surface materials.	Grooves and patterns (cast into walkways or caused by small paving units).	Large, deep expansion joints.	Uneven and irregular surfaces.	Loose and soft surfaces (gravel, sand, etc.).	Rough surfaces.	Discontinuous surface materials.
Key: N = No mobility problem I = Inconvenient D = Causes considerable difficulty B = An impossible barrier								
Uses white cane for guidance (visually impaired).	I	N	I	D	I	I	I	I
Uses guide dog.	I	I	I	I/D	I	I	I	I
Limited ability to acquire or process visual stimuli.	I/D	D	N	D	I	I	I	I
Limited ability to perceive or process auditory stimuli.	N	N	N	N	N	N	N	N

Key: N = No mobility problem I = Inconvenient D = Causes considerable difficulty B = An impossible barrier	Maintenance			Stairways				
	Debris from erosion on walkway.	Disrepair (frost heaves, potholes, etc.).	Disrepair from vandalism or accident (handrails, guardrails, etc.).	Stairway is only means of access to structure.	Stairway only on one side of structure.	Poorly lighted steps, stairs, ramps.	Treads less than 11" (too small).	Projecting nosings.
Difficulty with environmental orientation.	N	N	N	N	N	I	N	N
Understanding deficit.	N	N	N	N	N	N	N	N
Limited attention span.	N	N	N	N	N	N	N	N
Memory deficit.	N	N	N	N	I	N	N	N
Decreased ability to sequence, judge time, direction, distance, size.	I	N	N	N	I	N	I	I
Impaired night vision.	I/D	I/D	I/D	I/D	I	D	I/D	I/D
Impaired cutaneous sensation detection.	I	I	I	I	N	I	I	I
Chronic stooped posture.	N	N	N	N	I	N	N	N
Difficulty in maintaining equilibrium.	I	I	I	I	I	I/D	I	I
Moves at slow speed.	N	N	N	I	N	I	N	N
Swaying, shuffling, uneven, erratic or staggering gait.	I/D	I/D	I/D	I/D	N	I/D	I/D	I/D
Frequent need to rest during exercise.	N	N	N	I	N	I	N	N

Key: N = No mobility problem I = Inconvenient D = Causes considerable difficulty B = An impossible barrier	Maintenance			Stairways				
	Debris from erosion on walkway.	Disrepair (frost heaves, potholes, etc.).	Disrepair from vandalism or accident (handrails, guardrails, etc.).	Stairway is only means of access to structure.	Stairway only on one side of structure.	Poorly lighted steps, stairs, ramps.	Treads less than 11" (too small).	Projecting nosings.
Reduced tolerance to brisk exercise (need to move slowly).	N	N	N	I	I	I	N	N
Limited ability to stand for long periods.	N	N	N	I	N	I	N	N
Impaired bladder control.	N	N	N	N	N	N	N	N
Extreme of size (dwarfism, giantism, obesity, etc.).	N	N	N	I	N	N	I	N
Cardiac Pacemaker affected by electrical interference.	N	N	N	N	N	N	N	N
Uses powered or manual wheelchair.	I/D	I/D	I/D	B	B	I	B	B
Uses walker, crutches, orthopedic cane.	I/D	I/D	I/D	D/B	D	I	D/B	D/B
Prosthesis (including braces) for lower extremities.	I/D	I/D	I/D	I/D	I/D	I	I/D	I/D
Decreased ability to tolerate smoke, dust, chemicals pollens, cold winds.	N	N	N	N	N	N	N	N
Limited ability to grasp, release or manipulate with upper extremities (arms, wrist, hands).	N	N	N	N	N	N	N	N
Limited reach.	N	N	N	N	N	N	N	N

Key: N = No mobility problem I = Inconvenient D = Causes considerable difficulty B = An impossible barrier	Maintenance			Stairways				
	Debris from erosion on walkway.	Disrepair (frost heaves, potholes, etc.).	Disrepair from vandalism or accident (handrails, guardrails, etc.).	Stairway is only means of access to structure.	Stairway only on one side of structure.	Poorly lighted steps, stairs, ramps.	Treads less than 11" (too small).	Projecting nosings.
Limited manual dexterity.	N	N	N	N	N	N	N	N
Inability to turn head.	N	N	N	N	N	I	N	N
Decreased ability to stoop.	N	N	N	N	N	N	N	N
Difficulty standing from sitting position, or in sitting down.	N	N	N	N	N	N	N	N
Limited vertical motion with legs and feet.	I	I	I	I	I/D	I	I	I
Limited horizontal motion with legs and feet.	I	I	I	I/D	N	I	I	I
Decreased ability to tolerate heat and cold.	N	N	N	N	N	N	N	N
Speech disorder.	N	N	N	N	N	N	N	N
Loss of normal speed in motor coordination/slowed reflexes.	I	I	I	I	N	I	I	I
Fear of crime.	N	N	N	N	N	I	N	N
Fear of heights (vertigo)	N	N	I	N	N	I	N	N
Agoraphobia.	N	N	N	N	N	N	N	N
Claustrophobia.	N	N	N	N	N	N	N	N
Fear of loud noises.	N	N	N	N	N	N	N	N



Key: N = No mobility problem I = Inconvenient D = Causes considerable difficulty B = An impossible barrier	Maintenance			Stairways				
	Debris from erosion on walkway.	Disrepair (frost heaves, potholes, etc.).	Disrepair from vandalism or accident (handrails, guardrails, etc.).	Stairway is only means of access to structure.	Stairway only on one side of structure.	Poorly lighted steps, stairs, ramps.	Treads less than 11" (too small).	Projecting nosings.
Uses white cane for guidance (visually impaired).	I	I	I	I	I	I	I	I
Uses guide dog.	I	I	I	I	I	I	I	I
Limited ability to acquire or process visual stimuli.	I	I	I	I	I/D	I	I	I
Limited ability to perceive or process auditory stimuli.	N	N	N	N	N	N	N	N

Key: N = No mobility problem I = Inconvenient D = Causes considerable difficulty B = An impossible barrier	Stairways					Ramps		
	Open risers.	Risers greater than 7" (too high).	Curb greater than 6" (too high).	Step (settlement) between approach and structure .	Dangerous stair location.	Only ramps provided.	Only ramps provided on one side of structure.	Pathway leading to over/undercrossing too steep and long.
Difficulty with environmental orientation.	N	N	N	N	N	N	N	N
Understanding deficit.	N	N	N	N	I	N	N	N
Limited attention span.	N	N	N	N	D/B	N	N	I
Memory deficit.	N	N	N	N	I/D	N	I	I
Decreased ability to sequence, judge time, direction, distance, size.	N	N	N	N	I/D	N	I	I/D
Impaired night vision.	N	N	N	N	D/B	N	I	I
Impaired cutaneous sensation detection.	I	I	I	I	N	N	N	N
Chronic stooped posture.	N	N	N	N	I/D	N	I	D/B
Difficulty in maintaining equilibrium.	I/D	I/D	I	I	D/B	N	I	D/B
Moves at slow speed.	N	N	N	N	N	N	I	D/B
Swaying, shuffling, uneven, erratic or staggering gait.	I	I	I	I	D/B	N	N	D/B
Frequent need to rest during exercise.	N	I	N	N	I	N	N	D/B

Key: N = No mobility problem I = Inconvenient D = Causes considerable difficulty B = An impossible barrier	Stairways					Ramps		
	Open risers.	Risers greater than 7" (too high).	Curb greater than 6" (too high).	Step (settlement) between approach and structure.	Dangerous stair location.	Only ramps provided.	Only ramps provided on one side of structure.	Pathway leading to over/undercrossing too steep and long.
Reduced tolerance to brisk exercise (need to move slowly).	N	I	N	N	I	N	I	D/B
Limited ability to stand for long periods.	N	N	N	N	I	N	I	D/B
Impaired bladder control.	N	N	N	N	N	N	N	I/D
Extreme of size (dwarfism, giantism, obesity, etc.).	I	I	I	I	N	N	N	D/B
Cardiac Pacemaker affected by electrical interference.	N	N	N	N	N	N	N	D
Uses powered or manual wheelchair.	B	B	B	D/B	B	N	B	B
Uses walker, crutches, orthopedic cane.	D/B	D/B	D	I	D	N	I/D	D/B
Prosthesis (including braces) for lower extremities.	D	D	D	I	I/D	N	I/D	D/B
Decreased ability to tolerate smoke, dust, chemicals, pollens, cold winds.	N	N	N	N	N	N	N	N
Limited ability to grasp, release or manipulate with upper extremities (arms, wrist, hands).	N	N	N	N	I	N	N	N
Limited reach.	N	N	N	N	I	N	N	N

	Stairways					Ramps		
	Open risers.	Risers greater than 7" (too high).	Curb greater than 6" (too high).	Step (settlement) between approach and structure.	Dangerous stair location.	Only ramps provided.	Only ramps provided on one side of structure.	Pathway leading to over/undercrossing too steep and long.
Limited manual dexterity.	N	N	N	N	I	N	N	N
Inability to turn head.	N	N	N	N	I/D	N	N	N
Decreased ability to stoop.	N	N	N	N	N	N	N	N
Difficulty standing from sitting position, or in sitting down.	N	N	N	N	N	N	N	N
Limited vertical motion with legs and feet.	N	I	I	N	D/B	N	I/D	D/B
Limited horizontal motion with legs and feet.	D	D	D	D	D	N	I/D	D/B
Decreased ability to tolerate heat and cold.	N	N	N	N	N	N	N	N
Speech disorder.	N	N	N	N	N	N	N	N
Loss of normal speed in motor coordination/slowed reflexes.	N	N	N	N	D/B	N	N	D/B
Fear of crime.	N	N	N	N	N	N	N	N
Fear of heights (vertigo).	I	D	N	N	N	N	N	N
Agoraphobia.	I/D	N	N	N	N	N	N	N
Claustrophobia.	N	N	N	N	N	N	N	N
Fear of loud noises.	N	N	N	N	N	N	N	N

Key: N = No mobility problem I = Inconvenient D = Causes considerable difficulty B = An impossible barrier	Stairways					Ramps		
	Open risers.	Risers greater than 7" (too high).	Step (settlement) between approach and structure.	Dangerous stair location.	Curb greater than 6" (too high).	Only ramps provided.	Only ramps provided on one side of structure.	Pathway leading to over/undercrossing too steep and long.
Uses white cane for guidance (visually impaired).	N	N	N	N	D	N	I/D	I/D
Uses guide dog.	N	N	N	N	I/D	N	I	I
Limited ability to acquire or process visual stimuli.	N	N	N	N	D	N	I	I/D
Limited ability to perceive or process auditory stimuli.	N	N	N	N	N	N	N	N

Key: N = No mobility problem I = Inconvenient D = Causes considerable difficulty B = An impossible barrier	Ramps							
	Ramp too long (exceeds 30 feet).	Ramp too steep (slope greater than 1:12).	Ramp too narrow (less than 48").	Cross slope greater than 1:50 (too steep).	Slope across structure too long and steep.	No curb cuts.	Helical ramp.	Ramp layout inconvenient.
Difficulty with environmental orientation.	N	N	N	N	N	N	I	N
Understanding deficit.	N	N	N	N	N	N	N	N
Limited attention span.	N	N	N	N	I	N	N	N
Memory deficit.	N	N	N	N	I	N	N	N
Decreased ability to sequence, judge time, direction, distance, size.	N	N	N	N	I/D	N	N	N
Impaired night vision.	N	N	N	N	I	N	N	N
Impaired cutaneous sensation detection.	N	I	I	I	N	N	N	N
Chronic stooped posture.	N	N	N	N	D/B	N	N	N
Difficulty in maintaining equilibrium.	N	I	N	I/D	D/B	N	I	I
Moves at slow speed.	N	N	N	N	D/B	N	N	N
Swaying, shuffling, uneven, erratic or staggering gait.	N	I	N	I	D/B	N	I	N
Frequent need to rest during exercise.	I	I	N	I	D/B	N	I	I

Key: N = No mobility problem I = Inconvenient D = Causes considerable difficulty B = An impossible barrier	Ramps							
	Ramp too long (exceeds 30 feet).	Ramp too steep (slope greater than 1:12).	Ramp too narrow (less than 48").	Cross slope greater than 1:50 (too steep).	Slope across structure too long and steep.	No curb cuts.	Helical ramp.	Ramp layout inconvenient.
Reduced tolerance to brisk exercise (need to move slowly).	I	I	N	I	D/B	N	I	I
Limited ability to stand for long periods.	I	N	N	N	D/B	N	I	I
Impaired bladder control.	N	N	N	N	I/D	N	N	N
Extreme of size (dwarfism, gigantism, obesity, etc.).	N	I	I	I	D/B	N	N	N
Cardiac Pacemaker affected by electrical interference.	N	N	N	N	D	N	N	N
Uses powered or manual wheelchair.	I	D	I/B	D	B	D	D	D/B
Uses walker, crutches, orthopedic cane.	N/I	I	N	I/D	D/B	I	I	I
Prosthesis (including braces) for lower extremities.	I	I	N	I	D/B	N	I	I
Decreased ability to tolerate smoke, dust, chemicals, pollens, cold winds.	N	N	N	N	N	N	N	N
Limited ability to grasp, release or manipulate with upper extremities (arms, wrist, hands).	N	N	N	N	N	N	N	N
Limited reach.	N	N	N	N	N	N	N/I	N/I

Key: N = No mobility problem I = Inconvenient D = Causes considerable difficulty B = An impossible barrier	Ramps							
	Ramp too long (exceeds 30 feet).	Ramp too steep (slope greater than 1:12).	Ramp too narrow (less than 48").	Cross slope greater than 1:50 (too steep).	Slope across structure too long and steep.	No curb cuts.	Helical ramp.	Ramp layout inconvenient.
Limited manual dexterity.	N	N	N	N	N	N	N	N
Inability to turn head.	N	N	N	N	N	N	N	N
Decreased ability to stoop.	N	N	N	N	N	N	N	N
Difficulty standing from sitting position, or in sitting down.	N	N	N	N	N	N	N	N
Limited vertical motion with legs and feet.	I	D	N	I	D/B	I	D	I
Limited horizontal motion with legs and feet.	N	I	N	I	D/B	I	D	I
Decreased ability to tolerate heat and cold.	N	N	N	N	N	N	N	N
Speech disorder.	N	N	N	N	N	N	N	N
Loss of normal speed in motor coordination/slowed reflexes.	N	N	N	N	I	N	N	N
Fear of crime.	N	N	N	N	N	N	N	N
Fear of heights (vertigo).	N	N	N	N	N	N	D	N
Agoraphobia.	N	N	N	N	N	N	N	N
Claustrophobia.	N	N	I	N	N	N	N	N
Fear of loud noises.	N	N	N	N	N	N	N	N



Key: N = No mobility problem I = Inconvenient D = Causes considerable difficulty B = An impossible barrier	Ramps							
	Ramp too long (exceeds 30 feet).	Ramp too steep (slope greater than 1:12).	Ramp too narrow (less than 48").	Cross slope greater than 1:50 (too steep).	Slope across structure too long and steep.	No curb cuts.	Helical ramp.	Ramp layout inconvenient.
Uses white cane for guidance (visually impaired).	N	N	N	I	I	N	N	I
Uses guide dog.	N	N	N	I	I	N	N	I
Limited ability to acquire or process visual stimuli.	N	N	N	N	I/D	N	N	I
Limited ability to perceive or process auditory stimuli.	N	N	N	N	N	N	N	N

Key: N = No mobility problem I = Inconvenient D = Causes considerable difficulty B = An impossible barrier	Ramps				Handrails			
	Abrupt transition to connecting walkways.	Ramp exits directly into street or parking area (less than 6' clearance at bottom of ramp).	Bollards in the middle of entrance to the ramp.	Steps in the middle of the ramp.	Handrails higher than 36" (too high).	Handrails lower than 32" (too low).	No handrails.	Handrail inadequate for comfortable grasp.
Difficulty with environmental orientation.	N	I	N	I/D	N	N	N	N
Understanding deficit.	N	N	I	I	N	N	N	N
Limited attention span.	N	N	N	I	N	N	N	N
Memory deficit.	N	N	N	N	N	N	N	N
Decreased ability to sequence, judge time, direction, distance, size.	N	N	N	I	N	N	N	N
Impaired night vision.	I	I	I	I/D	N	N	N	N
Impaired cutaneous sensation detection.	N	N	N	N	N	N	N	N
Chronic stooped posture.	N	N	N	N	N	N	N	N
Difficulty in maintaining equilibrium.	I	I	N	I	I	D	I	I
Moves at slow speed.	N	N	N	N	N	I	N	N
Swaying, shuffling, uneven, erratic or staggering gait.	N	N	I/D	N	N	I	N	N
Frequent need to rest during exercise.	N	N	N	N	N	N	N	N

Key: N = No mobility problem I = Inconvenient D = Causes considerable difficulty B = An impossible barrier	Ramps				Handrails			
	Abrupt transition to connecting walkways.	Ramp exits directly into street or parking area (less than 6' clearance at bottom of ramp).	Bollards in the middle of entrance to the ramp.	Steps in the middle of the ramp.	Handrails higher than 36" (too high).	Handrails lower than 32" (too low).	No handrails.	Handrail inadequate for comfortable grasp.
Reduced tolerance to brisk exercise (need to move slowly).	N	N	N	N	N	N	N	N
Limited ability to stand for long periods.	I	N	N	N	I	I	I	I
Impaired bladder control.	N	N	N	N	N	N	N	N
Extreme of size (dwarfism, giantism, obesity, etc.).	N	N	N	N	D	I	D	I
Cardiac Pacemaker affected by electrical interference.	N	N	N	N	N	N	N	N
Uses powered or manual wheelchair.	D	D	N	B	I	I	I	I
Uses walker, crutches, orthopedic cane.	I	N	N	D/B	I	I	I	I
Prosthesis (including braces) for lower extremities.	I	N	N	N	I	I	I	I
Decreased ability to tolerate smoke, dust, chemicals, pollens, cold winds.	N	N	N	N	N	N	N	N
Limited ability to grasp, release or manipulate with upper extremities (arms, wrist, hands).	N	N	N	I	D	D	D	D
Limited reach.	N	N	N	I	B/D	N	B/D	B/D

Key: N = No mobility problem I = Inconvenient D = Causes considerable difficulty B = An impossible barrier	Ramps				Handrails			
	Abrupt transition to connecting walkways.	Ramp exits directly into street or parking area (less than 6' clearance at bottom of ramp).	Bollards in the middle of entrance to the ramp.	Steps in the middle of the ramp.	Handrails higher than 36" (too high).	Handrails lower than 32" (too low).	No handrails.	Handrail inadequate for comfortable grasp.
Limited manual dexterity.	N	N	N	N	I	I	I	D
Inability to turn head.	N	N/I	N	N	N	N	N	N
Decreased ability to stoop.	N	N	N	N	N	N	N	N
Difficulty standing from sitting position, or in sitting down.	N	N	N	N	N	N	N	N
Limited vertical motion with legs and feet.	D	I	N	I	I	I	I	I
Limited horizontal motion with legs and feet.	D	I	N	I	N	N	N	N
Decreased ability to tolerate heat and cold.	N	N	N	N	N	N	N	N
Speech disorder.	N	N	N	N	N	N	N	N
Loss of normal speed in motor coordination/slowed reflexes.	I	I	N	D	I	I	I	I
Fear of crime.	N	N	N	N	N	N	N	N
Fear of heights (vertigo).	N	N	N	N	N	N	N	N
Agoraphobia.	N	N	N	N	N	N	N	N
Claustrophobia.	N	N	N	N	N	N	N	N
Fear of loud noises.	N	N	N	N	N	N	N	N

Key: N = No mobility problem I = Inconvenient D = Causes considerable difficulty B = An impossible barrier	Ramps				Handrails			
	Abrupt transition to connecting walkways.	Ramp exits directly into street or parking area (less than 6' clearance at bottom of ramp).	Bollards in the middle of entrance to the ramp.	Steps in the middle of the ramp.	Handrails higher than 36" (too high).	Handrails lower than 32" (too low).	No handrails.	Handrail inadequate for comfortable grasp.
Uses white cane for guidance (visually impaired).	I	D	I	D	N	N	N	N
Uses guide dog.	I	I	I	I	N	N	N	N
Limited ability to acquire or process visual stimuli.	I	I	I/D	D/B	N	N	N	N
Limited ability to perceive or process auditory stimuli.	N	N	N	N	N	N	N	N

Key: N = No mobility problem I = Inconvenient D = Causes considerable difficulty B = An impossible barrier	Handrails				Guardrails, Barricades			
	Handrail material metal or aluminum (hot in hot weather, cold in cold).	Handrails not continuous.	Handrails don't extend far enough (1' at top and bottom of stairs and ramps).	No handrails on ramps.	Barricades not detectable (blind cane).	Guardrails not continuous.	Guardrails too low (less than 42").	No pedestrian guardrails.
Difficulty with environmental orientation.	N	N	N	N	D	N	N	N
Understanding deficit.	N	N	N	N	D	N	N	N
Limited attention span.	N	N	N	N	N	N	N	N
Memory deficit.	N	N	N	N	N	N	N	N
Decreased ability to sequence, judge time, direction, distance, size.	N	N	N	N	D	I	N	I
Impaired night vision.	N	N/I	N	N	D	I	I	I
Impaired cutaneous sensation detection.	N	N	N	N	I	N	N	N
Chronic stooped posture.	N	N	N	N	N	N	N	N
Difficulty in maintaining equilibrium.	I	I	I	D	N	I	I	I
Moves at slow speed.	N	I	N	N	N	N	N	N
Swaying, shuffling, uneven, erratic or staggering gait.	N	I	I	I	I	N	N	N
Frequent need to rest during exercise.	N	N	I	I	N	N	N	N

Key: N = No mobility problem I = Inconvenient D = Causes considerable difficulty B = An impossible barrier	Handrails				Guardrails, Barricades			
	Handrail material metal or aluminum (hot in hot weather, cold in cold).	Handrails not continuous.	Handrails don't extend far enough (1' at top and bottom of stairs and ramps).	No handrails on ramps.	Barricades not detectable (blind cane).	Guardrails not continuous.	Guardrails too low (less than 42").	No pedestrian guardrails.
Reduced tolerance to brisk exercise (need to move slowly).	N	N	I	I	N	N	N	N
Limited ability to stand for long periods.	I	I	I	D	N	N	N	N
Impaired bladder control.	N	N	N	N	N	N	N	N
Extreme of size (dwarfism, giantism, obesity, etc.).	I	N	N	I	N	N	N	N
Cardiac Pacemaker affected by electrical interference.	N	N	N	N	N	N	N	N
Uses powered or manual wheelchair.	I	I	N	N	N	I	I	I
Uses walker, crutches, orthopedic cane.	I	I	I	I	N	N	N	N
Prosthesis (including braces) for lower extremities.	I	I	I	I	N	N	N	N
Decreased ability to tolerate smoke, dust, chemicals, pollens, cold winds.	N	N	N	N	N	N	N	N
Limited ability to grasp, release or manipulate with upper extremities (arms, wrist, hands).	I	D	I	I	N	N	N	N
Limited reach.	N	D/B	I	N	N	N	N	N

	Handrails				Guardrails, Barricades			
	Handrail material metal or aluminum (hot in hot weather, cold in cold).	Handrails not continuous.	Handrails don't extend far enough (1' at top and bottom of stairs and ramps).	No handrails on ramps.	Barricades not detectable (blind cane).	Guardrails not continuous.	Guardrails too low (less than 42").	No pedestrian guardrails.
Key: N = No mobility problem I = Inconvenient D = Causes considerable difficulty B = An impossible barrier								
Limited manual dexterity.	I	I	I	I	N	N	N	N
Inability to turn head.	N	N	N	N	N	N	N	N
Decreased ability to stoop.	N	N	N	N	N	N	N	N
Difficulty standing from sitting position, or in sitting down.	N	N	N	N	N	N	N	N
Limited vertical motion with legs and feet.	I	I	N	I	N	N	N	N
Limited horizontal motion with legs and feet.	N	N	I	D	N	N	N	N
Decreased ability to tolerate heat and cold.	N	N	N	N	N	N	N	N
Speech disorder.	N	N	N	N	N	N	N	N
Loss of normal speed in motor coordination/slowed reflexes.	I	I	D	D	N	D	D	I
Fear of crime.	N	N	N	N	N	N	N	N
Fear of heights (vertigo)	N	N	N	I/D	N	N	N	I/D
Agoraphobia.	N	N	N	N	N	N	N	N
Claustrophobia.	N	N	N	N	N	N	N	N
Fear of loud noises.	N	N	N	N	N	N	N	N



Key: N = No mobility problem I = Inconvenient D = Causes considerable difficulty B = An impossible barrier	Handrails				Guardrails, Barricades			
	Handrail material metal or aluminum (hot in hot weather, cold in cold).	Handrails not continuous.	Handrails don't extend far enough (1' at top and bottom of stairs and ramps).	No handrails on ramps.	Barricades not detectable (blind cane).	Guardrails not continuous.	Guardrails too low (less than 42").	No pedestrian guardrails.
Uses white cane for guidance (visually impaired).	I	I	I	I	D	D	N	D
Uses guide dog.	I	I	N	N	N	N	N	I
Limited ability to acquire or process visual stimuli.	I	N	I/D	I/D	I/D	I/D	I/D	D
Limited ability to perceive or process auditory stimuli.	N	N	N	N	N	N	N	N

Key: N = No mobility problem I = Inconvenient D = Causes considerable difficulty B = An impossible barrier	Guardrails, Barricades Pedestrian/Vehicular Separation						Escalators	
	Inadequate guardrails.	Guardrail mesh hazardous.	No detectable separation between bikeway and pedestrian way.	No detectable separation between roadway and walkway.	No detectable separation between walkway and parking lot.	Unprotected sidewalks (cars, edges, etc.).	Escalators.	Elevators.
Difficulty with environmental orientation.	I/D	N	I	I	I	I	N	N
Understanding deficit.	I/D	N	N	N	N	I	I/N	N
Limited attention span.	I/D	N	N	N	N	D	N	N
Memory deficit.	I/D	N	N	N	N	N/I	N	N
Decreased ability to sequence, judge time, direction, distance, size.	I/D	N	I	I	I	B	I	N
Impaired night vision.	D/B	I	I	I	I	D/B	N	N
Impaired cutaneous sensation detection.	N	I	N	N	N	I/D	N	N
Chronic stooped posture.	I/D	N	N	N	N	I	N	N
Difficulty in maintaining equilibrium.	D/B	I	I	I	I/D	B	N	N
Moves at slow speed.	N	N	N	N	N	I	D/B	I
Swaying, shuffling, uneven, erratic or staggering gait.	D/B	N	I	I	I	B/D	I/D	N
Frequent need to rest during exercise.	N	N	N	N	N	N	N	N

Key: N = No mobility problem I = Inconvenient D = Causes considerable difficulty B = An impossible barrier	Guardrails, Barricades Pedestrian/Vehicular Separation						Escalators	
	Inadequate guardrails.	Guardrail mesh hazardous.	No detectable separation between bikeway and pedestrian way.	No detectable separation between roadway and walkway.	No detectable separation between walkway and parking lot.	Unprotected sidewalks (cars, edges, etc.).	Escalators.	Elevators.
Reduced tolerance to brisk exercise (need to move slowly).	N	N	N	N	N	I	I	N
Limited ability to stand for long periods.	N	N	N	N	N	D/B	I/D	N
Impaired bladder control.	N	N	N	N	N	N	N	N
Extreme of size (dwarfism, giantism, obesity, etc.).	N	N	N	N	N	N	N/I	N/I
Cardiac Pacemaker affected by electrical interference.	N	N	N	N	N	N	N	N
Uses powered or manual wheelchair.	I/D	I	I	D	I	D/B	B	I
Uses walker, crutches, orthopedic cane.	I	N	I	D	I	D/B	B/D	N
Prosthesis (including braces) for lower extremities.	I	N	N	N	N	I/D	D/B	N
Decreased ability to tolerate smoke, dust, chemicals, pollens, cold winds.	N	N	N	N	N	N	N	I/D
Limited ability to grasp, release or manipulate with upper extremities (arms, wrist, hands).	I	N	N	N	N	N	I/D	I
Limited reach.	I	N	N	N	N	N	I/D	I/D

Key: N = No mobility problem I = Inconvenient D = Causes considerable difficulty B = An impossible barrier	Guardrails, Barricades Pedestrian/Vehicular Separation						Escalators	
	Inadequate guardrails.	Guardrail mesh hazardous.	No detectable separation between bikeway and pedestrian way.	No detectable separation between roadway and walkway.	No detectable separation between walkway and parking lot.	Unprotected sidewalks (cars, edges, etc.).	Escalators.	Elevators.
Limited manual dexterity.	I	N	N	N	N	N	I	I
Inability to turn head.	I/D	N	D	D	D	I/D	N	N
Decreased ability to stoop.	N	N	N	N	N	N	N	N
Difficulty standing from sitting position, or in sitting down.	N	N	N	N	N	N	N	N
Limited vertical motion with legs and feet.	N	N	N	N	N	D	D	N
Limited horizontal motion with legs and feet.	N	N	N	N	N	I	D	I
Decreased ability to tolerate heat and cold.	N	N	N	N	N	N	N	N
Speech disorder.	N	N	N	N	N	N	N	N
Loss of normal speed in motor coordination/slowed reflexes.	N	I	N	N	N	I/D	I/D	I/D
Fear of crime.	N	N	N	N	N	N	N	B
Fear of heights (vertigo).	D/B	I	N	N	N	B	I/D	I
Agoraphobia.	N	N	N	I	I	D	N	N
Claustrophobia.	N	N	N	N	N	N	N	B
Fear of loud noises.	N	N	N	I/D	I/D	I	N	N

Key: N = No mobility problem I = Inconvenient D = Causes considerable difficulty B = An impossible barrier	Guardrails, Barricades Pedestrian/Vehicular Separation						Escalators	
	Inadequate guardrails. Guardrail mesh hazardous. No detectable separation between bikeway and pedestrian way. No detectable separation between roadway and walkway. No detectable separation between walkway and parking lot. Unprotected sidewalks (cars, edges, etc.).						Escalators.	Elevators.
Uses white cane for guidance (visually impaired).	D/B	I	D	D	D	B	I	N
Uses guide dog.	I	I	I/D	I/D	I/D	D/B	B	N
Limited ability to acquire or process visual stimuli.	D/B	I	D	D	D	D/B	I	N
Limited ability to perceive or process auditory stimuli.	N	N	I	I	I	I	N	N

Key: N = No mobility problem I = Inconvenient D = Causes considerable difficulty B = An impossible barrier	Rest Areas/Benches				Emergency Provisions		Lighting, Illumination	
	Resting places not under cover (wind, rain, sun).	Not enough places to stop and rest.	No provision for scenic overlook.	Benches too high or low, too deep or shallow, or with no armrest.	No alternative route for flood condition structures.	No pedestrian emergency provisions.	Significant change of light level in tunnel at entrance.	Interior lighting not adjusted to outside light conditions.
Difficulty with environmental orientation.	N	N	I	N	I	N	I	I
Understanding deficit.	N	N	N	N	D/B	N	I	N
Limited attention span.	N	N	N	N	D	N	N	N
Memory deficit.	N	N	N	N	D/B	D/B	I	N
Decreased ability to sequence, judge time, direction, distance, size.	N	D	N	N	B	D	D/B	I/D
Impaired night vision.	N	N	N	N	D/B	N	D	D
Impaired cutaneous sensation detection.	I	N	N	N	N	N	N	N
Chronic stooped posture.	N	I	N	I	I	N	I	N
Difficulty in maintaining equilibrium.	N	I	N	I	D	N	D/B	D/B
Moves at slow speed.	N	D/B	N	I	D/B	I	N	N
Swaying, shuffling, uneven, erratic or staggering gait.	N	I/D	N	I	I/N	N	D	D
Frequent need to rest during exercise.	D/B	B	N	D/B	D/B	D/B	N	N

Key: N = No mobility problem I = Inconvenient D = Causes considerable difficulty B = An impossible barrier	Rest Areas/Benches				Emergency Provisions		Lighting, Illumination	
	Resting places not under cover (wind, rain, sun).	Not enough places to stop and rest.	No provision for scenic overlook.	Benches too high or low, too deep or shallow, or with no armrest.	No alternative route for flood condition structures.	No pedestrian emergency provisions.	Significant change of light level in tunnel at entrance.	Interior lighting not adjusted to outside light conditions.
Reduced tolerance to brisk exercise (need to move slowly).	D/B	D/B	N	I	D/B	N	N	N
Limited ability to stand for long periods.	D/B	B	N	D/B	I/D	D/B	I	I
Impaired bladder control.	I/D	I/D	N	N	N	I/D	N	N
Extreme of size (dwarfism, giantism, obesity, etc.).	N	N/I	N	I/D	N	N	N/I	N/I
Cardiac Pacemaker affected by electrical interference.	I	D/B	N	N/I	N	D	I	I
Uses powered or manual wheelchair.	I/D	D/B	N	N	B/D	I	D	I
Uses walker, crutches, orthopedic cane.	I/D	B/D	N	I/D	D/B	I	I/D	I/D
Prosthesis (including braces) for lower extremities.	I	D/B	N	D/B	B	I	I/D	I/D
Decreased ability to tolerate smoke, dust, chemicals, pollens, cold winds.	D/B	I	N	N	N	I	N	N
Limited ability to grasp, release or manipulate with upper extremities (arms, wrist, hands).	N	N	N	N	N	N	I	I
Limited reach.	N	N	N	N	N	N	I	I

Key: N = No mobility problem I = Inconvenient D = Causes considerable difficulty B = An impossible barrier	Rest Areas/Benches				Emergency Provisions		Lighting, Illumination	
	Resting places not under cover (wind, rain, sun).	Not enough places to stop and rest.	No provision for scenic overlook.	Benches too high or low, too deep or shallow, or with no armrest.	No alternative route for flood condition structures.	No pedestrian emergency provisions.	Significant change of light level in tunnel at entrance.	Interior lighting not adjusted to outside light conditions.
Limited manual dexterity.	N	N	N	N	N	N	I	I
Inability to turn head.	N	N	N	N	N	N	I	I
Decreased ability to stoop.	N	N	N	I/D	N	N	I	I
Difficulty standing from sitting position, or in sitting down.	I	I	N	D/B	N	N	N	N
Limited vertical motion with legs and feet.	N	I	N	I	N	N	I	I/D
Limited horizontal motion with legs and feet.	N	D	N	N	B	N	N	N
Decreased ability to tolerate heat and cold.	B	I/D	N	N	N	D	N	N
Speech disorder.	N	N	N	N	N	N	N	N
Loss of normal speed in motor coordination/slowed reflexes.	N	N	N	I/D	B	I	I/D	D
Fear of crime.	N	N	N	N	N	N	D	D
Fear of heights (vertigo).	N	N	N	N	N	N	N	N
Agoraphobia.	N	N	N	N	N	N	N	N
Claustrophobia.	N	N	N	N	N	N	D	D/B
Fear of loud noises.	N	N	N	N	N	N	N	N



Key: N = No mobility problem I = Inconvenient D = Causes considerable difficulty B = An impossible barrier	Rest Areas/Benches				Emergency Provisions		Lighting, Illumination	
	Resting places not under cover (wind, rain, sun).	Not enough places to stop and rest.	No provision for scenic overlook.	Benches too high or low, too deep or shallow, or with no armrest.	No alternative route for flood condition structures.	No pedestrian emergency provision.	Significant change of light level in tunnel at entrance.	Interior lighting not adjusted to outside light conditions.
Uses white cane for guidance (visually impaired).	N	N	N	I	D/B	I	D	D
Uses guide dog.	N	N	N	I	D/B	N	I	I
Limited ability to acquire or process visual stimuli.	N	N	N	I	D/B	N	D	D
Limited ability to perceive or process auditory stimuli.	N	N	N	N	N	N	N	N

Key: N = No mobility problem I = Inconvenient D = Causes considerable difficulty B = An impossible barrier	Lighting, Illumination				Signage/Media Cues				
	Glare at end of tunnel.	Tunnel too dark.	Glare and flashing lights from vehicles.	Poor illumination.	No signage indicating location of rest areas.	Street signs too high, too low or far.	No special signage for the visually impaired.	Traffic lights with short green cycle.	Complicated instructions on signs.
Difficulty with environmental orientation.	I	I	D/B	I	D/B	D	N	I	D/B
Understanding deficit.	N	I	D/B	N	D	D/B	N	N	D/B
Limited attention span.	N	I/D	I/D	I/D	D/B	D	N	N	D/B
Memory deficit.	N	I	I/D	I	D	D/B	N	N	D/B
Decreased ability to sequence, judge time, direction, distance, size.	I	D/B	D/B	D	D/B	D/B	N	D/B	D/B
Impaired night vision.	D	D/B	I	D/B	I	I	N	I	I/D
Impaired cutaneous sensation detection.	N	I	N	I	N	N	N	N	N
Chronic stooped posture.	N	I	N	I	D	D	N	D	D
Difficulty in maintaining equilibrium.	D/B	D/B	D/B	D/B	N	N	N	I	I
Moves at slow speed.	N	N	N	N	D/B	D/B	N	B/D	D/B
Swaying, shuffling, uneven, erratic or staggering gait.	D	D	D	D	I/D	I	N	D	D
Frequent need to rest during exercise.	N	D	N	D	B	D/B	N	B	D/B

Key: N = No mobility problem I = Inconvenient D = Causes considerable difficulty B = An impossible barrier	Lighting, Illumination				Signage/Media Cues				
	Glare at end of tunnel.	Tunnel too dark.	Glare and flashing lights from vehicles.	Poor illumination.	No signage indicating location of rest areas.	Street signs too high, too low or far.	No special signage for the visually impaired.	Traffic lights with short green cycle.	Complicated instructions on signs.
Reduced tolerance to brisk exercise (need to move slowly).	N	I	N	I	I	I	N	B	D/B
Limited ability to stand for long periods.	I	D	N	D	B	D	N	D	D/B
Impaired bladder control.	N	N	N	N	D/B	I	N	N	N
Extreme of size (dwarfism, giantism, obesity, etc.).	N	I/D	N	I/D	N	I	N	I/D	N
Cardiac Pacemaker affected by electrical interference.	I	I/D	I/D	I/D	D	I	N	I/D	N
Uses powered or manual wheelchair.	I	D	I	D	D	D	N	D/B	I/D
Uses walker, crutches, orthopedic cane.	I/D	D	I/D	D	D	I/D	N	D/B	D/B
Prosthesis (including braces) for lower extremities.	I/D	D	I/D	D	D	I/D	N	D/B	D/B
Decreased ability to tolerate smoke, dust, chemicals, pollens, cold winds.	N	N	N	N	I/D	I	N	N	N
Limited ability to grasp, release or manipulate with upper extremities (arms, wrist, hands).	N	I	N	I	N	N	N	N	N
Limited reach.	N	I	N	I	N	N	N	N	N

	Lighting, Illumination				Signage/Media Cues				
	Glare at end of tunnel.	Tunnel too dark.	Glare and flashing lights from vehicles.	Poor illumination.	No signage indicating location of rest areas.	Street signs too high, too low or far.	No special signage for the visually impaired.	Traffic lights with short green cycle.	Complicated instructions on signs.
Limited manual dexterity.	N	I	N	I	N	N	N	N	N
Inability to turn head.	I	I/D	I/D	I/D	N	D/B	N	D	D
Decreased ability to stoop.	I	I	I	I	I	N	N	N	N
Difficulty standing from sitting position, or in sitting down.	N	N	N	N	N	N	N	N	N
Limited vertical motion with legs and feet.	I	D	I	I	I/D	I/D	N	D/B	I
Limited horizontal motion with legs and feet.	I	D	I	I	I	N	N	D/B	I/D
Decreased ability to tolerate heat and cold.	N	N	N	N	I	N	N	N	N
Speech disorder.	N	N	N	N	N	N	N	N	I/D
Loss of normal speed in motor coordination/slowed reflexes.	D	D	D	D	I	I	N	D/B	I/D
Fear of crime.	D	B	I	B	N	N	N	N	D
Fear of heights (vertigo).	N	N	N	N	N	N	N	N	I
Agoraphobia.	N	N	N	N	N	N	N	N	I
Claustrophobia.	N	B	N	B/D	N	N	N	N	I
Fear of loud noises.	N	N	N	N	N	N	N	N	N

Key: N = No mobility problem I = Inconvenient D = Causes considerable difficulty B = An impossible barrier	Lighting, Illumination				Signage/Media Cues				
	Glare at end of tunnel.	Tunnel too dark.	Glare and flashing lights from vehicles.	Poor illumination.	No signage indicating location of rest areas.	Street signs too high, too low or far.	No special signage for the visually impaired.	Traffic lights with short green cycle.	Complicated instructions on signs.
Uses white cane for guidance (visually impaired).	D	I	D	I	I	D	D/B	D/B	D/B
Uses guide dog.	I	D	D	I	I	I	D/B	I	D/B
Limited ability to acquire or process visual stimuli.	D	D	D	D	D	D	D/B	D/I	D/B
Limited ability to perceive or process auditory stimuli.	N	I	I	I	D	D	N	N	I/D

Key: N = No mobility problem I = Inconvenient D = Causes considerable difficulty B = An impossible barrier	Signage/Media Cues						
	No warning of potential hazards.	No orientation cue as to start of approach.	Lack of orientation cues generally.	Pathway junctions which are not at 90 degree angle or which curve.	No detectable orientation cue as to start of channelization.	Walkway not channelized.	Traffic noise.
Difficulty with environmental orientation.	D/B	D/I	D/B	I/D	I/D	I	I/D
Understanding deficit.	D/B	D	D/B	I/D	I	I/D	I/D
Limited attention span.	I/D	I/D	D/B	N	N	I	I/D
Memory deficit.	I/D	I/D	B	I/D	I/D	I	N
Decreased ability to sequence, judge time, direction, distance, size.	D/B	D	D/B	I	D	I	N
Impaired night vision.	I/D	I/D	I/D	N	N/I	N/I	N
Impaired cutaneous sensation detection.	N	N	N	N	N	N	N
Chronic stooped posture.	D/B	D	D	I	D	I	N
Difficulty in maintaining equilibrium.	D/B	I/D	I	N	N	N	N
Moves at slow speed.	D	D	D	N	I/D	I	N
Swaying, shuffling, uneven, erratic or staggering gait.	D/B	I/D	D	N	I/D	I/D	N
Frequent need to rest during exercise.	D/B	D/B	D/B	N	D	N	N

Key: N = No mobility problem I = Inconvenient D = Causes considerable difficulty B = An impossible barrier	Signage/Media Cues						
	No warning of potential hazards.	No orientation cue as to start of approach.	Lack of orientation cues generally.	Pathway junctions which are not at 90 degree angle or which curve.	No detectable orientation cue as to start of channelization.	Walkway not channelized.	Traffic noise.
Reduced tolerance to brisk exercise (need to move slowly).	D	D	D	N	I/D	I	N
Limited ability to stand for long periods.	D/B	D/B	D/B	N	D	N	N
Impaired bladder control.	N	N	I/D	N	I/D	N	N
Extreme of size (dwarfism, giantism, obesity, etc.).	I	N	N	N	N	N	N
Cardiac Pacemaker affected by electrical interference.	D/B	N	I	N	N	N	N
Uses powered or manual wheelchair.	D/B	I/D	I/B	I	I	N	N
Uses walker, crutches, orthopedic cane.	D/B	I/D	D/B	N	I	N	N
Prosthesis (including braces) for lower extremities.	D/B	I/D	D/B	N	I	N	N
Decreased ability to tolerate smoke, dust, chemicals, pollens, cold winds.	N	N	I	N	N	N	N
Limited ability to grasp, release or manipulate with upper extremities (arms, wrist, hands).	I	N	I	N	N	N	N
Limited reach.	I	N	I	N	N	N	N

Key: N = No mobility problem I = Inconvenient D = Causes considerable difficulty B = An impossible barrier	Signage/Media Cues							
	No warning of potential hazards.	No orientation cue as to start of approach.	Lack of orientation cues generally.	Pathway junctions which are not at 90 degree angle or which curve.	No detectable orientation cue as to start of channelization.	Walkway not channelized.	Traffic noise.	
Limited manual dexterity.	I	N	I	N	N	N	N	
Inability to turn head.	I/D	I/D	I/D	N	N	N	I/D	
Decreased ability to stoop.	I	N	I	N	N	N	N	
Difficulty standing from sitting position, or in sitting down.	I	N	I	N	N	N	N	
Limited vertical motion with legs and feet.	D	I/D	D/B	N	I/D	N	N	
Limited horizontal motion with legs and feet.	D/B	D	D/B	N	I	N	N	
Decreased ability to tolerate heat and cold.	N	N	N	N	N	N	N	
Speech disorder.	N	I/D	D/B	N	N	N	N	
Loss of normal speed in motor coordination/slowed reflexes.	D/B	D	I/D	N	I	N	N	
Fear of crime.	D	D/B	D/B	N	I	N	N	
Fear of heights (vertigo).	D/B	I/D	D/B	N	N	N	N	
Agoraphobia.	D/B	I/D	D/B	N	N	N	N	
Claustrophobia.	D/B	I/D	D/B	N	N	N	N	
Fear of loud noises.	D/B	I	D/B	N	N	N	B	



Key: N = No mobility problem I = Inconvenient D = Causes considerable difficulty B = An impossible barrier	Signage/Media Cues						
	No warning of potential hazards.	No orientation cue as to start of approach.	Lack of orientation cues generally.	Pathway junctions which are not at 90 degree angle or which curve.	No detectable orientation cue as to start of channelization.	Walkway not channelized.	Traffic noise.
Uses white cane for guidance (visually impaired).	D/B	D/B	D/B	I/D	D	D	I/D
Uses guide dog.	D/B	D/B	D/B	I/D	D	D	I
Limited ability to acquire or process visual stimuli.	D/B	D/B	D/B	I/D	D	D	I/D
Limited ability to perceive or process auditory stimuli.	D/B	I	I/D	N	I	N	I/D

Key: N = No mobility problem I = Inconvenient D = Causes considerable difficulty B = An impossible barrier	Micro-Climatic Factors, Weather/Pollution			
	High wind gusts present.	Wind generated by traffic.	Inadequate provision for rain-water runoff.	Walkways and sidewalks not kept clear of snow, ice and debris.
Difficulty with environmental orientation.	I	I	I	I
Understanding deficit.	I/D	I/D	D/B	D/B
Limited attention span.	I/D	I	I	I/D
Memory deficit.	N	N	I/D	I/D
Decreased ability to sequence, judge time, direction, distance, size.	D/B	D/B	D/B	D/B
Impaired night vision.	D/B	D/B	D	D/B
Impaired cutaneous sensation detection.	N	N	I/D	I/D
Chronic stooped posture.	D	D	I/D	D/B
Difficulty in maintaining equilibrium.	D/B	B	D/B	D/B
Moves at slow speed.	D/B	N	D/B	D/B
Swaying, shuffling, uneven, erratic or staggering gait.	D/B	B	D/B	D/B
Frequent need to rest during exercise.	D/B	D/B	D/B	D/B

Key: N = No mobility problem I = Inconvenient D = Causes considerable difficulty B = An impossible barrier	Micro-Climatic Factors, Weather/Pollution			
	High wind gusts present.	Wind generated by traffic.	Inadequate provision for rain-water runoff.	Walkways and sidewalks not kept clear of snow, ice and debris.
Reduced tolerance to brisk exercise (need to move slowly).	D/B	D/B	D/B	D/B
Limited ability to stand for long periods.	D/B	D/B	D/B	D/B
Impaired bladder control.	N	N	N	I
Extreme of size (dwarfism, gigantism, obesity, etc.).	I	I	I/D	D/B
Cardiac Pacemaker affected by electrical interference.	N	N	N	I/D
Uses powered or manual wheelchair.	I/D	I	B	B
Uses walker, crutches, orthopedic cane.	D/B	I/D	D/B	B
Prosthesis (including braces) for lower extremities.	D/B	I/D	D/B	D/B'
Decreased ability to tolerate smoke, dust, chemicals, pollens, cold winds.	D/B	D/B	N	N
Limited ability to grasp, release or manipulate with upper extremities (arms, wrist, hands).	N	N	I/D	D/B
Limited reach.	N	N	I/D	I/D

Key: N = No mobility problem I = Inconvenient D = Causes considerable difficulty B = An impossible barrier	Micro-Climatic Factors, Weather/Pollution			
	High wind gusts present.	Wind generated by traffic.	Inadequate provision for rain-water runoff.	Walkways and sidewalks not kept clear of snow, ice and debris.
Limited manual dexterity.	N	N	I/D	I/D
Inability to turn head.	I	I	I/D	D/B
Decreased ability to stoop.	N	N	N	I/D
Difficulty standing from sitting position, or in sitting down.	N	N	I	D/B
Limited vertical motion with legs and feet.	I	I	D/B	D/B
Limited horizontal motion with legs and feet.	I	I	D	D/B
Decreased ability to tolerate heat and cold.	D	I	N	D
Speech disorder.	N	N	N	N
Loss of normal speed in motor coordination/slowed reflexes.	D	D/B	D	D/B
Fear of crime.	N	N	N	N
Fear of heights (vertigo).	N	N	N	N
Agoraphobia.	N	N	N	N
Claustrophobia.	N	N	N	N
Fear of loud noises.	N	N	N	N

Key: N = No mobility problem I = Inconvenient D = Causes considerable difficulty B = An impossible barrier	Micro-Climatic Factors, Weather/Pollution			
	High wind gusts present.	Wind generated by traffic.	Inadequate provision for rain-water runoff.	Walkways and sidewalks not kept clear of snow, ice and debris.
Uses white cane for guidance (visually impaired).	D	D	D	D/B
Uses guide dog.	I	I	D	I/D
Limited ability to acquire or process visual stimuli.	I/D	I/D	D	D
Limited ability to perceive or process auditory stimuli.	I	N	N	N

# CITY MATRICES

**D**  
appendix

<b>A</b>	Under	Over	Over	Over	Under	Over	Over	Over	Over	TOTAL
	1	2	3	4	5	6	7	8	9	
LOCATION & END CONDITION										
Portions of walkway are hidden from view (crime potential).	X	X	X	X						4
Overcrossing/undercrossing is not close to public transportation stop.			X							1
No sidewalk at end condition.					X	X	X	X		4
Parked cars restrict approach.*										
Parked cars obstruct view of approach.*										
No accessible parking.**		X								1
No detectable pedestrian crosswalk to approach.		X		X	X	X	X	X		6
Driver's view of pedestrian blocked.*										
<b>WALKWAYS</b>										
Pedestrian walkway on only one side.										
Walkway less than 48" (too narrow).**										
Headroom below 6'10".**										
Walkway through "long" tunnel (over 40').	X									1
Structure vibrates (traffic).										
Abrasive or perforated material on vertical surface adjacent to walkway.				X						1
Objects project into walkway (signs, trees, etc.)										
<b>SURFACE MATERIALS</b>										
Manhole covers and gratings in walkway.				X		X				2
Highly reflective surface materials.										
Grooves and patterns (cast into walkways or caused by small paving units).										

A	Under	Over	Over	Over	Under	Over	Over	Over	Over	TOTAL
	1	2	3	4	5	6	7	8	9	
Large, deep expansion joints.**		X	X	X			X	X		5
Uneven and irregular surfaces.						X	X		X	3
Loose and soft surfaces (gravel, sand, etc.).		X		X	X	X				4
Rough surfaces.									X	1
Discontinuous surface materials.					X				X	2
MAINTENANCE										
Debris from erosion on walkway.										
Disrepair (frost heaves, potholes, etc.).				X						1
Disrepair from vandalism or accident (handrails, guardrails, etc.).				X						1
STAIRWAYS										
Stairway is only means of access to structure.**	X	X	X							3
Stairway only on one side of structure.**										
Poorly lighted steps, stairs, ramps.		X	X	X						3
Treads less than 11" (too small).										
Projecting nosings.										
Open risers.										
Risers greater than 7" (too high).**										
Curb greater than 6" (too high).										
Step (settlement) between approach and structure.**									X	1
Dangerous stair location.										

A	Under	Over	Over	Over	Under	Over	Over	Over	Over	TOTAL
	1	2	3	4	5	6	7	8	9	
<b>RAMPS</b>										
Only ramps provided.				X						1
Only ramps provided on one side of structure.									X	1
Pathway leading to over-undercrossing too steep and long.**	X			X			X		X	4
Ramp too long (exceeds 30 feet).**				X						1
Ramp too steep (slope greater than 1:12).**				X						1
Ramp too narrow (less than 48").**										
Cross slope greater than 1:50 (too steep).				X	X		X			3
Slope across structure too long and steep.**				X						1
No curb cuts.**				X	X	X	X		X	5
Helical ramp.										
Ramp layout inconvenient.										
Abrupt transition to connecting walkways.										
Ramp exits directly into street or parking area (less than 6' clearance at bottom of ramp).										
Bollards in the middle of entrance to the ramp.										
Steps in the middle of the ramp.										
<b>HANDRAILS</b>										
Handrails higher than 36" (too high).	X									1
Handrails lower than 32" (too low).**				X						1



A	Under	Over	Over	Over	Under	Over	Over	Over	Over	TOTAL
	1	2	3	4	5	6	7	8	9	
No handrails.**					X	X	X	X	X	5
Handrail inadequate for comfortable grasp.			X							1
Handrail material metal or aluminum (hot in hot weather, cold in cold).	X	X	X	X						4
Handrails not continuous.		X	X	X						2
Handrails don't extend far enough (1' at top and bottom of stairs and ramps).**	X			X						2
No handrails on ramps.									X	1
GUARDRAILS, BARRICADES, PEDESTRIAN/VEHICULAR SEPARATION										
Barricades not detectable (blind cane).		X								1
Guardrails not continuous.									X	1
Guardrails too low (less than 42").						X	X			2
No pedestrian guardrails.					X			X		2
Inadequate guardrails.									X	1
Guardrail mesh hazardous.*				X						1
No detectable separation between bikeway and pedestrian way.				X		X	X		X	4
No detectable separation between roadway and walkway.								X		1
No detectable separation between walkway and parking lot.										
Unprotected sidewalks (cars, edges, etc.).					X		X	X		3
ESCALATORS/ELEVATORS										
Escalators.										
Elevators.										

<b>A</b>	Under	Over	Over	Over	Under	Over	Over	Over	Over	TOTAL
<b>REST AREAS/BENCHES</b>	1	2	3	4	5	6	7	8	9	
Resting places not under cover (wind, rain, sun).									X	1
Not enough places to stop and rest.				X	X	X	X	X		5
No provision for scenic overlook.										
Benches too high or low, too deep or shallow, or with no armrest.									X	1
<b>EMERGENCY PROVISIONS</b>										
No alternative route for flood condition structures.										
No pedestrian emergency provisions.	X	X	X	X	X	X	X	X	X	9
<b>LIGHTING ILLUMINATION</b>										
Significant change of light level in tunnel at entrance.					X					1
Interior lighting not adjusted to outside light conditions.	X				X					2
Glare at end of tunnel.*	X									1
Tunnel too dark.*					X					1
Glare and flashing lights from vehicles.*		X			X					2
Poor illumination.*			X	X	X	X	X	X		6
<b>SIGNAGE/MEDIA CUES</b>										
No signage indicating location of rest areas.	X	X			X			X	X	5
Street signs too high, too low or far.										
No special signage for the visually impaired.	X	X	X	X	X	X	X	X	X	9
Traffic lights with short green cycle.										
Complicated instructions on signs.			X							1
No warning of potential hazards.		X				X	X			3

A	Under	Over	Over	Over	Under	Over	Over	Over	Over	TOTAL
	1	2	3	4	5	6	7	8	9	
No orientation cue as to start of approach.		X		X	X	X	X	X	X	7
Lack of orientation cues generally.		X	X	X	X		X	X	X	7
Pathway junctions which are not at 90° angle or which curve.				X					X	2
No detectable orientation cue as to start of channelization.	X									1
Walkway not channelized.		X		X	X	X	X	X	X	7
Traffic noise.			X	X	X	X	X	X	X	7
MICRO-CLIMATIC FACTORS										
High wind gusts present.*		X	X	X						3
Wind generated by traffic.*						X				1
Inadequate provision for rain-water runoff.										
Walkways and sidewalks not kept clear of snow, ice and debris.				X	X					2

\*Responses to these problems may not indicate that the problem definitely exists, but rather, in the opinion of the observer, that the problem probably exists quite frequently.

\*\*Based on the 1961 ANSI Standards.

B	Over	Over	Over	Over	Over	Over	Over	Over	Over	Over	Over	Over	Over	Over	Over	Over	Under	Over	Over	TOTAL	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19		
LOCATION & END CONDITION																					
Portions of walkway are hidden from view (crime potential).			X									X		X	X		X	X			6
Overcrossing/ undercrossing is not close to public transportation stop.																					
No sidewalk at end condition.																					
Parked cars restrict approach.*																					
Parked cars obstruct view of approach.*																					
No accessible parking.**																			X		1
No detectable pedestrian cross- walk to approach.			X	X				X	X						X			X			6
Driver's view of pedestrian blocked.*																					
WALKWAYS																					
Pedestrian walkway on only one side.																			X		1
Walkway less than 48" (too narrow).**																			X		1
Headroom below 6'10".**																					
Walkway through "long" tunnel (over 40').																	X				1
Structure vibrates (traffic).																			X		1
Abrasive or per- forated material on vertical surface adjacent to walkway.					X			X	X				X								4
Objects project into walkway (signs, trees, etc.).										X		X								X	3

B	Over	Over	Over	Over	Over	Over	Over	Over	Over	Over	Over	Over	Over	Over	Over	Over	Over	Under	Over	Over	TOTAL
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19		
SURFACE MATERIALS																					
Manhole covers and gratings in walkway.	X	X	X	X				X	X										X	X	8
Highly reflective surface materials.	X																				1
Grooves and patterns (cast into walkways or caused by small paving units).																X		X			2
Large, deep expansion joints.**	X	X	X	X	X	X	X	X	X				X		X						11
Uneven and irregular surfaces.					X										X	X				X	4
Loose and soft surfaces (gravel, sand, etc.).						X	X							X	X	X					5
Rough Surfaces.					X																1
Discontinuous surface materials.																					
MAINTENANCE																					
Debris from erosion on walkway.							X	X	X												3
Disrepair (frost heaves, potholes, etc.).	X	X					X													X	4
Disrepair from vandalism or accident (handrails, guardrails, etc.).			X	X	X	X						X	X								6
STAIRWAYS																					
Stairway is only means of access to structure**											X		X								2
Stairway only on one side of structure.										X											1
Poorly lighted steps, stairs, ramps.					X	X	X	X				X	X	X	X	X					9
Treads less than 11" (too small).					X																1
Projecting nosings.										X	X	X	X								4
Open risers.																					
Risers greater than 7" (too high).**																					
Curb greater than 6" (too high).																					

<b>B</b>	Over	Over	Over	Over	Over	Over	Over	Over	Over	Over	Over	Over	Over	Over	Over	Over	Over	Under	Over	Over	TOTAL
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19		
Step (settlement) between approach and structure.**	X	X	X	X			X							X	X						7
Dangerous stair location.																					
<b>RAMPS</b>																					
Only ramps provided.	X	X		X			X							X	X				X	X	8
Only ramps provided on one side of structure.																					
Pathway leading to over-undercrossing too steep and long.**																					
Ramp too long (exceeds 30 feet).**	X	X	X	X		X	X						X	X	X				X	X	11
Ramp too steep (slope greater than 1:12).**	X	X		X		X	X						X	X	X				X	X	10
Ramp too narrow (less than 48').**																					
Cross slope greater than 1:50 (too steep).														X	X						2
Slope across structure too long and steep.**	X	X		X									X		X						5
No curb cuts.**			X	X	X								X		X				X		6
Helical ramp.														X							1
Ramp layout inconvenient.																					
Abrupt transition to connecting walkways.																					
Ramp exits directly into street or parking area (less than 6' clearance at bottom of ramp).			X	X			X	X	X												5
Bollards in the middle of entrance to the ramp.			X		X		X				X										4
Steps in the middle of the ramp.																					
<b>HANDRAILS</b>																					
Handrails higher than 36" (too high).										X	X	X		X	X						5
Handrails lower than 32" (too low).**																					

B	Over	Over	Over	Over	Over	Over	Over	Over	Over	Over	Over	Over	Over	Over	Over	Over	Over	Under	Over	Over	TOTAL
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19		
No handrails.**	X	X	X	X	X		X	X	X				X			X	X	X	X		13
Handrail inadequate for comfortable grasp.																					
Handrail material metal or aluminum (hot in hot weather, cold in cold).						X				X	X	X		X	X						6
Handrails not continuous.										X	X	X									3
Handrails don't extend far enough (1' at top and bottom of stairs and ramps).**																					
No handrails on ramps.		X	X	X			X												X	X	6
GUARDRAILS, BARRICADES, PEDESTRIAN/VEHICULAR SEPARATION																					
Barricades not detectable (blind cane).										X		X									2
Guardrails not continuous.					X																1
Guardrails too low (less than 42").											X	X							X		3
No pedestrian guardrails.																					
Inadequate guardrails.																					
Guardrail mesh hazardous.*	X				X	X	X	X	X				X								7
No detectable separation between bike-way and pedestrian way.	X	X	X	X	X	X	X	X	X					X	X	X	X	X	X	X	15
No detectable separation between road-way and walkway.																				X	1
No detectable separation between walkway and parking lot.																					
Unprotected sidewalks (cars, edges, etc.).																	X		X		2
ESCALATORS/ ELEVATORS																					
Escalators.										X											1
Elevators.										X		X									2

B	Over	Over	Over	Over	Over	Over	Over	Over	Over	Over	Over	Over	Over	Over	Over	Over	Under	Over	Over	TOTAL	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19		
<b>REST AREAS/BENCHES</b>																					
Resting places not under cover (wind, rain, sun).	X							X	X		X	X	X			X				X	8
Not enough places to stop and rest.			X	X	X	X	X							X	X		X	X			9
No provision for scenic overlook.																					
Benches too high or low, too deep or shallow, or with no armrest.	X			X						X											3
<b>EMERGENCY PROVISIONS</b>																					
No alternative route for flood condition structures.																					
No pedestrian emergency provisions.	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	19
<b>LIGHTING ILLUMINATION</b>																					
Significant change of light level in tunnel at entrance.																					
Interior lighting not adjusted to outside light conditions.																					
Glare at end of tunnel.*																					
Tunnel too dark.*																					
Glare and flashing lights from vehicles.*	X		X	X	X	X	X				X			X	X		X		X		11
Poor illumination.*						X	X					X	X	X	X	X	X	X			9
<b>SIGNAGE/MEDIA CUES</b>																					
No signage indicating location of rest areas.	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	19
Street signs too high, too low or far.																					
No special signage for the visually impaired.	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	19
Traffic lights with short green cycle.																					
Complicated instructions on sign.																					



B	Over	Over	Over	Over	Over	Over	Over	Over	Over	Over	Over	Over	Over	Over	Over	Over	Under	Over	Over	TOTAL	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19		
No warning of potential hazards.																					
No orientation cue as to start of approach.	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	19
Lack of orientation cues generally	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	19
Pathway junctions which are not at 90 degree angle or which curve.	X	X			X														X	X	5
No detectable orientation cue as to start of channelization.																					
Walkway not channelized.	X	X	X	X	X	X	X	X	X				X	X	X	X	X	X	X	X	16
Traffic noise.							X												X		2
MICRO-CLIMATIC FACTORS																					
High wind gusts present.*		X	X	X		X	X	X	X	X	X	X		X	X				X	X	14
Wind generated by traffic.*																			X		1
Inadequate provision for rain-water runoff.																					
Walkways and sidewalks not kept clear of snow, ice and debris.		X	X	X	X	X	X	X	X			X								X	10

\*Response to these problems may not indicate that the problem definitely exists, but rather, in the opinion of the observer, that the problem probably exists quite frequently.

\*\*Based on the 1961 ANSI Standards.

C	Over	Over	Over	Under	Over	Over	Over	Over	Over	Under	Over	Over	Over	Over	Over	Over	Under	Over	Over	TOTAL	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19		
LOCATION & END CONDITION																					
Portions of walkway are hidden from view (crime potential).					X							X		X	X		X		X		6
Overcrossing/ undercrossing is not close to public transportation stop.									X			X									2
No sidewalk at end condition.																					
Parked cars restrict approach.*																					
Parked cars obstruct view of approach.*																					
No accessible parking.**												X			X						2
No detectable pedestrian cross- walk to approach.									X			X			X						3
Driver's view of pedestrian blocked.*								X				X									2
WALKWAYS																					
Pedestrian walkway on only one side.																					
Walkway less than 48" (too narrow).**																					
Headroom below 6'10".**																					
Walkway through "long" tunnel (over 40').									X								X				2
Structure vibrates (traffic).				X																	1
Abrasive or per- forated material on vertical surface adjacent to walkway.				X								X		X				X	X		5
Objects project into walkway (signs, trees, etc.).												X									1

C	Over	Over	Over	Under	Over	Over	Over	Over	Over	Under	Over	Over	Over	Over	Over	Over	Under	Over	Over	TOTAL	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19		
SURFACE MATERIALS																					
Manhole covers and gratings in walkway.					X																1
Highly reflective surface materials.																					
Grooves and patterns (cast into walkways or caused by small paving units).							X	X						X	X				X		5
Large, deep expansion joints.**	X												X						X	X	4
Uneven and irregular surfaces.							X	X						X	X				X		5
Loose and soft surfaces (gravel, sand, etc.).										X											1
Rough Surfaces.							X	X						X	X						4
Discontinuous surface materials.										X											1
MAINTENANCE																					
Debris from erosion on walkway.												X		X	X						3
Disrepair (frost heaves, potholes, etc.).															X		X	X			3
Disrepair from vandalism or accident (handrails, guardrails, etc.).			X		X									X	X				X	X	6
STAIRWAYS																					
Stairway is only means of access to structure**							X			X			X								3
Stairway only on one side of structure.**												X									1
Poorly lighted steps, stairs, ramps.					X					X				X	X				X		5
Treads less than 11" (too small).		X													X					X	3
Projecting nosings.							X													X	2
Open risers.		X			X				X											X	4
Risers greater than 7" (too high).**	X	X			X														X		4
Curb greater than 6" (too high).													X								1

C	Over	Over	Over	Under	Over	Over	Over	Over	Over	Under	Over	Over	Over	Over	Over	Over	Over	Under	Over	Over	TOTAL
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19		
Step (settlement) between approach and structure.**														X		X					2
Dangerous stair location.					X																1
RAMPS																					
Only ramps provided.			X		X	X										X					4
Only ramps provided on one side of structure.								X							X						2
Pathway leading to over-undercrossing too steep and long.**														X							1
Ramp too long (exceeds 30 feet).**	X	X	X		X	X		X							X	X		X	X		10
Ramp too steep (slope greater than 1:12).**	X						X	X							X	X		X			6
Ramp too narrow (less than 48').**																					
Cross slope greater than 1:50 (too steep).																					
Slope across structure too long and steep.**																					
No curb cuts.**								X					X			X					3
Helical ramp.																					
Ramp layout inconvenient.																				X	1
Abrupt transition to connecting walkways.																	X				1
Ramp exits directly into street or parking area (less than 6' clearance at bottom of ramp).		X	X		X			X					X			X				X	7
Bollards in the middle of entrance to the ramp.																					
Steps in the middle of the ramp.																					
HANDRAILS																					
Handrails higher than 36" (too high).	X	X	X		X	X	X	X		X				X					X	X	11
Handrails lower than 32" (too low).**																					

C	Over	Over	Over	Under	Over	Over	Over	Over	Over	Under	Over	Over	Over	Over	Over	Over	Under	Over	Over	TOTAL	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19		
No handrails.**				X	X								X		X	X	X				6
Handrail inadequate for comfortable grasp.														X							1
Handrail material metal or aluminum (hot in hot weather, cold in cold).	X	X	X		X		X	X	X		X	X		X				X	X		12
Handrails not continuous.	X	X			X		X				X		X	X				X	X		9
Handrails don't extend far enough (1' at top and bottom of stairs and ramps).**	X				X		X		X		X							X			6
No handrails on ramps.																	X				1
GUARDRAILS, BARRICADES, PEDESTRIAN/VEHICULAR SEPARATION																					
Barricades not detectable (blind cane).									X												1
Guardrails not continuous.									X				X								2
Guardrails too low (less than 42").				X																	1
No pedestrian guardrails.																					
Inadequate guardrails.																					
Guardrail mesh hazardous.*					X						X	X	X					X	X		6
No detectable separation between bike-way and pedestrian way.	X	X	X	X	X	X	X	X	X			X		X			X	X			13
No detectable separation between roadway and walkway.										X											1
No detectable separation between walkway and parking lot.																					
Unprotected sidewalks (cars, edges, etc.).																					
ESCALATORS/ ELEVATORS																					
Escalators.																					
Elevators.																					

C	Over	Over	Over	Under	Over	Over	Over	Over	Over	Under	Over	Over	Over	Over	Over	Over	Under	Over	Over	TOTAL	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19		
<b>REST AREAS/BENCHES</b>																					
Resting places not under cover (wind, rain, sun).	X		X				X	X	X			X									6
Not enough places to stop and rest.		X	X	X	X				X	X	X	X	X	X		X	X	X	X		14
No provision for scenic overlook.	X	X																			2
Benches too high or low, too deep or shallow, or with no armrest.							X														1
<b>EMERGENCY PROVISIONS</b>																					
No alternative route for flood condition structures.	X																X				2
No pedestrian emergency provisions.			X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	18
<b>LIGHTING ILLUMINATION</b>																					
Significant change of light level in tunnel at entrance.																	X				1
Interior lighting not adjusted to outside light conditions.										X											1
Glare at end of tunnel.*																					
Tunnel too dark.*																	X				1
Glare and flashing lights from vehicles.*	X	X	X	X	X	X			X	X		X	X			X		X	X		13
Poor illumination.*	X				X					X				X	X	X	X	X			8
<b>SIGNAGE/MEDIA CUES</b>																					
No signage indicating location of rest areas.	X	X	X	X	X	X	X	X	X		X	X		X	X		X	X	X		16
Street signs too high, too low or far.																					
No special signage for the visually impaired.	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	19
Traffic lights with short green cycle.																					
Complicated instructions on sign.																					

C	Over	Over	Over	Under	Over	Over	Over	Over	Over	Under	Over	Over	Over	Over	Over	Over	Under	Over	Over	TOTAL
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	
No warning of potential hazards.													X							1
No orientation cue as to start of approach.	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	19
Lack of orientation cues generally	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	19
Pathway junctions which are not at 90 degree angle or which curve.	X	X										X	X	X	X	X				7
No detectable orientation cue as to start of channelization.																				
Walkway not channelized.	X	X	X	X	X	X	X	X	X			X		X	X		X	X	X	15
Traffic noise.			X	X					X			X	X				X	X	X	8
MICRO-CLIMATIC FACTORS																				
High wind gusts present.*	X	X	X		X	X	X	X	X		X	X	X			X		X	X	14
Wind generated by traffic.*				X																1
Inadequate provision for rain-water runoff.														X			X	X		3
Walkways and sidewalks not kept clear of snow, ice and debris.			X			X						X		X	X		X			6

\*Response to these problems may not indicate that the problem definitely exists, but rather, in the opinion of the observer, that the problem probably exists quite frequently.

\*\*Based on the 1961 ANSI Standards.

D	Over	Over	Over	Over	Over	TOTAL
	1	2	3	4	5	
LOCATION & END CONDITION						
Portions of walkway are hidden from view (crime potential).		X				1
Overcrossing/undercrossing is not close to public transportation stop.						
No sidewalk at end condition.	X	X	X			3
Parked cars restrict approach.*						
Parked cars obstruct view of approach.*						
No accessible parking.**						
No detectable pedestrian crosswalk to approach.		X				1
Driver's view of pedestrian blocked.*						
WALKWAYS						
Pedestrian walkway on only one side.						
Walkway less than 48" (too narrow).**						
Headroom below 6'10".**						
Walkway through "long" tunnel (over 40').						
Structure vibrates (traffic).						
Abrasive or perforated material on vertical surface adjacent to walkway.			X			1
Objects project into walkway (signs, trees, etc.).						
SURFACE MATERIALS						
Manhole covers and gratings in walkway.						
Highly reflective surface materials.						
Grooves and patterns (cast into walkways or caused by small paving units).			X			1



D	Over	Over	Over	Over	Over	TOTAL
	1	2	3	4	5	
Large, deep expansion joints.**	X				X	2
Uneven and irregular surfaces.			X	X		2
Loose and soft surfaces (gravel, sand, etc.).						
Rough surfaces.			X	X		2
Discontinuous surface materials.			X	X		2
MAINTENANCE						
Debris from erosion on walkway.						
Disrepair (frost heaves, potholes, etc.).					X	1
Disrepair from vandalism or accident (handrails, guardrails, etc.).	X	X				2
STAIRWAYS						
Stairway is only means of access to structure.**			X	X		2
Stairway only on one side of structure.**						
Poorly lighted steps, stairs, ramps.				X		1
Treads less than 11" (too small).			X	X		2
Projecting nosings.				X		1
Open risers.			X	X		2
Risers greater than 7" (too high).**			X			1
Curb greater than 6" (too high).						
Step (settlement) between approach and structure.**						
Dangerous stair location.						

D	Over	Over	Over	Over	Over	TOTAL
	1	2	3	4	5	
RAMPS						
Only ramps provided.		X				1
Only ramps provided on one side of structure.					X	1
Pathway leading to over-undercrossing too steep and long.**						
Ramp too long (exceeds 30 feet).**		X			X	2
Ramp too steep (slope greater than 1:12).**		X			X	2
Ramp too narrow (less than 48").**						
Cross slope greater than 1:50 (too steep).						
Slope across structure too long and steep.**						
No curb cuts.**	X	X				2
Helical ramp.		X				1
Ramp layout inconvenient.						
Abrupt transition to connecting walkways.						
Ramp exits directly into street or parking area (less than 6' clearance at bottom of ramp).						
Bollards in the middle of entrance to the ramp.						
Steps in the middle of the ramp.						
HANDRAILS						
Handrails higher than 36" (too high).		X		X		2
Handrails lower than 32" (too low).**						

D	Over	Over	Over	Over	Over	TOTAL
	1	2	3	4	5	
No handrails.**			X		X	2
Handrail inadequate for comfortable grasp.						
Handrail material metal or aluminum (hot in hot weather, cold in cold).		X		X		2
Handrails not continuous.		X		X		2
Handrails don't extend far enough (1' at top and bottom of stairs and ramps).**		X				1
No handrails on ramps.						
<b>GUARDRAILS, BARRACIDES, PEDESTRIAN/VEHICULAR SEPARATION</b>						
Barricades not detectable (blind cane).						
Guardrails not continuous.						
Guardrails too low (less than 42").	X	X			X	3
No pedestrian guardrails.						
Inadequate guardrails.						
Guardrail mesh hazardous.*			X			1
No detectable separation between bikeway and pedestrian way.	X	X				2
No detectable separation between roadway and walkway.						
No detectable separation between walkway and parking lot.						
Unprotected sidewalks (cars, edges, etc.).						
<b>ESCALATORS/ELEVATORS</b>						
Escalators.						
Elevators.						

D	Over	Over	Over	Over	Over	TOTAL
	1	2	3	4	5	
<b>REST AREAS/BENCHES</b>						
Resting places not under cover (wind, rain, sun).						
Not enough places to stop and rest.	X	X	X	X	X	5
No provision for scenic overlook.						
Benches too high or low, too deep or shallow, or with no armrest.						
<b>EMERGENCY PROVISIONS</b>						
No alternative route for flood condition structures.						
No pedestrian emergency provisions.	X	X	X	X	X	5
<b>LIGHTING ILLUMINATION</b>						
Significant change of light level in tunnel at entrance.						
Interior lighting not adjusted to outside light conditions.						
Glare at end of tunnel.*						
Tunnel too dark.*						
Glare and flashing lights from vehicles.*				X		1
Poor illumination.*	X	X	X	X		4
<b>SINAGE/MEDIA CUES</b>						
No signage indicating location of rest areas.			X		X	2
Street signs too high, too low or far.						
No special signage for the visually impaired.	X	X	X	X	X	5
Traffic lights with short green cycle.						
Complicated instructions on signs.						
No warning of potential hazards.		X		X	X	3

D	Over	Over	Over	Over	Over	TOTAL
	1	2	3	4	5	
No orientation cue as to start of approach.	X	X	X	X	X	5
Lack of orientation cues generally.	X	X	X	X	X	5
Pathway junctions which are not at 90° angle or which curve.						
No detectable orientation cue as to start of channelization.						
Walkway not channelized.	X	X				2
Traffic noise.	X					1
<b>MICRO-CLIMATIC FACTORS</b>						
High wind gusts present.*						
Wind generated by traffic.*						
Inadequate provision for rain-water runoff.						
Walkways and sidewalks not kept clear of snow, ice and debris.		X				1

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\*\*Based on the 1961 ANSI Standards.

<b>E</b>	Under	Over	Over	Under	Over	Under	TOTAL
	1	2	3	4	5	6	
<b>LOCATION &amp; END CONDITION</b>							
Portions of walkway are hidden from view (crime potential).							
Overcrossing/undercrossing is not close to public transportation stop.							
No sidewalk at end condition.							
Parked cars restrict approach.*							
Parked cars obstruct view of approach.*							
No accessible parking.**							
No detectable pedestrian crosswalk to approach.	X						1
Driver's view of pedestrian blocked.*							
<b>WALKWAYS</b>							
Pedestrian walkway on only one side.							
Walkway less than 48" (too narrow).**						X	1
Headroom below 6'10".**						X	1
Walkway through "long" tunnel (over 40').				X			1
Structure vibrates (traffic).							
Abrasive or perforated material on vertical surface adjacent to walkway.	X						1
Objects project into walkway (signs, trees, etc.).							
<b>SURFACE MATERIALS</b>							
Manhole covers and gratings in walkway.							
Highly reflective surface materials.							
Grooves and patterns (cast into walkways or caused by small paving units).			X		X		2

E	Under	Over	Over	Under	Over	Under	TOTAL
	1	2	3	4	5	6	
Large, deep expansion joints. **							
Uneven and irregular surfaces.			X		X		2
Loose and soft surfaces (gravel, sand, etc.).							
Rough surfaces.		X			X		2
Discontinuous surface materials.			X		X		2
MAINTENANCE							
Debris from erosion on walkway.							
Disrepair (frost heaves, potholes, etc.).							
Disrepair from vandalism or accident (handrails, guardrails, etc.).							
STAIRWAYS							
Stairway is only means of access to structure.**							
Stairway only on one side of structure. **							
Poorly lighted steps, stairs, ramps.							
Treads less than 11" (too small).							
Projecting nosings.							
Open risers.							
Risers greater than 7" (too high).**							
Curb greater than 6" (too high).							
Step (settlement) between approach and structure.**							
Dangerous stair location.							

E	Under	Over	Over	Under	Over	Under	TOTAL
	1	2	3	4	5	6	
RAMPS							
Only ramps provided.			X				1
Only ramps provided on one side of structure.							
Pathway leading to over-undercrossing too steep and long.**				X			1
Ramp too long (exceeds 30 feet).**							
Ramp too steep (slope greater than 1:12).**							
Ramp too narrow (less than 48").**							
Cross slope greater than 1:50 (too steep).							
Slope across structure too long and steep.**			X		X		2
No curb cuts.**							
Helical ramp.							
Ramp layout inconvenient.							
Abrupt transition to connecting walkways.							
Ramp exits directly into street or parking area (less than 6' clearance at bottom of ramp).							
Bollards in the middle of entrance to the ramp.							
Steps in the middle of the ramp.							
HANDRAILS							
Handrails higher than 36" (too high).			X		X		2
Handrails lower than 32" (too low).**							



E	Under	Over	Over	Under	Over	Under	TOTAL
	1	2	3	4	5	6	
No handrails. **				X			1
Handrail inadequate for comfortable grasp.			X		X		2
Handrail material metal or aluminum (hot in hot weather, cold in cold).	X						1
Handrails not continuous.							
Handrails don't extend far enough (1' at top and bottom of stairs and ramps). **					X		1
No handrails on ramps.							
<b>GUARDRAILS, BARRICADES, PEDESTRIAN/VEHICULAR SEPARATION</b>							
Barricades not detectable (blind cane).							
Guardrails not continuous.							
Guardrails too low (less than 42").							
No pedestrian guardrails.		X		X			2
Inadequate guardrails.							
Guardrail mesh hazardous.*							
No detectable separation between bikeway and pedestrian way.	X	X	X		X		4
No detectable separation between roadway and walkway.							
No detectable separation between walkway and parking lot.							
Unprotected sidewalks (cars, edges, etc.).		X		X			2
<b>ESCALATORS/ELEVATORS</b>							
Escalators.							
Elevators.							

E	Under	Over	Over	Under	Over	Under	TOTAL
	1	2	3	4	5	6	
<b>REST AREAS/BENCHES</b>							
Resting places not under cover (wind, rain, sun).							
Not enough places to stop and rest.	X		X	X	X		4
No provision for scenic overlook.							
Benches too high or low, too deep or shallow, or with no armrest.							
<b>EMERGENCY PROVISIONS</b>							
No alternative route for flood condition structures.							
No pedestrian emergency provisions.	X	X	X	X	X		5
<b>LIGHTING ILLUMINATION</b>							
Significant change of light level in tunnel at entrance.							
Interior lighting not adjusted to outside light conditions.				X			1
Glare at end of tunnel.*				X			1
Tunnel too dark.*				X			1
Glare and flashing lights from vehicles.*							
Poor illumination.*				X			1
<b>SIGNAGE/MEDIA CUES</b>							
No signage indicating location of rest areas.				X			1
Street signs too high, too low or far.							
No special signage for the visually impaired.	X	X	X	X	X		5
Traffic lights with short green cycle.							
Complicated instructions on signs.							
No warning of potential hazards.							

E	Under	Over	Over	Under	Over	Under	TOTAL
	1	2	3	4	5	6	
No orientation cue as to start of approach.	X		X		X		3
Lack of orientation cues generally.	X	X	X	X	X		5
Pathway junctions which are not at 90° angle or which curve.							
No detectable orientation cue as to start of channelization.							
Walkway not channelized.	X	X	X	X	X		5
Traffic noise.							
MICRO-CLIMATIC FACTORS							
High wind gusts present.*							
Wind generated by traffic.*							
Inadequate provision for rain-water runoff.							
Walkways and sidewalks not kept clear of snow, ice and debris.	X						1

\*Responses to these problems may not indicate that the problem definitely exists, but rather, in the opinion of the observer, that the problem probably exists quite frequently.

\*\*Based on the 1961 ANSI Standards.

F	Over	Over	Over	Over	Under	Over	Over	Over	Under	Over	Over	Under	Over	Over	Under	TOTAL
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
LOCATION & END CONDITION																
Portions of walkway are hidden from view (crime potential).					X				X	X					X	4
Overcrossing/undercrossing is not close to public transportation stop.																
No sidewalk at end condition.																
Parked cars restrict approach.*																
Parked cars obstruct view of approach.*																
No accessible parking.**																
No detectable pedestrian crosswalk to approach.									X						X	2
Driver's view of pedestrian blocked.*																
WALKWAYS																
Pedestrian walkway on only one side.												X				1
Walkway less than 48" (too narrow).**																
Headroom below 6'10".**																
Walkway through "long" tunnel (over 40').					X				X						X	3
Structure vibrates (traffic).																
Abrasive or perforated material on vertical surface adjacent to walkway.	X	X	X	X		X	X	X			X	X	X	X		11
Objects project into walkway (signs, trees, etc.).																

F	Over	Over	Over	Over	Under	Over	Over	Over	Under	Over	Over	Under	Over	Over	Under	TOTAL
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
SURFACE MATERIALS																
Manhole covers and gratings in walkway.								X				X				2
Highly reflective surface materials.																
Grooves and patterns (cast into walkways or caused by small paving units).		X	X													2
Large, deep expansion joints.**		X				X	X	X		X			X	X		7
Uneven and irregular surfaces.	X			X	X	X	X						X			6
Loose and soft surfaces (gravel, sand, etc.).								X								1
Rough Surfaces.				X									X			2
Discontinuous surface materials.																
MAINTENANCE																
Debris from erosion on walkway.					X				X			X			X	4
Disrepair (frost heaves, potholes, etc.).	X					X	X									3
Disrepair from vandalism or accident (handrails, guardrails, etc.).	X			X			X	X					X			5
STAIRWAYS																
Stairway is only means of access to structure.**			X				X						X			3
Stairway only on one side of structure.**													X			1
Poorly lighted steps, stairs, ramps.	X	X	X				X	X				X				6
Treads less than 11" (too small).										X						1
Projecting nosings.													X			1
Open risers.																
Risers greater than 7" (too high).**	X															1
Curb greater than 6" (too high).																

F	Over	Over	Over	Over	Under	Over	Over	Over	Under	Over	Over	Under	Over	Over	Under	TOTAL
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
Step (settlement) between approach and structure.**	X					X		X								3
Dangerous stair location.																
RAMPS																
Only ramps provided.	X	X						X			X				X	5
Only ramps provided on one side of structure.																
Pathway leading to over-undercrossing too steep and long.**					X				X						X	3
Ramp too long (exceeds 30 feet).**	X	X						X		X	X				X	6
Ramp too steep (slope greater than 1:12).**	X	X		X				X			X				X	6
Ramp too narrow (less than 48').**																
Cross slope greater than 1:50 (too steep).													X			1
Slope across structure too long and steep.**																
No curb cuts.**		X				X										2
Helical ramp.																
Ramp layout inconvenient.																
Abrupt transition to connecting walkways.					X											1
Ramp exits directly into street or parking area (less than 6' clearance at bottom of ramp).	X								X				X	X	X	5
Bollards in the middle of entrance to the ramp.																
Steps in the middle of the ramp.	X															1
HANDRAILS																
Handrails higher than 36" (too high).		X	X			X									X	4
Handrails lower than 32" (too low).**																

F	Over	Over	Over	Over	Under	Over	Over	Over	Under	Over	Over	Under	Over	Over	Under	TOTAL	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15		
No handrails.**	X			X	X				X			X	X			X	7
Handrail inadequate for comfortable grasp.		X		X		X									X		4
Handrail material metal or aluminum (hot in hot weather, cold in cold).		X	X	X			X	X		X			X	X			8
Handrails not continuous.		X	X					X		X			X	X			6
Handrails don't extend far enough (1' at top and bottom of stairs and ramps).**		X				X		X							X		4
No handrails on ramps.				X					X							X	3
GUARDRAILS, BARRICADES, PEDESTRIAN/VEHICULAR SEPARATION																	
Barricades not detectable (blind cane).			X														1
Guardrails not continuous.																	
Guardrails too low (less than 42").	X												X				2
No pedestrian guardrails.						X											1
Inadequate guardrails.		X	X														2
Guardrail mesh hazardous.*		X	X	X		X	X	X			X				X		8
No detectable separation between bike-way and pedestrian way.	X	X		X	X	X		X	X		X	X			X	X	11
No detectable separation between roadway and walkway.						X											1
No detectable separation between walkway and parking lot.																	
Unprotected sidewalks (cars, edges, etc.).															X		1
ESCALATORS/ ELEVATORS																	
Escalators.																	
Elevators.										X							1

F	Over	Over	Over	Over	Under	Over	Over	Over	Under	Over	Over	Under	Over	Over	Under	TOTAL
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
<b>REST AREAS/BENCHES</b>																
Resting places not under cover (wind, rain, sun).				X												1
Not enough places to stop and rest.	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	15
No provision for scenic overlook.																
Benches too high or low, too deep or shallow, or with no armrest.																
<b>EMERGENCY PROVISIONS</b>																
No alternative route for flood condition structures.					X				X							2
No pedestrian emergency provisions.	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	15
<b>LIGHTING ILLUMINATION</b>																
Significant change of light level in tunnel at entrance.					X											1
Interior lighting not adjusted to outside light conditions.					X											1
Glare at end of tunnel.*					X											1
Tunnel too dark.*					X											1
Glare and flashing lights from vehicles.*	X	X	X			X	X	X			X	X	X	X		10
Poor illumination.*		X	X		X		X	X			X	X	X			8
<b>SIGNAGE/MEDIA CUES</b>																
No signage indicating location of rest areas.	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	15
Street signs too high, too low or far.																
No special signage for the visually impaired.	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	15
Traffic lights with short green cycle.																
Complicated instructions on sign.																



F	Over	Over	Over	Over	Under	Over	Over	Over	Under	Over	Over	Under	Over	Over	Under	TOTAL
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
No warning of potential hazards.																
No orientation cue as to start of approach.	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	15
Lack of orientation cues generally	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	15
Pathway junctions which are not at 90 degree angle or which curve.					X	X			X			X	X		X	6
No detectable orientation cue as to start of channelization.																
Walkway not channelized.	X	X	X	X	X			X	X		X	X		X	X	11
Traffic noise.						X	X	X				X	X	X		6
MICRO-CLIMATIC FACTORS																
High wind gusts present.*	X	X	X				X	X			X		X	X		8
Wind generated by traffic.*																
Inadequate provision for rain-water runoff.					X				X			X			X	4
Walkways and sidewalks not kept clear of snow, ice and debris.		X			X	X		X				X	X		X	7

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\*\*Based on the 1961 ANSI Standards.

G	Under	Over	Under	Over	Over	TOTAL
	1	2	3	4	5	
LOCATION & END CONDITION						
Portions of walkway are hidden from view (crime potential).		X				1
Overcrossing/undercrossing is not close to public transportation stop.						
No sidewalk at end condition.						
Parked cars restrict approach.*						
Parked cars obstruct view of approach.*						
No accessible parking.**						
No detectable pedestrian crosswalk to approach.	X	X	X	X	X	5
Driver's view of pedestrian blocked.*						
WALKWAYS						
Pedestrian walkway on only one side.	X					1
Walkway less than 48" (too narrow).**						
Headroom below 6'10".**						
Walkway through "long" tunnel (over 40').	X		X			2
Structure vibrates (traffic).						
Abrasive or perforated material on vertical surface adjacent to walkway.				X		1
Objects project into walkway (signs, trees, etc.).						
SURFACE MATERIALS						
Manhole covers and gratings in walkway.						
Highly reflective surface materials.						
Grooves and patterns (cast into walkways or caused by small paving units).						

G	Under	Over	Under	Over	Over	TOTAL
	1	2	3	4	5	
Large, deep expansion joints. **						
Uneven and irregular surfaces.						
Loose and soft surfaces (gravel, sand, etc.).						
Rough surfaces.						
Discontinuous surface materials.						
MAINTENANCE						
Debris from erosion on walkway.						
Disrepair (frost heaves, potholes, etc.).						
Disrepair from vandalism or accident (handrails, guardrails, etc.).						
STAIRWAYS						
Stairway is only means of access to structure.**						
Stairway only on one side of structure.**						
Poorly lighted steps, stairs, ramps.						
Treads less than 11" (too small).						
Projecting nosings.						
Open risers.						
Risers greater than 7" (too high).**						
Curb greater than 6" (too high).						
Step (settlement) between approach and structure.**						
Dangerous stair location.						

G	Under	Over	Under	Over	Over	TOTAL
	1	2	3	4	5	
RAMPS						
Only ramps provided.		X	X	X		3
Only ramps provided on one side of structure.						
Pathway leading to over-undercrossing too steep and long.**						
Ramp too long (exceeds 30 feet).**		X				1
Ramp too steep (slope greater than 1:12).**		X				1
Ramp too narrow (less than 48").**						
Cross slope greater than 1:50 (too steep).						
Slope across structure too long and steep. **		X		X		2
No curb cuts. **	X	X	X	X	X	5
Helical ramp.		X				1
Ramp layout inconvenient.						
Abrupt transition to connecting walkways.						
Ramp exits directly into street or parking area (less than 6' clearance at bottom of ramp).						
Bollards in the middle of entrance to the ramp.						
Steps in the middle of the ramp.						
HANDRAILS						
Handrails higher than 36" (too high).						
Handrails lower than 32" (too low).**						

G	Under	Over	Under	Over	Over	TOTAL
	1	2	3	4	5	
No handrails.**	X	X	X	X	X	5
Handrail inadequate for comfortable grasp.						
Handrail material metal or aluminum (hot in hot weather, cold in cold).						
Handrails not continuous.						
Handrails don't extend far enough (1' at top and bottom of stairs and ramps).**						
No handrails on ramps.		X		X		2
GUARDRAILS, BARRICADES, PEDESTRIAN/VEHICULAR SEPARATION						
Barricades not detectable (blind cane).						
Guardrails not continuous.						
Guardrails too low (less than 42").						
No pedestrian guardrails.	X					1
Inadequate guardrails.		X				1
Guardrail mesh hazardous.*				X		1
No detectable separation between bikeway and pedestrian way.	X		X		X	3
No detectable separation between roadway and walkway.						
No detectable separation between walkway and parking lot.						
Unprotected sidewalks (cars, edges, etc.).		X				1
ESCALATORS/ELEVATORS						
Escalators.						
Elevators.						

G	Under	Over	Under	Over	Over	TOTAL
	1	2	3	4	5	
<b>REST AREAS/BENCHES</b>						
Resting places not under cover (wind, rain, sun).						
Not enough places to stop and rest.	X	X	X	X	X	5
No provision for scenic overlook.						
Benches too high or low, too deep or shallow, or with no armrest.						
<b>EMERGENCY PROVISIONS</b>						
No alternative route for flood condition structures.						
No pedestrian emergency provisions.	X	X	X			3
<b>LIGHTING ILLUMINATION</b>						
Significant change of light level in tunnel at entrance.			X			1
Interior lighting not adjusted to outside light conditions.	X		X			2
Glare at end of tunnel.*			X			1
Tunnel too dark.*			X			1
Glare and flashing lights from vehicles.*						
Poor illumination.*	X	X	X	X	X	5
<b>SIGNAGE/MEDIA CUES</b>						
No signage indicating location of rest areas.	X	X				2
Street signs too high, too low or far.						
No special signage for the visually impaired.	X	X	X	X		4
Traffic lights with short green cycle.						
Complicated instructions on signs.						
No warning of potential hazards.	X	X	X		X	4

G	Under	Over	Under	Over	Over	TOTAL
	1	2	3	4	5	
No orientation cue as to start of approach.	X	X	X	X		4
Lack of orientation cues generally.	X	X	X	X		4
Pathway junctions which are not at 90° angle or which curve.						
No detectable orientation cue as to start of channelization.						
Walkway not channelized.	X	X	X	X		4
Traffic noise.	X					1
MICRO-CLIMATIC FACTORS						
High wind gusts present.*		X				1
Wind generated by traffic.*						
Inadequate provision for rain-water runoff.						
Walkways and sidewalks not kept clear of snow, ice and debris.						

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\*\*Based on the 1961 ANSI Standards.

H	Under	Over	Over	Under	Over	Over	Over	Over	Over	Over	Under	Under	Over	Over	Under	Over	TOTAL
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
LOCATION & END CONDITION																	
Portions of walkway are hidden from view (crime potential).	X	X												X		X	4
Overcrossing/undercrossing is not close to public transportation stop.																	
No sidewalk at end condition.																	
Parked cars restrict approach.*																	
Parked cars obstruct view of approach.*	X																1
No accessible parking.**																	
No detectable pedestrian crosswalk to approach.	X	X	X	X		X			X	X	X	X	X	X	X	X	13
Driver's view of pedestrian blocked.*	X				X			X	X						X		5
WALKWAYS																	
Pedestrian walkway on only one side.																	
Walkway less than 48" (too narrow).**							X										1
Headroom below 6'10". **																	
Walkway through "long" tunnel (over 40').	X				X						X	X			X		5
Structure vibrates (traffic).																	
Abrasive or perforated material on vertical surface adjacent to walkway.				X								X				X	3
Objects project into walkway (signs, trees, etc.).	X		X														2



H	Under	Over	Over	Under	Over	Over	Over	Over	Over	Over	Under	Under	Over	Over	Under	Over	TOTAL
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
SURFACE MATERIALS																	
Manhole covers and gratings in walkway.							X										1
Highly reflective surface materials.																	
Grooves and patterns (cast into walkways or caused by small paving units).													X	X			2
Large, deep expansion joints.**	X				X		X										3
Uneven and irregular surfaces.							X						X	X			3
Loose and soft surfaces (gravel, sand, etc.).															X		1
Rough Surfaces.							X						X				2
Discontinuous surface materials.														X			1
MAINTENANCE																	
Debris from erosion on walkway.																	
Disrepair (frost heaves, potholes, etc.).																X	1
Disrepair from vandalism or accident (handrails, guardrails, etc.).		X		X													2
STAIRWAYS																	
Stairway is only means of access to structure.**																	
Stairway only on one side of structure.**																	
Poorly lighted steps, stairs, ramps.																	
Treads less than 11" (too small).																	
Projecting nosings.																	
Open risers.	X																1
Risers greater than 7" (too high).**																	
Curb greater than 6" (too high).					X						X						2

H	Under	Over	Over	Under	Over	Over	Over	Over	Over	Over	Under	Under	Over	Over	Under	Over	TOTAL
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
Step (settlement) between approach and structure.**																	
Dangerous stair location.																	
RAMPS																	
Only ramps provided.		X			X			X						X		X	5
Only ramps provided on one side of structure.																	
Pathway leading to over-undercrossing too steep and long.**						X	X		X	X							4
Ramp too long (exceeds 30 feet).**	X	X			X			X						X		X	6
Ramp too steep (slope greater than 1:12).**	X	X			X			X								X	5
Ramp too narrow (less than 48').**							X										1
Cross slope greater than 1:50 (too steep).				X													1
Slope across structure too long and steep.**																	
No curb cuts.**		X	X	X	X	X			X	X	X		X	X			10
Helical ramp.																X	1
Ramp layout inconvenient.																	
Abrupt transition to connecting walkways.																	
Ramp exits directly into street or parking area (less than 6' clearance at bottom of ramp).		X			X			X								X	4
Bollards in the middle of entrance to the ramp.																	
Steps in the middle of the ramp.																	
HANDRAILS																	
Handrails higher than 36" (too high).		X				X	X		X	X			X	X			7
Handrails lower than 32" (too low).**																	

H	Under	Over	Over	Under	Over	Over	Over	Over	Over	Over	Under	Under	Over	Over	Under	Over	TOTAL
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
No handrails.**				X							X	X					3
Handrail inadequate for comfortable grasp.	X		X			X	X		X	X			X	X			8
Handrail material metal or aluminum (hot in hot weather, cold in cold).	X	X	X		X	X	X	X	X	X				X		X	11
Handrails not continuous.	X	X												X		X	4
Handrails don't extend far enough (1' at top and bottom of stairs and ramps).**			X			X	X		X	X			X			X	7
No handrails on ramps.	X	X				X			X	X							5
GUARDRAILS, BARRICADES, PEDESTRIAN/VEHICULAR SEPARATION																	
Barricades not detectable (blind cane). Guardrails not continuous.																	
Guardrails too low (less than 42").																	
No pedestrian guardrails.				X							X						2
Inadequate guardrails.																	
Guardrail mesh hazardous.*			X														1
No detectable separation between bike-way and pedestrian way.	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	15
No detectable separation between roadway and walkway.			X	X		X									X		4
No detectable separation between walkway and parking lot. Unprotected sidewalks (cars, edges, etc.).				X	X		X	X		X	X	X	X			X	9
ESCALATORS/ ELEVATORS																	
Escalators.																	
Elevators.																	

H	Under	Over	Over	Under	Over	Over	Over	Over	Over	Over	Under	Under	Over	Over	Under	Over	TOTAL
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
REST AREAS/BENCHES																	
Resting places not under cover (wind, rain, sun).													X				1
Not enough places to stop and rest.	X	X		X	X			X	X			X	X		X	X	11
No provision for scenic overlook.																	
Benches too high or low, too deep or shallow, or with no armrest.																	
EMERGENCY PROVISIONS																	
No alternative route for flood condition structures.	X	X		X		X		X									5
No pedestrian emergency provisions.	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	16
LIGHTING ILLUMINATION																	
Significant change of light level in tunnel at entrance.	X			X													2
Interior lighting not adjusted to outside light conditions.	X			X													2
Glare at end of tunnel.*	X			X													2
Tunnel too dark.*	X			X							X						3
Glare and flashing lights from vehicles.*		X	X	X	X	X	X	X	X	X							9
Poor illumination.*	X			X			X				X				X		5
SIGNAGE/MEDIA CUES																	
No signage indicating location of rest areas.	X	X	X	X	X	X	X	X	X	X		X					11
Street signs too high, too low or far.			X														1
No special signage for the visually impaired.	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	16
Traffic lights with short green cycle.					X			X	X								3
Complicated instructions on sign.																	

H	Under	Over	Over	Under	Over	Over	Over	Over	Over	Over	Under	Under	Over	Over	Under	Over	TOTAL
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
No warning of potential hazards.						X			X	X		X					4
No orientation cue as to start of approach.	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	16
Lack of orientation cues generally.	X	X	X	X	X	X		X			X	X	X	X	X	X	13
Pathway junctions which are not at 90 degree angle or which curve.												X		X		X	3
No detectable orientation cue as to start of channelization.																	
Walkway not channelized.	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	16
Traffic noise.			X	X	X	X	X	X	X	X	X	X			X	X	12
MICRO-CLIMATIC FACTORS																	
High wind gusts present.*		X	X		X	X	X	X	X	X	X				X	X	11
Wind generated by traffic.*			X		X							X					3
Inadequate provision for rain-water runoff.																	
Walkways and sidewalks not kept clear of snow, ice and debris.		X															1

\*Response to these problems may not indicate that the problem definitely exists, but rather, in the opinion of the observer, that the problem probably exists quite frequently.

\*\*Based on the 1961 ANSI Standards.

	Over	Over	Over	Over	Over	Over	Over	Over	Over	Over	Over	Over	TOTAL
LOCATION & END CONDITION	1	2	3	4	5	6	7	8	9	10	11	12	
Portions of walkway are hidden from view (crime potential).	X	X											2
Overcrossing/undercrossing is not close to public transportation stop.	X	X						X			X	X	5
No sidewalk at end condition.	X												1
Parked cars restrict approach.*													
Parked cars obstruct view of approach.*													
No accessible parking.**			X	X	X			X	X			X	6
No detectable pedestrian crosswalk to approach.	X	X				X			X				4
Driver's view of pedestrian blocked.*													
<b>WALKWAYS</b>													
Pedestrian walkway on only one side.													
Walkway less than 48" (too narrow).**													
Headroom below 6'10".**						X							1
Walkway through "long" tunnel (over 40').													
Structure vibrates (traffic).													
Abrasive or perforated material on vertical surface adjacent to walkway.	X	X										X	3
Objects project into walkway (signs, trees, etc.).													
<b>SURFACE MATERIALS</b>													
Manhole covers and gratings in walkway.													
Highly reflective surface materials.													
Grooves and patterns (cast into walkways or caused by small paving units).													

	Over	Over	Over	Over	Over	Over	Over	Over	Over	Over	Over	Over	TOTAL
	1	2	3	4	5	6	7	8	9	10	11	12	
Large, deep expansion joints.**	X		X										2
Uneven and irregular surfaces.													
Loose and soft surfaces (gravel, sand, etc.).													
Rough surfaces.													
Discontinuous surface materials.													
MAINTENANCE													
Debris from erosion on walkway.													
Disrepair (frost heaves, potholes, etc.).													
Disrepair from vandalism or accident (handrails, guardrails, etc.).													
STAIRWAYS													
Stairway is only means of access to structure.**		X			X								2
Stairway only on one side of structure.**													
Poorly lighted steps, stairs, ramps.		X	X				X				X	X	5
Treads less than 11" (too small).													
Projecting nosings.													
Open risers.													
Risers greater than 7" (too high).**													
Curb greater than 6" (too high).	X												1
Step (settlement) between approach and structure.**			X										1
Dangerous stair location.													

	Over	Over	Over	Over	Over	Over	Over	Over	Over	Over	Over	Over	TOTAL
	1	2	3	4	5	6	7	8	9	10	11	12	
<b>RAMPS</b>													
Only ramps provided.	X		X	X		X	X	X		X	X	X	9
Only ramps provided on one side of structure.													
Pathway leading to over-undercrossing too steep and long.**													
Ramp too long (exceeds 30 feet).**	X		X	X		X	X	X	X	X	X	X	10
Ramp too steep (slope greater than 1:12).**	X		X	X		X	X	X	X	X	X		9
Ramp too narrow (less than 48").**													
Cross slope greater than 1:50 (too steep).			X										1
Slope across structure too long and steep. **	X	X	X	X						X			5
No curb cuts.**	X	X	X	X				X				X	6
Helical ramp.			X	X			X	X	X				5
Ramp layout inconvenient.													
Abrupt transition to connecting walkways.													
Ramp exits directly into street or parking area (less than 6' clearance at bottom of ramp).				X	X					X			3
Bollards in the middle of entrance to the ramp.													
Steps in the middle of the ramp.													
<b>HANDRAILS</b>													
Handrails higher than 36" (too high).													
Handrails lower than 32" (too low).**													



	Over	Over	Over	Over	Over	Over	Over	Over	Over	Over	Over	Over	TOTAL
	1	2	3	4	5	6	7	8	9	10	11	12	
No handrails.**			X				X			X		X	4
Handrail inadequate for comfortable grasp.				X									1
Handrail material metal or aluminum (hot in hot weather, cold in cold).	X	X		X	X	X		X	X		X		8
Handrails not continuous.				X	X		X				X		4
Handrails don't extend far enough (1' at top and bottom of stairs and ramps).**		X					X	X					3
No handrails on ramps.			X	X			X			X		X	5
<b>GUARDRAILS, BARRICADES, PEDESTRIAN/VEHICULAR SEPARATION</b>													
Barricades not detectable (blind cane).				X	X	X							3
Guardrails not continuous.													
Guardrails too low (less than 42").													
No pedestrian guardrails.													
Inadequate guardrails.													
Guardrail mesh hazardous.*	X	X		X				X				X	5
No detectable separation between bikeway and pedestrian way.				X									1
No detectable separation between roadway and walkway.													
No detectable separation between walkway and parking lot.					X					X			2
Unprotected sidewalks (cars, edges, etc.).													
<b>ESCALATORS/ELEVATORS</b>													
Escalators.													
Elevators.													

	Over	Over	Over	Over	Over	Over	Over	Over	Over	Over	Over	Over	Over	TOTAL
	1	2	3	4	5	6	7	8	9	10	11	12		
<b>REST AREAS/BENCHES</b>														
Resting places not under cover (wind, rain, sun).			X	X										2
Not enough places to stop and rest.	X	X		X	X	X	X	X	X		X			9
No provision for scenic overlook.														
Benches too high or low, too deep or shallow, or with no armrest.			X											1
<b>EMERGENCY PROVISIONS</b>														
No alternative route for flood condition structures.			X											1
No pedestrian emergency provisions.	X	X			X	X	X	X	X	X	X	X	X	10
<b>LIGHTING ILLUMINATION</b>														
Significant change of light level in tunnel at entrance.														
Interior lighting not adjusted to outside light conditions.														
Glare at end of tunnel.*														
Tunnel too dark.*														
Glare and flashing lights from vehicles.*	X	X				X	X	X	X		X	X		8
Poor illumination.*		X				X						X		3
<b>SIGNAGE/MEDIA CUES</b>														
No signage indicating location of rest areas.	X	X					X							3
Street signs too high, too low or far.														
No special signage for the visually impaired.	X	X	X		X	X	X	X	X	X	X	X		10
Traffic lights with short green cycle.														
Complicated instructions on signs.														
No warning of potential hazards.														

	Over	Over	Over	Over	Over	Over	Over	Over	Over	Over	Over	Over	TOTAL
	1	2	3	4	5	6	7	8	9	10	11	12	
No orientation cue as to start of approach.	X	X	X	X	X	X	X	X	X	X	X	X	12
Lack of orientation cues generally.	X	X	X	X	X	X	X	X	X	X	X	X	12
Pathway junctions which are not at 90° angle or which curve.			X						X			X	3
No detectable orientation cue as to start of channelization.				X									1
Walkway not channelized.													
Traffic noise.													
MICRO-CLIMATIC FACTORS													
High wind gusts present.*					X	X	X	X					4
Wind generated by traffic.*													
Inadequate provision for rain-water runoff.													
Walkways and sidewalks not kept clear of snow, ice and debris.													

\*Responses to these problems may not indicate that the problem definitely exists, but rather, in the opinion of the observer, that the problem probably exists quite frequently.

\*\*Based on the 1961 ANSI Standards.

J	Over	Over	Over	Over	Over	Over	Over	Over	Over	Over	Over	Over	Over	Over	Over	Over	Under	Over	Over	TOTAL
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18		
LOCATION & END CONDITION																				
Portions of walkway are hidden from view (crime potential).	X	X	X		X	X	X	X	X	X	X	X		X	X	X				14
Overcrossing/ undercrossing is not close to public transportation stop.																				
No sidewalk at end condition.																				
Parked cars restrict approach.*			X							X										2
Parked cars obstruct view of approach.*		X										X								2
No accessible parking.**																X				1
No detectable pedestrian cross- walk to approach.	X	X		X	X	X		X	X		X		X	X	X	X				12
Driver's view of pedestrian blocked.*		X	X					X				X								4
<b>WALKWAYS</b>																				
Pedestrian walkway on only one side.																				
Walkway less than 48" (too narrow).**																				
Headroom below 6'10".**																				
Walkway through "long" tunnel (over 40').																X				1
Structure vibrates (traffic).																				
Abrasive or per- forated material on vertical surface adjacent to walkway.	X	X	X		X	X				X	X									7
Objects project into walkway (signs, trees, etc.).																				

J	Over	Over	Over	Over	Over	Over	Over	Over	Over	Over	Over	Over	Over	Over	Over	Over	Under	Over	Over	TOTAL
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18		
SURFACE MATERIALS																				
Manhole covers and gratings in walkway.																				
Highly reflective surface materials.																				
Grooves and patterns (cast into walkways or caused by small paving units).											X	X								2
Large, deep expansion joints.**	X		X				X	X		X										5
Uneven and irregular surfaces.								X		X	X									3
Loose and soft surfaces (gravel, sand, etc.).						X											X			2
Rough Surfaces.																				
Discontinuous surface materials.																				
MAINTENANCE																				
Debris from erosion on walkway.						X														1
Disrepair (frost heaves, potholes, etc.).								X												1
Disrepair from vandalism or accident (handrails, guardrails, etc.).				X	X					X		X	X			X	X	X		8
STAIRWAYS																				
Stairway is only means of access to structure.**												X								1
Stairway only on one side of structure.**																				
Poorly lighted steps, stairs, ramps.														X						1
Treads less than 11" (too small).																		X		1
Projecting nosings.												X								1
Open risers.																				
Risers greater than 7" (too high).**																				
Curb greater than 6" (too high).					X															1

J	Over	Over	Over	Over	Over	Over	Over	Over	Over	Over	Over	Over	Over	Over	Over	Over	Under	Over	Over	TOTAL
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18		
Step (settlement) between approach and structure.**	X						X													2
Dangerous stair location.																				
RAMPS																				
Only ramps provided.		X	X	X	X	X	X	X	X	X	X		X	X	X				X	14
Only ramps provided on one side of structure.	X								X	X								X		4
Pathway leading to over-undercrossing too steep and long.**																				
Ramp too long (exceeds 30 feet).**	X	X	X	X	X	X	X	X		X	X		X	X	X			X	X	15
Ramp too steep (slope greater than 1:12).**	X	X	X	X	X	X	X	X	X		X			X	X			X	X	14
Ramp too narrow (less than 48').**																				
Cross slope greater than 1:50 (too steep).						X														1
Slope across structure too long and steep.**	X	X	X	X			X	X	X	X	X		X	X					X	13
No curb cuts.**	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X			16
Helical ramp.	X													X				X		3
Ramp layout inconvenient.																				
Abrupt transition to connecting walkways.		X	X	X				X	X											5
Ramp exits directly into street or parking area (less than 6' clearance at bottom of ramp).			X		X		X	X	X	X	X			X	X					9
Bollards in the middle of entrance to the ramp.							X													1
Steps in the middle of the ramp.																				
HANDRAILS																				
Handrails higher than 36" (too high).	X																		X	2
Handrails lower than 32" (too low).**			X																	1

J	Over	Over	Over	Over	Over	Over	Over	Over	Over	Over	Over	Over	Over	Over	Over	Over	Under	Over	Over	TOTAL
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18		
No handrails.**		X		X									X	X	X	X				6
Handrail inadequate for comfortable grasp.	X								X											2
Handrail material metal or aluminum (hot in hot weather, cold in cold).	X		X		X	X	X	X	X	X	X							X		10
Handrails not continuous.	X		X		X	X												X		5
Handrails don't extend far enough (1' at top and bottom of stairs and ramps).**			X		X	X		X				X						X		6
No handrails on ramps.	X			X	X									X	X					5
GUARDRAILS, BARRICADES, PEDESTRIAN/VEHICULAR SEPARATION																				
Barricades not detectable (blind cane).				X																1
Guardrails not continuous.					X															1
Guardrails too low (less than 42").																				
No pedestrian guardrails.																				
Inadequate guardrails.				X																1
Guardrail mesh hazardous.*	X	X	X	X	X	X	X	X	X	X	X									7
No detectable separation between bike-way and pedestrian way.	X	X	X	X	X	X	X	X	X	X	X			X	X	X	X	X	X	16
No detectable separation between roadway and walkway.																				
No detectable separation between walkway and parking lot.																				
Unprotected sidewalks (cars, edges, etc.).																				
ESCALATORS/ ELEVATORS																				
Escalators.																				
Elevators.																				

J	Over	Over	Over	Over	Over	Over	Over	Over	Over	Over	Over	Over	Over	Over	Over	Under	Over	Over	TOTAL
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	
<b>REST AREAS/BENCHES</b>																			
Resting places not under cover (wind, rain, sun).	X							X											2
Not enough places to stop and rest.		X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	16
No provision for scenic overlook.																			
Benches too high or low, too deep or shallow, or with no armrest.	X																		1
<b>EMERGENCY PROVISIONS</b>																			
No alternative route for flood condition structures.																			
No pedestrian emergency provisions.	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	18
<b>LIGHTING ILLUMINATION</b>																			
Significant change of light level in tunnel at entrance.																X			1
Interior lighting not adjusted to outside light conditions.																X			1
Glare at end of tunnel.*																X			1
Tunnel too dark.*																X			1
Glare and flashing lights from vehicles.*	X	X						X	X		X						X	X	7
Poor illumination.*		X	X					X			X		X	X	X	X	X	X	9
<b>SIGNAGE/MEDIA CUES</b>																			
No signage indicating location of rest areas.	X			X		X	X	X	X				X		X	X	X		10
Street signs too high, too low or far.																			
No special signage for the visually impaired.	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	18
Traffic lights with short green cycle.																			
Complicated instructions on sign.																			



J	Over	Over	Over	Over	Over	Over	Over	Over	Over	Over	Over	Over	Over	Over	Over	Over	Under	Over	Over	TOTAL
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18		
No warning of potential hazards.	X					X	X	X	X	X		X								7
No orientation cue as to start of approach.	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	17
Lack of orientation cues generally	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	17
Pathway junctions which are not at 90 degree angle or which curve.	X			X	X	X						X			X		X		7	
No detectable orientation cue as to start of channelization.																				
Walkway not channelized.	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	18
Traffic noise.	X	X	X		X	X	X	X	X	X	X				X			X	X	13
MICRO-CLIMATIC FACTORS																				
High wind gusts present.*	X	X	X	X	X	X	X	X	X	X	X			X	X				X	14
Wind generated by traffic.*																				
Inadequate provision for rain-water runoff.																				
Walkways and sidewalks not kept clear of snow, ice and debris.						X	X										X			3

\*Response to these problems may not indicate that the problem definitely exists, but rather, in the opinion of the observer, that the problem probably exists quite frequently.

\*\*Based on the 1961 ANSI Standards.

# CUMULATIVE MATRIX: OVERCROSSINGS

**E**  
appendix

	Area A (7 Structures)	Area B (18 Structures)	Area C (16 Structures)	Area D (5 Structures)	Area E (3 Structures)	Area F (11 Structures)	Area G (3 Structures)	Area H (11 Structures)	Area I (12 Structures)	Area J (17 Structures)	TOTAL (103 Structures)	% of Total
<b>LOCATION &amp; END CONDITION</b>												
Portions of walkway are hidden from view (crime potential).	3	5	5	1		1	1	3	2	13	34	33.0
Overcrossing is not close to public transportation stop.	1		1						5		7	6.8
No sidewalk at end condition.	3			3				2	1		9	8.7
Parked cars restrict approach.*										2	2	1.9
Parked cars obstruct view of approach.*										2	2	1.9
No accessible parking.**	1	1	2						6		10	9.7
No detectable pedestrian crosswalk to approach.	5	6	2	1			4	8	4	11	41	39.9
Driver's view of pedestrian blocked.*			2					3		4	9	8.7
<b>WALKWAYS</b>												
Pedestrian walkway on only one side.		1									1	1.0
Walkway less than 48" (too narrow).**		1						1			2	1.9
Headroom below 6'10".**									1		1	1.0
Structure vibrates (traffic).		1	1								2	1.9
Abrasive or perforated material on vertical surface adjacent to walkway.	1	4	5	1		10	1	1	3	7	33	32.0
Objects project into walkway-signs, trees, etc.		3	1					1			5	4.9
<b>SURFACE MATERIALS</b>												
Manhole covers and gratings in walkway.	2	8	1			1		1			13	12.7

	Area A (7 Structures)	Area B (18 Structures)	Area C (16 Structures)	Area D (5 Structures)	Area E (3 Structures)	Area F (11 Structures)	Area G (3 Structures)	Area H (11 Structures)	Area I (12 Structures)	Area J (17 Structures)	TOTAL (103 Structures)	% of Total	
Highly reflective surface materials		1									1	1.0	
Grooves and patterns (cast into walkways or caused by small paving units).		2	5	1	2	2		2		2	16	15.5	
Large, deep expansion joints.**	5	11	4	2		7		2	2	5	38	36.9	
Uneven and irregular surfaces.	3	4	5	2	2	5		3		3	27	26.2	
Loose and soft surfaces (gravel, sand, etc.)	3	5	1			1				1	11	10.7	
Rough Surfaces.	1	1	4	2	2	2		2			14	13.6	
Discontinuous surface materials.	1		1	2	2			1			7	6.8	
MAINTENANCE													
Debris from erosion on walkway.		3	3								1	7	6.8
Disrepair (frost heaves, potholes, etc.).	1	4	2	1		3		1			1	13	12.6
Disrepair from vandalism or accident (handrails, guardrails, etc.).	1	6	6	2		5		1			7	28	27.2
STAIRWAYS													
Stairway is only means of access to structure.**	2	2	3	2		3			2		1	15	14.6
Stairway only on one side of structure.		1	1			1						3	2.9
Poorly lighted steps, stairs, ramps.	3	9	5	1		5			5		1	29	28.2
Treads less than 11" (too small).		1	3	2		1					1	8	7.8
Projecting nosings.		4	2	1		1					1	9	8.7
Open Risers.			4	2								6	5.8

	Area A (7 Structures)	Area B (18 Structures)	Area C (16 Structures)	Area D (5 Structures)	Area E (3 Structures)	Area F (11 Structures)	Area G (3 Structures)	Area H (11 Structures)	Area I (12 Structures)	Area J (17 Structures)	TOTAL (103 Structures)	% of Total
Risers greater than 7" (too high). **			4	1		1					6	5.8
Curb greater than 6" (too high).			1					1	1	1	4	3.9
Step (settlement) between approach and structure.**	1	7	2			3			1	2	16	15.5
Dangerous stair location.			1								1	1.0
RAMPS												
Only ramps provided.	1	8	4	1	1	5	2	5	9	14	50	48.5
Only ramps provided on one side of structure.	1		2	1						4	8	7.8
Pathway leading to overcrossing too steep and long.**	3		1					4			8	7.8
Ramp too long (exceeds 30').**	1	11	10	2		6	1	5	10	15	61	59.2
Ramp too steep (slope greater than 1:12).**	1	10	6	2		6	1	4	9	14	53	51.5
Ramp too narrow (less than 48").**								1			1	1.0
Cross slope greater than 1:50 (too steep).	2	2							1	1	6	5.8
Slope across structure too long and steep.**	1	5			2	1	2		5	13	29	28.2
No curb cuts.**	4	6	3	2		2	3	8	6	15	49	47.6
Helical ramp.		1		1			1		5	3	11	10.7
Ramp layout inconvenient.			1					1			2	1.9
Abrupt transition to connecting walkways.			1			1				5	7	6.8
Ramp exits directly into street or parking area (less than 6' clearance at bottom of ramp).		5	7			3		4	3	9	31	30.1

	Area A (7 Structures)	Area B (18 Structures)	Area C (16 Structures)	Area D (5 Structures)	Area E (3 Structures)	Area F (11 Structures)	Area G (3 Structures)	Area H (11 Structures)	Area I (12 Structures)	Area J (17 Structures)	TOTAL (103 Structures)	% of Total
Bollards in the middle of the entrance to the ramp.		4								1	5	4.9
Steps in the middle of the ramp.			1			1					2	1.9
<b>HANDRAILS</b>												
Handrails higher than 36" (too high).		5	11	2	2	4		7		2	33	32.0
Handrails lower than 32" (too low).**	1									1	2	1.9
No handrails.**	4	12	4	2		3	3		4	6	38	36.9
Handrail inadequate for comfortable grasp.	1		1		2	4		7	1	2	18	17.5
Handrail material metal or aluminum (hot in hot weather, cold in cold).	3	6	12	2		8		10	8	10	59	57.3
Handrails not continuous.	2	3	9	2		6		3	4	5	34	33.0
Handrails don't extend far enough (1' at top and bottom of stairs and ramps).**	1		6	1	1	4		7	3	6	29	28.2
No handrails on ramps.	1	6	1			1	2	4	5	5	25	24.3
<b>GUARDRAILS, BARRICADES, PEDESTRIAN/VEHICULAR SEPARATION</b>												
Barricades not detectable (blind cane)	1	2	1			1			3	1	9	8.7
Guardrails not continuous.	1	1	2							1	5	4.9
Guardrails too low (less than 42").	2	3		3		2					10	9.7
No pedestrian guardrails.	1				1	1					3	2.9

	Area A (7 Structures)	Area B (18 Structures)	Area C (16 Structures)	Area D (5 Structures)	Area E (3 Structures)	Area F (11 Structures)	Area G (3 Structures)	Area H (11 Structures)	Area I (12 Structures)	Area J (17 Structures)	TOTAL (103 Structures)	% of Total
Inadequate guardrails.	1					2	1				3	2.9
Guardrail mesh hazardous.*	1	7	6	1		8	1	1	5	7	37	36.0
No detectable separation between bikeway and pedestrian way.	4	14	1	2	3	7	1	10	1	15	58	56.3
No detectable separation between roadway and walkway.	1	1	10			1		2			15	14.6
No detectable separation between walkway and parking lot.									2		2	1.9
Unprotected sidewalks (cars, edges, etc.).	2	1			1	1	1	5			11	10.7
<b>ESCALATORS/ELEVATORS</b>												
Escalators.		1									1	1.0
Elevators.		2				1					3	2.9
<b>REST AREAS/BENCHES</b>												
Resting places not under cover (wind, rain, sun).	1	8	6			1		1	2	2	21	20.4
Not enough places to stop and rest.	4	8	11	5	2	11	3	6	9	15	74	71.8
No provision for scenic overlook.			2								2	1.9
Benches too high or low, too deep or shallow, or with no armrest.	1	3	1						1	1	7	6.8
<b>EMERGENCY PROVISIONS</b>												
No alternative route for flood condition structures.			1					3	1		5	4.9
No pedestrian emergency provisions.	7	18	15	5	3	11	1	11	10	17	98	95.1
<b>LIGHTING, ILLUMINATION</b>												
Glare and flashing lights from vehicles.	1	10	11	1		9		8	8	7	57	55.3

	Area A (7 Structures)	Area B (18 Structures)	Area C (16 Structures)	Area D (5 Structures)	Area E (3 Structures)	Area F (11 Structures)	Area G (3 Structures)	Area H (11 Structures)	Area I (12 Structures)	Area J (17 Structures)	TOTAL (103 Structures)	% of Total
Poor illumination.*	5	8	6	4		6	3	1	3	8	44	42.7
<b>SIGNAGE/MEDIA CUES</b>												
No signage indicating location of rest areas.	3	18	14	2		11	1	8	3	9	69	67.0
Street signs too high, too low, or too far.								1			1	1.0
No special signage for the visually impaired.	7	18	16	5	3	11	2	11	10	17	100	97.1
Complicated instructions on signs.	1										1	1.0
No warning of potential hazards.	3		1	3			2	3		7	19	18.4
No orientation cue as to start of approach.	6	18	16	5	2	11	2	11	12	16	99	96.1
Lack of orientation cues generally.	6	18	16	5	3	11	2	8	12	16	97	94.2
Pathway junctions which are not at 90 degree angle or which curve.	2	5	7			2		2	3	7	28	27.2
No detectable orientation cue as to start of channelization.									1		1	1.0
Walkway not channelized.	6	15	13	2	3	7	2	11		17	76	73.8
Traffic noise.	6	2	6	1		5		8		13	41	39.9
<b>MICRO-CLIMATIC FACTORS</b>												
High wind gusts present.*	3	14	14			8	1	9	4	14	67	65.0
Wind generated by traffic.*	1	1						2			4	3.9
Inadequate provision for rain-water runoff.			2								2	1.9
Walkways and sidewalks not kept clear of snow, ice and debris.	1	10	5	1		3		1		2	23	22.3

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\*\*Based on the 1961 ANSI Standards.

# CUMULATIVE MATRIX: UNDERCROSSINGS

**F**  
appendix

	Area A (2 Structures)	Area B (1 Structure)	Area C (3 Structures)	Area D (0 Structures)	Area E (3 Structures)	Area F (4 Structures)	Area G (2 Structures)	Area H (5 Structures)	Area I (0 Structures)	Area J (1 Structure)	TOTAL (21 Structures)	% of Total
<b>LOCATION &amp; END CONDITION</b>												
Portions of walkway are hidden from view (crime potential).	1	1	1			3		1		1	8	38.1
Undercrossing not close to public transportation stop.			1								1	4.8
No sidewalk at end condition.	1										1	4.8
Parked cars obstruct view of approach.*								1			1	4.8
No accessible parking.**										1	1	4.8
No detectable pedestrian crosswalk to approach.	1		1		1	2	1	5		1	12	57.1
Driver's view of pedestrian blocked.*								2			2	9.5
<b>WALKWAYS</b>												
Pedestrian walkway on only one side.						1	1				2	9.5
Walkway less than 48" (too narrow).**					1						1	4.8
Headroom below 6'10".**					1						1	4.8
Walkway through "long" tunnel (over 40').	1	1	2		1	3	2	5		1	15	71.4
Abrasive or perforated material on vertical surface adjacent to walkway.					1	1		2			4	19.0
Objects project into walkway (signs, trees, etc.)								1			1	4.8
<b>SURFACE MATERIALS</b>												
Manhole covers and gratings in walkway.						1					1	4.8
Large, deep expansion joints.**								1			1	4.8
Uneven and irregular surfaces.						1					1	4.8



	Area A (2 Structures)	Area B (1 Structure)	Area C (3 Structures)	Area D (0 Structures)	Area E (3 Structures)	Area F (4 Structures)	Area G (2 Structures)	Area H (5 Structures)	Area I (0 Structures)	Area J (1 Structure)	TOTAL (21 Structures)	% of Total
Loose and soft surfaces (gravel, sand, etc.).	1							1		1	3	14.3
Discontinuous surface materials.	1										1	4.8
MAINTENANCE												
Debris from erosion on walkway.						4					4	19.0
Disrepair (frost heaves, potholes).			1								1	4.8
Disrepair from vandalism or accident (handrails, guardrails, etc.).								1		1	2	9.5
STAIRWAYS												
Stairway is only means of access to structure.**	1										1	4.8
Poorly lighted steps, stairs, ramps.						1					1	4.8
Open risers.								1			1	4.8
Curb greater than 6" (too high).								1			1	4.8
RAMPS												
Only ramp provided.							1				1	4.8
Pathway leading to structure too long and steep.**	1				1	3					5	23.8
Ramp too long (exceeds 30').**								1			1	4.8
Ramp too steep (slope greater than 1:12).**								1			1	4.8
Cross slope greater than 1:50 (too steep).	1							1			2	9.5
No curb cuts.**	1						2	2		1	6	28.6
Ramp exits directly into street or parking area (less than 6' clearance at bottom of ramp).						2					2	9.5

	Area A (2 Structures)	Area B (1 Structure)	Area C (3 Structures)	Area D (0 Structures)	Area E (3 Structures)	Area F (4 Structures)	Area G (2 Structures)	Area H (5 Structures)	Area I (0 Structures)	Area J (1 Structure)	TOTAL (21 Structures)	% of Total
<b>HANDRAILS</b>												
Handrails higher than 36" (too high).	1										1	4.8
No handrails.**	1	1	2		1	4	2	3			14	66.7
Handrails inadequate for comfortable grasp.								1			1	4.8
Handrail material metal or aluminum (hot in hot weather, cold in cold).	1				1			1			3	14.3
Handrail not continuous.								1			1	4.8
Handrails don't extend far enough (1' at top and bottom of ramps).**	1										1	4.8
No handrails on ramps.						2		1			3	14.3
<b>GUARDRAILS, BARRICADES, PEDESTRIAN/VEHICULAR SEPARATION</b>												
Guardrails less than 42" (too low).			1								1	4.8
No pedestrian guardrails.	1				1		1	2			5	23.8
No detectable separation between bikeway and pedestrian way.		1			1	4	2	5		1	14	66.7
No detectable separation between roadway and walkway.			2					2			4	19.0
No detectable separation between walkway and parking lot.			1								1	4.8
Unprotected sidewalks (cars, edges, etc.).	1	1			1			4			7	33.3
<b>REST AREAS/BENCHES</b>												
Not enough places to stop and rest.	1	1	3		2	4	2	5		1	19	90.5

	Area A (2 Structures)	Area B (1 Structure)	Area C (3 Structures)	Area D (0 Structures)	Area E (3 Structures)	Area F (4 Structures)	Area G (2 Structures)	Area H (5 Structures)	Area I (0 Structures)	Area J (1 Structure)	TOTAL (21 Structures)	% of Total
<b>EMERGENCY PROVISIONS</b>												
No alternative route for flood condition structures.			1			2		2			5	23.8
No pedestrian emergency provisions.	2	1	3		2	4	2	5		1	20	95.2
<b>LIGHTING, ILLUMINATION</b>												
Significant change of light level in tunnel at entrance.	1		1			1	1	2		1	7	33.3
Interior lighting not adjusted to outside light conditions.	2		1		1	1	2	2		1	10	47.6
Glare at end of tunnel.*	1				1	1	1	2		1	7	33.3
Tunnel too dark.*	1		1		1	1	1	3		1	9	42.9
Glare and flashing lights from vehicles.	1	1	2			1		1			6	28.1
Poor illumination.*	1	1	2		1	2	2	4		1	14	66.7
<b>SIGNAGE/MEDIA CUES</b>												
No signage indicating location of rest areas.	2	1	2		1	4	1	3		1	15	71.4
No special signage for the visually impaired.	2	1	3		2	4	2	5		1	20	95.2
Traffic lights with short green cycle.								3			3	14.3
No warning of potential hazards.							2	1			3	14.3
No orientation cue as to start of approach.	1	1	3		1	4	2	5		1	18	85.7
Lack of orientation cues generally.	1	1	3		2	4	2	5		1	19	90.5
Pathway junctions which are not at 90 degree angle or which curve.						4		1			5	23.8

	Area A (2 Structures)	Area B (1 Structure)	Area C (3 Structures)	Area D (0 Structures)	Area E (3 Structures)	Area F (4 Structures)	Area G (2 Structures)	Area H (5 Structures)	Area I (0 Structures)	Area J (1 Structure)	TOTAL (21 Structures)	% of Total
No detectable orientation cue as to start of channelization.	1										1	4.8
Walkway not channelized.	1	1	2		2	4	2	5		1	18	85.7
Traffic noise.	1		2			1	1	4			9	42.9
MICRO-CLIMATIC FACTORS												
High wind gusts present.*								2			2	9.5
Wind generated by traffic.*			1					1			2	9.5
Inadequate provision for rain-water runoff.			1			4					5	23.8
Walkways and sidewalks not kept clear of snow, ice and debris.	1		1		1	4				1	8	38.1
<p>*Responses to these problems may not indicate that the problem definitely exists, but rather, in the opinion of the observer, that the problem probably exists quite frequently.</p> <p>**Based on the 1961 ANSI Standards.</p>												

This appendix correlated environmental barriers with groups of people with various handicapping conditions. Environmental barriers are listed across the top of each sheet while the handicapping conditions are enumerated along the left hand column of the matrix. The list of handicapping conditions is four pages long; on the fifth page of the matrix it begins again, linking the list with the next group of environmental barriers.

For example, the effect of different environmental barriers on people with the handicapping condition, "Difficulty with environmental orientation" is found in matrix sections A1, B1, C1, etc. However, the different effects of the environmental barrier entitled, "Driver's view of pedestrian blocked" on all groups of people can be found in the matrix sections A1, A2, A3, and A4 (matrix section numbers are found in the top right hand corner of each page).

<p>KEY</p> <p>X = No Problem for this group.</p> <p>S = Solution for this problem is known.</p> <p>● = Solution for this problem is not known.</p>	Driver's view of pedestrian blocked.	Pedestrian walkway on only one side.	Walkway less than 48" (too narrow).	Headroom below 6'10".	Walkway through "long" tunnel (over 40').	Structure vibrates (traffic).	Abrasive or perforated material on vertical surface adjacent to walkway.	Objects project into walkway (signs, trees, etc.).
Difficulty with environmental orientation.	X	●	X	X	●	X	X	X
Understanding deficit.	X	●	X	X	●	●	X	X
Limited attention span.	X	●	X	X	X	X	X	S
Memory deficit.	X	S	X	X	X	X	X	X
Decreased ability to sequence, judge time, direction, distance, size.	S	S	S	X	●	X	X	S
Impaired night vision.	S	S	S	X	X	X	S	S
Impaired cutaneous sensation detection.	X	X	X	X	X	X	S	X
Chronic stooped posture.	X	X	X	X	X	X	X	X
Difficulty in maintaining equilibrium.	S	X	S	X	X	S	S	S
Moves at slow speed.	S	X	X	X	X	X	X	X
Swaying, shuffling, uneven, erratic or staggering gait.	S	X	S	X	X	S	S	S
Frequent need to rest during exercise.	X	X	X	X	S	X	X	X

<p>KEY</p> <p>X = No Problem for this group.</p> <p>S = Solution for this problem is known.</p> <p>● = Solution for this problem is not known.</p>	Driver's view of pedestrian blocked.	Pedestrian walkway on only one side.	Walkway less than 48" (too narrow).	Headroom below 6'10".	Walkway through "long" tunnel (over 40').	Structure vibrates (traffic).	Abrasive or perforated material on vertical surface adjacent to walkway.	Objects project into walkway (signs, trees, etc.).
Reduced tolerance to brisk exercise (need to move slowly).	X	X	X	X	S	X	X	X
Limited ability to stand for long periods.	X	X	X	X	S	X	X	X
Impaired bladder control.	X	X	X	X	X	X	X	X
Extreme of size (dwarfism, gigantism, obesity, etc.).	S	X	S	S	X	X	X	X
Cardiac Pacemaker affected by electrical interference.	X	X	X	X	X	X	X	X
Uses powered or manual wheelchair.	S	S	S	X	X	X	S	S
Uses walker, crutches, orthopedic cane.	S	S	S	X	S	X	S	S
Prosthesis (including braces) for lower extremities.	S	X	S	X	S	X	S	S
Increased ability to tolerate smoke, dust, chemicals, pollutants, cold winds.	X	X	X	X	X	X	X	X
Limited ability to grasp, release or manipulate with upper extremities (arms, wrist, hands).	X	X	X	X	X	X	X	X
Limited reach.	X	X	X	X	X	X	X	X

KEY	Driver's view of pedestrian blocked.	Pedestrian walkway on only one side.	Walkway less than 48" (too narrow).	Headroom below 6'10".	Walkway through "long" tunnel (over 40').	Structure vibrates (traffic).	Abrasive or perforated material on vertical surface adjacent to walkway.	Objects project into walkway (signs, trees, etc.).
Limited manual dexterity.	X	X	X	X	X	X	X	X
Inability to turn head.	S	S	X	X	X	X	X	X
Decreased ability to stoop.	X	X	X	X	X	X	X	X
Difficulty standing from sitting position, or in sitting down.	X	X	X	X	X	X	X	X
Limited vertical motion with legs and feet.	S	X	X	X	X	X	X	X
Limited horizontal motion with legs and feet.	S	X	X	X	S	X	X	X
Decreased ability to tolerate heat and cold.	X	X	X	X	X	X	X	X
Speech disorder.	X	X	X	X	X	X	X	X
Loss of normal speed in motor coordination/slowed reflexes.	S	X	X	X	X	X	X	S
Fear of crime.	X	X	X	X	●	X	X	X
Fear of heights (vertigo).	X	X	X	X	X	X	X	X
Agoraphobia.	X	X	X	X	X	X	X	X
Claustrophobia.	X	X	S	X	●	X	X	X
Fear of loud noises.	X	X	X	X	X	X	X	X



<p>KEY</p> <p>X = No Problem for this group.</p> <p>S = Solution for this problem is known.</p> <p>● = Solution for this problem is not known.</p>	Driver's view of pedestrian blocked.	Pedestrian walkway on only one side.	Walkway less than 48" (too narrow).	Headroom below 6'10".	Walkway through "long" tunnel (over 40').	Structure vibrates (traffic).	Abrasive or perforated material on vertical surface adjacent to walkway.	Objects project into walkway (signs, trees, etc.).
Uses white cane for guidance (visually impaired).	S	●	S	●	X	X	S	S
Uses guide dog.	S	●	S	●	X	X	X	S
Limited ability to acquire or process visual stimuli.	S	●	S	●	●	X	S	S
Limited ability to perceive or process auditory stimuli.	X	X	X	X	X	X	X	X

<p>KEY</p> <p>X = No Problem for this group.</p> <p>S = Solution for this problem is known.</p> <p>● = Solution for this problem is not known.</p>	<p>Portions of walkway are hidden from view (crime potential).</p>	<p>Overcrossing/undercrossing is not close to public transportation stop.</p>	<p>No sidewalk at end condition.</p>	<p>Parked cars restrict approach.</p>	<p>Parked cars obstruct view of approach.</p>	<p>No accessible parking.</p>	<p>No detectable pedestrian crosswalk to approach.</p>	<p>Crossing approach and entrance not easy to find (hidden from view).</p>
Difficulty with environmental orientation.	●	S	S	X	S	X	S	●
Understanding deficit.	X	S	S	S	S	X	S	●
Limited attention span.	●	S	S	S	S	X	S	●
Memory deficit.	X	S	S	S	S	X	S	●
Decreased ability to sequence, judge time, direction, distance, size.	X	X	S	S	S	X	S	X
Impaired night vision.	X	S	S	S	S	X	S	●
Impaired cutaneous sensation detection.	X	S	X	S	S	X	X	X
Chronic stooped posture.	X	S	S	S	S	X	X	X
Difficulty in maintaining equilibrium.	X	S	S	S	S	S	S	X
Moves at slow speed.	X	S	S	S	S	S	S	X
Swaying, shuffling, uneven, erratic or staggering gait.	X	S	S	S	S	S	S	X
Frequent need to rest during exercise.	X	S	S	S	S	S	S	X

<p>KEY</p> <p>X = No Problem for this group.</p> <p>S = Solution for this problem is known.</p> <p>● = Solution for this problem is not known.</p>	<p>Portions of walkway are hidden from view (crime potential).</p>	<p>Overcrossing/undercrossing is not close to public transportation stop.</p>	<p>No sidewalk at end condition.</p>	<p>Parked cars restrict approach.</p>	<p>Parked cars obstruct view of approach.</p>	<p>No accessible parking.</p>	<p>No detectable pedestrian crosswalk to approach.</p>	<p>Crossing approach and entrance not easy to find (hidden from view).</p>
<p>Reduced tolerance to brisk exercise (need to move slowly).</p>	X	X	S	X	X	X	X	X
<p>Limited ability to stand for long periods.</p>	X	S	S	X	X	S	S	X
<p>Impaired bladder control.</p>	X	X	X	X	X	S	X	X
<p>Extreme of size (dwarfism, giantism, obesity, etc.).</p>	X	X	S	S	X	X	X	X
<p>Cardiac Pacemaker affected by electrical interference.</p>	X	X	X	X	X	X	X	X
<p>Uses powered or manual wheelchair.</p>	X	S	S	S	S	S	S	X
<p>Uses walker, crutches, orthopedic cane.</p>	X	S	S	S	S	S	S	X
<p>Prosthesis (including braces) for lower extremities.</p>	X	S	S	S	S	S	S	X
<p>Decreased ability to tolerate smoke, dust, chemicals, pollens, cold winds.</p>	X	X	X	X	X	X	X	X
<p>Limited ability to grasp, release or manipulate with upper extremities (arms, wrist, hands).</p>	X	X	S	X	X	X	X	X
<p>Limited reach.</p>	X	X	S	X	X	X	X	X

<p>KEY</p> <p>X = No Problem for this group.</p> <p>S = Solution for this problem is known.</p> <p>● = Solution for this problem is not known.</p>	<p>Portions of walkway are hidden from view (crime potential).</p>	<p>Overcrossing/undercrossing is not close to public transportation stop.</p>	<p>No sidewalk at end condition.</p>	<p>Parked cars restrict approach.</p>	<p>Parked cars obstruct view of approach.</p>	<p>No accessible parking.</p>	<p>No detectable pedestrian crosswalk to approach.</p>	<p>Crossing approach and entrance not easy to find (hidden from view).</p>
Limited manual dexterity.	X	X	X	X	X	X	X	X
Inability to turn head.	X	X	X	S	S	X	X	X
Decreased ability to stoop.	X	X	X	X	X	X	X	X
Difficulty standing from sitting position, or in sitting down.	X	X	X	X	X	X	X	X
Limited vertical motion with legs and feet.	X	S	S	S	S	S	S	X
Limited horizontal motion with legs and feet.	X	S	S	S	S	S	S	X
Decreased ability to tolerate heat and cold.	X	S	X	X	X	S	X	X
Speech disorder.	X	X	X	X	X	X	X	X
Loss of normal speed in motor coordination/slowed reflexes.	X	S	S	S	S	S	S	X
Fear of crime.	●	S	X	S	S	X	X	●
Fear of heights (vertigo).	X	X	X	X	X	X	X	X
Agoraphobia.	X	X	X	X	X	X	X	X
Claustrophobia.	X	X	X	X	X	X	X	X
Fear of loud noises.	X	X	X	X	X	X	X	X

<p>KEY</p> <p>X = No Problem for this group.</p> <p>S = Solution for this problem is known.</p> <p>● = Solution for this problem is not known.</p>	<p>Portions of walkway are hidden from view (crime potential).</p> <p>Overcrossing/undercrossing is not close to public transportation stop.</p> <p>No sidewalk at end condition.</p> <p>Parked cars restrict approach.</p> <p>Parked cars obstruct view of approach.</p> <p>No accessible parking.</p> <p>No detectable pedestrian crosswalk to approach.</p> <p>Crossing approach and entrance not easy to find (hidden from view).</p>							
<p>Uses white cane for guidance (visually impaired).</p>	X	S	S	S	S	X	S	●
<p>Uses guide dog.</p>	X	S	S	S	S	X	X	●
<p>Limited ability to acquire or process visual stimuli.</p>	X	S	S	S	S	X	S	●
<p>Limited ability to perceive or process auditory stimuli.</p>	X	X	X	X	X	X	X	X

<p>KEY</p> <p>X = No problem for this group.</p> <p>S = Solution for this problem is known.</p> <p>● = Solution for this problem is not known.</p>	Open risers.	Risers greater than 7" (too high).	Curb greater than 6" (too high).	Step (settlement) between approach and structure.	Dangerous stair location.	Only ramps provided.	Only ramps provided on one side of structure.	Pathway leading to over/undercrossing too steep and long.
Difficulty with environmental orientation.	X	X	X	X	X	X	X	X
Understanding deficit.	X	X	X	X	●	X	X	X
Limited attention span.	X	X	X	X	●	X	X	S
Memory deficit.	X	X	X	X	●	X	S	S
Decreased ability to sequence, judge time, direction, distance, size.	X	X	X	X	●	X	S	S
Impaired night vision.	X	X	X	X	●	X	S	S
Impaired cutaneous sensation detection.	S	S	S	S	X	X	X	X
Chronic stooped posture.	X	X	X	X	S	X	S	●
Difficulty in maintaining equilibrium.	S	S	S	S	S	S	S	●
Moves at slow speed.	X	X	X	X	X	X	S	●
Swaying, shuffling, uneven, erratic or staggering gait.	S	S	S	S	S	X	X	●
Frequent need to rest during exercise.	X	S	X	X	S	X	X	●

<p>KEY</p> <p>X = No problem for this group.</p> <p>S = Solution for this problem is known.</p> <p>● = Solution for this problem is not known.</p>	Open risers.	Risers greater than 7" (too high).	Curb greater than 6" (too high).	Step (settlement) between approach and structure.	Dangerous stair location.	Only ramps provided.	Only ramps provided on one side of structure.	Pathway leading to over/undercrossing too steep and long.
Reduced tolerance to brisk exercise (need to move slowly).	X	S	X	X	S	X	S	●
Limited ability to stand for long periods.	X	X	X	X	S	X	S	●
Impaired bladder control.	X	X	X	X	X	X	X	●
Extreme of size (dwarfism, gigantism, obesity, etc.).	S	S	S	S	X	X	X	●
Cardiac Pacemaker affected by electrical interference.	X	X	X	X	X	X	X	●
Uses powered or manual wheelchair.	S	S	S	S	S	X	S	●
Uses walker, crutches, orthopedic cane.	S	S	S	S	S	S	S	●
Prosthesis (including braces) for lower extremities.	S	S	S	S	S	S	S	●
Decreased ability to tolerate smoke, dust, chemicals, pollens, cold winds.	X	X	X	X	X	X	X	X
Limited ability to grasp, release or manipulate with upper extremities (arms, wrist, hands).	X	X	X	X	S	X	X	X
Limited reach.	X	X	X	X	S	X	X	X

KEY								
X = No problem for this group.								
S = Solution for this problem is known.								
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	Open risers.	Risers greater than 7" (too high).	Curb greater than 6" (too high).	Step (settlement) between approach and structure.	Dangerous stair location.	Only ramps provided.	Only ramps provided on one side of structure.	Pathway leading to over/undercrossing too steep and long.
Limited manual dexterity.	X	X	X	X	S	X	X	X
Inability to turn head.	X	X	X	X	S	X	X	X
Decreased ability to stoop.	X	X	X	X	X	X	X	X
Difficulty standing from sitting position, or in sitting down.	X	X	X	X	X	X	X	X
Limited vertical motion with legs and feet.	X	S	S	X	S	X	S	●
Limited horizontal motion with legs and feet.	S	S	S	S	S	X	S	●
Decreased ability to tolerate heat and cold.	X	X	X	X	X	X	X	X
Speech disorder.	X	X	X	X	X	X	X	X
Loss of normal speed in motor coordination/slowed reflexes.	X	X	X	X	S	X	X	X
Fear of crime.	X	X	X	X	X	X	X	X
Fear of heights (vertigo).	●	●	X	X	X	X	X	X
Agoraphobia.	●	X	X	X	X	X	X	X
Claustrophobia.	X	X	X	X	X	X	X	X
Fear of loud noises.	X	X	X	X	X	X	X	X



<p>KEY</p> <p>X = No problem for this group.</p> <p>S = Solution for this problem is known.</p> <p>● = Solution for this problem is not known.</p>	Open risers.	Risers greater than 7" (too high).	Curb greater than 6" (too high).	Step (settlement) between approach and structure.	Dangerous stair location.	Only ramps provided.	Only ramps provided on one side of structure.	Pathway leading to over/undercrossing too steep and long.
Uses white cane for guidance (visually impaired).	X	X	X	X	●	X	S	X
Uses guide dog.	X	X	X	X	●	X	S	X
Limited ability to acquire or process visual stimuli.	X	X	X	X	●	X	S	X
Limited ability to perceive or process auditory stimuli.	X	X	X	X	X	X	X	X

<p>KEY</p> <p>X = No problem for this group.</p> <p>S = Solution for this problem is known.</p> <p>● = Solution for this problem is not known.</p>	Debris from erosion on walkway.	Disrepair (frost heaves, potholes, etc.).	Disrepair from vandalism or accident (handrails, guardrails, etc.).	Stairway is only means of access to structure.	Stairway only on one side of structure.	Poorly lighted steps, stairs, ramps.	Treads less than 11" (too small).	Projecting nosings.
Difficulty with environmental orientation.	X	X	X	X	X	S	X	X
Understanding deficit.	X	X	X	X	X	X	X	X
Limited attention span.	X	X	X	X	X	X	X	X
Memory deficit.	X	X	X	X	S	X	X	X
Decreased ability to sequence, judge time, direction, distance, size.	S	X	X	X	S	S	S	S
Impaired night vision.	S	S	S	●	S	S	S	S
Impaired cutaneous sensation detection.	S	S	S	X	X	S	S	S
Chronic stooped posture.	X	X	X	X	S	X	X	X
Difficulty in maintaining equilibrium.	S	S	S	S	S	S	S	S
Moves at slow speed.	X	X	X	S	X	S	X	X
Swaying, shuffling, uneven, erratic or staggering gait.	S	S	S	S	X	S	S	S
Frequent need to rest during exercise.	X	X	X	S	X	X	X	X

<p>KEY</p> <p>X = No problem for this group.</p> <p>S = Solution for this problem is known.</p> <p>● = Solution for this problem is not known.</p>	Debris from erosion on walkway.	Disrepair (frost heaves, potholes, etc.).	Disrepair from vandalism or accident (handrails, guardrails, etc.).	Stairway is only means of access to structure.	Stairway only on one side of structure.	Poorly lighted steps, stairs, ramps.	Treads less than 11" (too small).	Projecting nosings.
Reduced tolerance to brisk exercise (need to move slowly).	X	X	X	S	S	X	X	X
Limited ability to stand for long periods.	X	X	X	S	X	X	X	X
Impaired bladder control.	X	X	X	X	X	X	X	X
Extreme of size (dwarfism, gigantism, obesity, etc.).	X	X	X	S	X	X	S	X
Cardiac Pacemaker affected by electrical interference.	X	X	X	X	X	X	X	X
Uses powered or manual wheelchair.	S	S	S	S	S	S	S	S
Uses walker, crutches, orthopedic cane.	S	S	S	S	S	S	S	S
Prosthesis (including braces) for lower extremities.	S	S	S	S	S	S	S	S
Decreased ability to tolerate smoke, dust, chemicals, pollens, cold winds.	X	X	X	X	X	X	X	X
Limited ability to grasp, release or manipulate with upper extremities (arms, wrist, hands).	X	X	X	X	X	X	X	X
Limited reach.	X	X	X	X	X	X	X	X

KEY								
X = No problem for this group.								
S = Solution for this problem is known.								
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	Debris from erosion on walkway.	Disrepair (frost heaves, potholes, etc.).	Disrepair from vandalism or accident (handrails, guardrails, etc.).	Stairway is only means of access to structure.	Stairway only on one side of structure.	Poorly lighted steps, stairs, ramps.	Treads less than 11" (too small).	Projecting nosings.
Limited manual dexterity.	X	X	X	X	X	X	X	X
Inability to turn head.	X	X	X	X	X	S	X	X
Decreased ability to stoop.	X	X	X	X	X	X	X	X
Difficulty standing from sitting position, or in sitting down.	X	X	X	X	X	X	X	X
Limited vertical motion with legs and feet.	S	S	S	S	S	S	S	S
Limited horizontal motion with legs and feet.	S	S	S	S	X	S	S	S
Decreased ability to tolerate heat and cold.	X	X	X	X	X	X	X	X
Speech disorder.	X	X	X	X	X	X	X	X
Loss of normal speed in motor coordination/slowed reflexes.	S	S	S	S	X	S	S	S
Fear of crime.	X	X	X	X	X	●	X	X
Fear of heights (vertigo).	X	X	S	X	X	S	X	X
Agoraphobia.	X	X	X	X	X	X	X	X
Claustrophobia.	X	X	X	X	X	X	X	X
Fear of loud noises.	X	X	X	X	X	X	X	X

<p>KEY</p> <p>X = No problem for this group.</p> <p>S = Solution for this problem is known.</p> <p>● = Solution for this problem is not known.</p>	<p>Debris from erosion on walkway.</p> <p>Disrepair (frost heaves, potholes, etc.).</p> <p>Disrepair from vandalism or accident (handrails, guardrails, etc.).</p> <p>Stairway is only means of access to structure.</p> <p>Stairway only on one side of structure.</p> <p>Poorly lighted steps, stairs, ramps.</p> <p>Treads less than 11" (too small).</p> <p>Projecting nosings.</p>							
Uses white cane for guidance (visually impaired).	S	S	S	●	S	X	S	X
Uses guide dog.	S	S	S	S	S	X	S	X
Limited ability to acquire or process visual stimuli.	S	S	S	●	S	S	S	X
Limited ability to perceive or process auditory stimuli.	X	X	X	X	X	X	X	X

<p>KEY</p> <p>X = No problem for this group.</p> <p>S = Solution for this problem is known.</p> <p>● = Solution for this problem is not known.</p>	Manhole covers and gratings in walkway.	Highly reflective surface materials.	Grooves and patterns (cast into walkways or caused by small paving units).	Large, deep expansion joints.	Uneven and irregular surfaces.	Loose and soft surfaces (gravel, sand, etc.).	Rough surfaces.	Discontinuous surface materials.
Difficulty with environmental orientation.	X	X	X	X	X	X	X	X
Understanding deficit.	X	X	X	S	X	X	X	X
Limited attention span.	S	S	X	S	S	X	X	X
Memory deficit.	X	X	X	X	X	X	X	X
Decreased ability to sequence, judge time, direction, distance, size.	S	X	X	S	X	X	●	S
Impaired night vision.	S	S	S	S	S	O	●	S
Impaired cutaneous sensation detection.	X	X	X	X	X	O	●	S
Chronic stooped posture.	X	X	X	S	X	X	X	X
Difficulty in maintaining equilibrium.	S	X	X	S	S	●	●	S
Moves at slow speed.	X	X	X	S	X	X	X	X
Swaying, shuffling, uneven, erratic or staggering gait.	S	X	X	S	S	●	●	S
Frequent need to rest during exercise.	X	X	X	S	X	X	X	X

<p>KEY</p> <p>X = No problem for this group.</p> <p>S = Solution for this problem is known.</p> <p>● = Solution for this problem is not known.</p>	Manhole covers and gratings in walkway.	Highly reflective surface materials.	Grooves and patterns (cast into walkways or caused by small paving units).	Large, deep expansion joints.	Uneven and irregular surfaces.	Loose and soft surfaces (gravel, sand, etc.).	Rough surfaces.	Discontinuous surface materials.
Reduced tolerance to brisk exercise (need to move slowly).	X	X	X	S	X	X	X	X
Limited ability to stand for long periods.	X	X	X	X	X	X	X	X
Impaired bladder control.	X	X	X	X	X	X	X	X
Extreme of size (dwarfism, gigantism, obesity, etc.).	X	X	X	S	X	X	X	X
Cardiac Pacemaker affected by electrical interference.	X	X	X	X	X	X	X	X
Uses powered or manual wheelchair.	S	X	S	S	S	●	●	S
Uses walker, crutches, orthopedic cane.	S	X	S	S	S	●	●	S
Prosthesis (including braces) for lower extremities.	S	X	S	S	S	●	●	S
Decreased ability to tolerate smoke, dust, chemicals, pollens, cold winds.	X	X	X	X	X	X	X	X
Limited ability to grasp, release or manipulate with upper extremities (arms, wrist, hands).	X	X	X	S	X	X	X	X
Limited reach.	X	X	X	S	X	X	X	X

KEY	Mahhole covers and gratings in walkway.	Highly reflective surface materials.	Grooves and patterns (cast into walkways or caused by small paving units).	Large, deep expansion joints.	Uneven and irregular surfaces.	Loose and soft surfaces (gravel, sand, etc.).	Rough surfaces.	Discontinuous surface materials.
X = No problem for this group.								
S = Solution for this problem is known.								
● = Solution for this problem is not known.								
Limited manual dexterity.	X	X	X	S	X	X	X	X
Inability to turn head.	S	X	X	S	X	X	X	X
Decreased ability to stoop.	X	X	X	X	X	X	X	X
Difficulty standing from sitting position, or in sitting down.	X	X	X	X	X	X	X	X
Limited vertical motion with legs and feet.	S	X	X	S	S	●	●	S
Limited horizontal motion with legs and feet.	S	X	X	S	S	●	●	S
Decreased ability to tolerate heat and cold.	X	X	X	X	X	X	X	X
Speech disorder.	X	X	X	X	X	X	X	X
Loss of normal speed in motor coordination/slowed reflexes.	S	X	X	S	S	●	●	S
Fear of crime.	X	X	X	X	X	X	X	X
Fear of heights (vertigo).	X	X	X	X	X	X	X	X
Agoraphobia.	X	X	X	X	X	X	X	X
Claustrophobia.	X	X	X	X	X	X	X	X
Fear of loud noises.	X	X	X	X	X	X	X	X



<p>KEY</p> <p>X = No problem for this group.</p> <p>S = Solution for this problem is known.</p> <p>● = Solution for this problem is not known.</p>	Ramp too long (exceeds 30 feet).	Ramp too steep (slope greater than 1:12).	Ramp too narrow (less than 48").	Cross slope greater than 1:50 (too steep).	Slope across structure too long and steep.	No curb cuts.	Helical ramp.	Ramp layout inconvenient.
Difficulty with environmental orientation.	X	X	X	X	X	X	●	X
Understanding deficit.	X	X	X	X	X	X	X	X
Limited attention span.	X	X	X	X	X	X	X	X
Memory deficit.	X	X	X	X	X	X	X	X
Decreased ability to sequence, judge time, direction, distance, size.	X	X	X	X	●	X	X	X
Impaired night vision.	X	X	X	X	X	X	X	X
Impaired cutaneous sensation detection.	X	●	X	●	X	X	X	X
Chronic stooped posture.	X	X	X	X	●	X	X	X
Difficulty in maintaining equilibrium.	●	●	X	●	●	X	S	S
Moves at slow speed.	X	X	X	X	O	X	X	X
Swaying, shuffling, uneven, erratic or staggering gait.	●	●	X	●	●	X	S	X
Frequent need to rest during exercise.	●	●	X	●	●	X	S	S

<p>KEY</p> <p>X = No problem for this group.</p> <p>S = Solution for this problem is known.</p> <p>● = Solution for this problem is not known.</p>	Manhole covers and gratings in walkway.	Highly reflective surface materials.	Grooves and patterns (cast into walkways or caused by small paving units).	Large, deep expansion joints.	Uneven and irregular surfaces.	Loose and soft surfaces (gravel, sand, etc.).	Rough surfaces.	Discontinuous surface materials.
Uses white cane for guidance (visually impaired).	S	X	S	S	S	●	●	S
Uses guide dog.	S	S	S	S	S	●	●	S
Limited ability to acquire or process visual stimuli.	S	S	S	S	S	●	●	S
Limited ability to perceive or process auditory stimuli.	X	X	X	X	X	X	X	X

<p>X = No problem for this group.</p> <p>S = Solution for this problem is known.</p> <p>● = Solution for this problem is not known.</p>	Ramp too long (exceeds 30 feet).	Ramp too steep (slope greater than 1:12).	Ramp too narrow (less than 48").	Cross slope greater than 1:50 (too steep).	Slope across structure too long and steep.	No curb cuts.	Helical ramp.	Ramp layout inconvenient.
Reduced tolerance to brisk exercise (need to move slowly).	●	●	X	●	●	X	S	S
Limited ability to stand for long periods.	●	X	X	X	●	X	S	S
Impaired bladder control.	X	X	X	X	●	X	X	X
Extreme of size (dwarfism, gigantism, obesity, etc.).	X	●	S	●	●	X	X	X
Cardiac Pacemaker affected by electrical interference.	X	X	X	X	●	X	X	X
Uses powered or manual wheelchair.	●	●	S	●	●	S	●	S
Uses walker, crutches, orthopedic cane.	●	●	X	●	●	S	●	S
Prosthesis (including braces) for lower extremities.	●	●	X	●	●	X	●	S
Decreased ability to tolerate smoke, dust, chemicals, pollens, cold winds.	X	X	X	X	X	X	X	X
Limited ability to grasp, release or manipulate with upper extremities (arms, wrist, hands).	X	X	X	X	X	X	X	X
Limited reach.	X	X	X	X	X	X	X	X

KEY	Ramp too long (exceeds 30 feet).	Ramp too steep (slope greater than 1:12).	Ramp too narrow (less than 48").	Cross slope greater than 1:50 (too steep).	Slope across structure too long and steep.	No curb cuts.	Helical ramp.	Ramp layout inconvenient.
X = No problem for this group.								
S = Solution for this problem is known.								
● = Solution for this problem is not known.								
Limited manual dexterity.	X	X	X	X	X	X	X	X
Inability to turn head.	X	X	X	X	X	X	X	X
Decreased ability to stoop.	X	X	X	X	X	X	X	X
Difficulty standing from sitting position, or in sitting down.	X	X	X	X	X	X	X	X
Limited vertical motion with legs and feet.	●	●	X	●	●	S	●	S
Limited horizontal motion with legs and feet.	X	●	X	●	●	S	●	S
Decreased ability to tolerate heat and cold.	X	X	X	X	X	X	X	X
Speech disorder.	X	X	X	X	X	X	X	X
Loss of normal speed in motor coordination/slowed reflexes.	X	X	X	X	X	X	X	X
Fear of crime.	X	X	X	X	X	X	X	X
Fear of heights (vertigo).	X	X	X	X	X	X	●	X
Agoraphobia.	X	X	X	X	X	X	X	X
Claustrophobia.	X	X	●	X	X	X	X	X
Fear of loud noises.	X	X	X	X	X	X	X	X

<p>KEY</p> <p>X = No problem for this group.</p> <p>S = Solution for this problem is known.</p> <p>● = Solution for this problem is not known.</p>	Ramp too long (exceeds 30 feet).	Ramp too steep (slope greater than 1:12).	Ramp too narrow (less than 48").	Cross slope greater than 1:50 (too steep).	Slope across structure too long and steep.	No curb cuts.	Helical ramp.	Ramp layout inconvenient.
Uses white cane for guidance (visually impaired).	X	X	X	●	X	X	X	●
Uses guide dog.	X	X	X	●	X	X	X	●
Limited ability to acquire or process visual stimuli.	X	X	X	●	X	X	X	●
Limited ability to perceive or process auditory stimuli.	X	X	X	X	X	X	X	X

<p>KEY</p> <p>X = No problem for this group.</p> <p>S = Solution for this problem is known.</p> <p>● = Solution for this problem is not known.</p>	Handrail material metal or aluminum (hot in hot weather, cold in cold).	Handrails not continuous.	Handrails don't extend far enough (1' at top and bottom of stairs and ramps).	No handrails on ramps.	Barricades not detectable (blind cane).	Guardrails not continuous.	Guardrails too low (less than 42").	No pedestrian guardrails.
Difficulty with environmental orientation.	X	X	X	X	S	X	X	X
Understanding deficit.	X	X	X	X	S	X	X	X
Limited attention span.	X	X	X	X	X	X	X	X
Memory deficit.	X	X	X	X	X	X	X	X
Decreased ability to sequence, judge time, direction, distance, size.	X	X	X	X	S	S	X	S
Impaired night vision.	X	X	X	X	S	S	S	S
Impaired cutaneous sensation detection.	S	X	X	X	S	X	X	X
Chronic stooped posture.	X	X	X	X	X	X	X	X
Difficulty in maintaining equilibrium.	S	S	S	●	X	S	S	S
Moves at slow speed.	X	S	X	X	X	X	X	X
Swaying, shuffling, uneven, erratic or staggering gait.	X	S	S	●	S	X	X	X
Frequent need to rest during exercise.	X	X	S	●	X	X	X	X

<p>KEY</p> <p>X = No problem for this group.</p> <p>S = Solution for this problem is known.</p> <p>● = Solution for this problem is not known.</p>	Handrail material metal or aluminum (hot in hot weather, cold in cold.	Handrails not continuous.	Handrails don't extend far enough (1' at top and bottom of stairs and ramps).	No handrails on ramps.	Barricades not detectable (blind cane).	Guardrails not continuous.	Guardrails too low (less than 42").	No pedestrian guardrails.
Reduced tolerance to brisk exercise (need to move slowly).	X	X	S	●	X	X	X	X
Limited ability to stand for long periods.	S	S	S	●	X	X	X	X
Impaired bladder control.	X	X	X	X	X	X	X	X
Extreme of size (dwarfism, gigantism, obesity, etc.).	S	X	X	●	X	X	X	X
Cardiac Pacemaker affected by electrical interference.	X	X	X	X	X	X	X	X
Uses powered or manual wheelchair.	S	S	X	X	X	S	S	S
Uses walker, crutches, orthopedic cane.	S	S	S	●	X	X	X	X
Prosthesis (including braces) for lower extremities.	S	S	S	●	X	X	X	X
Decreased ability to tolerate smoke, dust, chemicals, pollens, cold winds.	X	X	X	X	X	X	X	X
Limited ability to grasp, release or manipulate with upper extremities (arms, wrist, hands).	S	S	S	●	X	X	X	X
Limited reach.	X	S	S	X	X	X	X	X

<p>KEY</p> <p>X = No problem for this group.</p> <p>S = Solution for this problem is known.</p> <p>● = Solution for this problem is not known.</p>	Handrail material metal or aluminum (hot in hot weather, cold in cold).	Handrails not continuous.	Handrails don't extend far enough (1' at top and bottom of stairs and ramps).	No handrails on ramps.	Barricades not detectable (blind cane).	Guardrails not continuous.	Guardrails too low (less than 42").	No pedestrian guardrails.
Limited manual dexterity.	S	S	S	●	X	X	X	X
Inability to turn head.	X	X	X	X	X	X	X	X
Decreased ability to stoop.	X	X	X	X	X	X	X	X
Difficulty standing from sitting position, or in sitting down.	X	X	X	X	X	X	X	X
Limited vertical motion with legs and feet.	S	S	X	●	X	X	X	X
Limited horizontal motion with legs and feet.	X	X	S	●	X	X	X	X
Decreased ability to tolerate heat and cold.	X	X	X	X	X	X	X	X
Speech disorder.	X	X	X	X	X	X	X	X
Loss of normal speed in motor coordination/slowed reflexes.	S	S	S	●	X	S	S	S
Fear of crime.	X	X	X	X	X	X	X	X
Fear of heights (vertigo).	X	X	X	●	X	X	X	●
Agoraphobia.	X	X	X	X	X	X	X	X
Claustrophobia.	X	X	X	X	X	X	X	X
Fear of loud noises.	X	X	X	X	X	X	X	X



<p>KEY</p> <p>X = No problem for this group.</p> <p>S = Solution for this problem is known.</p> <p>● = Solution for this problem is not known.</p>	<p>Handrail material metal or aluminum (hot in hot weather, cold in cold).</p>	<p>Handrails not continuous.</p>	<p>Handrails don't extend far enough (1' at top and bottom of stairs and ramps).</p>	<p>No handrails on ramps.</p>	<p>Barricades not detectable (blind cane).</p>	<p>Guardrails not continuous.</p>	<p>Guardrails too low (less than 42").</p>	<p>No pedestrian guardrails.</p>
<p>Uses white cane for guidance (visually impaired).</p>	S	S	S	●	S	S	X	S
<p>Uses guide dog.</p>	S	S	X	X	X	X	X	S
<p>Limited ability to acquire or process visual stimuli.</p>	S	X	S	●	S	S	S	S
<p>Limited ability to perceive or process auditory stimuli.</p>	X	X	X	X	X	X	X	X

<p>KEY</p> <p>X = No problem for this group.</p> <p>S = Solution for this problem is known.</p> <p>● = Solution for this problem is not known.</p>	Abrupt transition to connecting walkways.	Ramp exits directly into street or parking area (less than 6' clearance at bottom of ramp).	Bollards in the middle of entrance to the ramp.	Steps in the middle of the ramp.	Handrails higher than 36" (too high).	Handrails lower than 32" (too low).	No handrails.	Handrail inadequate for comfortable grasp.
Difficulty with environmental orientation.	X	●	X	S	X	X	X	X
Understanding deficit.	X	X	S	S	X	X	X	X
Limited attention span.	X	X	X	S	X	X	X	X
Memory deficit.	X	X	X	X	X	X	X	X
Decreased ability to sequence, judge time, direction, distance, size.	X	X	X	S	X	X	X	X
Impaired night vision.	S	●	S	S	X	X	X	X
Impaired cutaneous sensation detection.	X	X	X	X	X	X	X	X
Chronic stooped posture.	X	X	X	X	X	X	X	X
Difficulty in maintaining equilibrium.	S	S	X	S	●	●	●	S
Moves at slow speed.	X	X	X	X	X	X	●	X
Swaying, shuffling, uneven, erratic or staggering gait.	X	X	X	X	X	X	●	X
Frequent need to rest during exercise.	X	X	X	X	X	X	X	X

<p>KEY</p> <p>X = No problem for this group.</p> <p>S = Solution for this problem is known.</p> <p>● = Solution for this problem is not known.</p>	Abrupt transition to connecting walkways.	Ramp exits directly into street or parking area (less than 6' clearance at bottom of ramp).	Bollards in the middle of entrance to the ramp.	Steps in the middle of the ramp.	Handrails higher than 36" (too high).	Handrails lower than 32" (too low).	No handrails.	Handrail inadequate for comfortable grasp.
Reduced tolerance to brisk exercise (need to move slowly).	X	X	X	X	X	X	X	X
Limited ability to stand for long periods.	S	X	X	X	●	●	●	S
Impaired bladder control.	X	X	X	X	X	X	X	X
Extreme of size (dwarfism, gigantism, obesity, etc.).	X	X	X	X	●	●	●	S
Cardiac Pacemaker affected by electrical interference.	X	X	X	X	X	X	X	X
Uses powered or manual wheelchair.	S	S	X	S	O	O	O	S
Uses walker, crutches, orthopedic cane.	S	X	X	S	●	●	●	S
Prosthesis (including braces) for lower extremities.	S	X	X	X	●	●	●	S
Decreased ability to tolerate smoke, dust, chemicals, pollens, cold winds.	X	X	X	X	X	X	X	X
Limited ability to grasp, release or manipulate with upper extremities (arms, wrist, hands).	X	X	X	S	●	●	●	S
Limited reach.	X	X	X	S	●	●	X	X

<p>KEY</p> <p>X = No problem for this group.</p> <p>S = Solution for this problem is known.</p> <p>● = Solution for this problem is not known.</p>	Abrupt transition to connecting walkways.	Ramp exits directly into street or parking area (less than 6' clearance at bottom of ramp).	Bollards in the middle of entrance to the ramp.	Steps in the middle of the ramp.	Handrails higher than 36" (too high).	Handrails lower than 32" (too low).	No handrails.	Handrail inadequate for comfortable grasp.
Limited manual dexterity.	X	X	X	X	●	●	●	S
Inability to turn head.	X	X	X	X	X	X	X	X
Decreased ability to stoop.	X	X	X	X	X	X	X	X
Difficulty standing from sitting position, or in sitting down.	X	X	X	X	X	X	X	X
Limited vertical motion with legs and feet.	S	S	X	S	O	O	O	S
Limited horizontal motion with legs and feet.	S	S	X	S	X	X	X	X
Decreased ability to tolerate heat and cold.	X	X	X	X	X	X	X	X
Speech disorder.	X	X	X	X	X	X	X	X
Loss of normal speed in motor coordination/slowed reflexes.	S	S	X	S	●	●	●	S
Fear of crime.	X	X	X	X	X	X	X	X
Fear of heights (vertigo).	X	X	X	X	X	X	X	X
Agoraphobia.	X	X	X	X	X	X	X	X
Claustrophobia.	X	X	X	X	X	X	X	X
Fear of loud noises.	X	X	X	X	X	X	X	X

<p>KEY</p> <p>X = No problem for this group.</p> <p>S = Solution for this problem is known.</p> <p>● = Solution for this problem is not known.</p>	Abrupt transition to connecting walkways.	Ramp exits directly into street or parking area (less than 6' clearance at bottom of ramp).	Bollards in the middle of entrance to the ramp.	Steps in the middle of the ramp.	Handrails higher than 36" (too high).	Handrails lower than 32" (too low).	No handrails.	Handrail inadequate for comfortable grasp.
Uses white cane for guidance (visually impaired).	●	●	S	S	X	X	X	X
Uses guide dog.	●	●	S	S	X	X	X	X
Limited ability to acquire or process visual stimuli.	●	●	S	S	X	X	X	X
Limited ability to perceive or process auditory stimuli.	X	X	X	X	X	X	X	X

<p>KEY</p> <p>X = No problem for this group.</p> <p>S = Solution for this problem is known.</p> <p>● = Solution for this problem is not known.</p>	Inadequate guardrails.	Guardrail mesh hazardous.	No detectable separation between bikeway and pedestrian way.	No detectable separation between roadway and walkway.	No detectable separation between walkway and parking lot.	Unprotected sidewalks (cars, edges, etc.).	Escalators.	Elevators.
Difficulty with environmental orientation.	S	X	●	S	●	S	X	X
Understanding deficit.	S	X	X	X	X	S	●	X
Limited attention span.	S	X	X	X	X	S	X	X
Memory deficit.	S	X	X	X	X	S	X	X
Decreased ability to sequence, judge time, direction, distance, size.	S	X	●	S	●	S	S	X
Impaired night vision.	S	●	●	S	●	S	X	X
Impaired cutaneous sensation detection.	X	●	X	X	X	S	X	X
Chronic stooped posture.	S	X	X	X	X	S	X	X
Difficulty in maintaining equilibrium.	S	●	●	S	S	S	X	X
Moves at slow speed.	X	X	X	X	X	S	S	S
Swaying, shuffling, uneven, erratic or staggering gait.	S	X	●	S	S	S	S	X
Frequent need to rest during exercise.	X	X	X	X	X	X	X	X

<p>KEY</p> <p>X = No problem for this group.</p> <p>S = Solution for this problem is known.</p> <p>● = Solution for this problem is not known.</p>	Inadequate guardrails.	Guardrail mesh hazardous.	No detectable separation between bikeway and pedestrian way.	No detectable separation between roadway and walkway.	No detectable separation between walkway and parking lot.	Unprotected sidewalks (cars, edges, etc.).	Escalators.	Elevators.
Reduced tolerance to brisk exercise (need to move slowly).	X	X	X	X	X	S	S	X
Limited ability to stand for long periods.	X	X	X	X	X	S	S	X
Impaired bladder control.	X	X	X	X	X	X	X	X
Extreme of size (dwarfism, gigantism, obesity, etc.).	X	X	X	X	X	X	S	S
Cardiac Pacemaker affected by electrical interference.	X	X	X	X	X	X	X	X
Uses powered or manual wheelchair.	S	●	●	S	S	S	S	S
Uses walker, crutches, orthopedic cane.	S	X	●	S	S	S	S	X
Prosthesis (including braces) for lower extremities.	S	X	X	X	X	S	S	X
Decreased ability to tolerate smoke, dust, chemicals, pollens, cold winds.	X	X	X	X	X	X	X	X
Limited ability to grasp, release or manipulate with upper extremities (arms, wrist, hands).	S	X	X	X	X	X	S	S
Limited reach.	S	X	X	X	X	X	S	S

KEY	Inadequate guardrails.	Guardrail mesh hazardous.	No detectable separation between bikeway and pedestrian way.	No detectable separation between roadway and walkway.	No detectable separation between walkway and parking lot.	Unprotected sidewalks (cars, edges, etc.).	Escalators.	Elevators.
X = No problem for this group.								
S = Solution for this problem is known.								
● = Solution for this problem is not known.								
Limited manual dexterity.	S	X	X	X	X	X	S	S
Inability to turn head.	S	X	●	S	S	S	X	X
Decreased ability to stoop.	X	X	X	X	X	X	X	X
Difficulty standing from sitting position, or in sitting down.	X	X	X	X	X	X	X	X
Limited vertical motion with legs and feet.	X	X	X	X	X	S	S	X
Limited horizontal motion with legs and feet.	X	X	X	X	X	S	S	S
Decreased ability to tolerate heat and cold.	X	X	X	X	X	X	X	X
Speech disorder.	X	X	X	X	X	X	X	X
Loss of normal speed in motor coordination/slowed reflexes.	X	●	X	X	X	S	S	S
Fear of crime.	X	X	X	X	X	X	X	●
Fear of heights (vertigo).	S	●	X	X	X	S	S	●
Agoraphobia.	X	X	X	●	●	S	X	X.
Claustrophobia.	X	X	X	X	X	X	X	S
Fear of loud noises.	X	X	X	●	●	●	X	X



<p>KEY</p> <p>X = No problem for this group.</p> <p>S = Solution for this problem is known.</p> <p>● = Solution for this problem is not known.</p>	Inadequate guardrails.	Guardrail mesh hazardous.	No detectable separation between bikeway and pedestrian way.	No detectable separation between roadway and walkway.	No detectable separation between walkway and parking lot.	Unprotected sidewalks (cars, edges, etc.).	Escalators.	Elevators.
Uses white cane for guidance (visually impaired).	S	●	●	S	●	S	S	X
Uses guide dog.	S	●	●	S	●	S	S	X
Limited ability to acquire or process visual stimuli.	S	●	●	S	●	S	S	X
Limited ability to perceive or process auditory stimuli.	X	X	●	S	S	S	X	X

<p>KEY</p> <p>X = No problem for this group.</p> <p>S = Solution for this problem is known.</p> <p>● = Solution for this problem is not known.</p>	<p>Resting places not under cover (wind, rain, sun).</p>	<p>Not enough places to stop and rest.</p>	<p>No provision for scenic overlook.</p>	<p>Benches too high or low, too deep or shallow, or with no armrest.</p>	<p>No alternative route for flood condition structures.</p>	<p>No pedestrian emergency provisions.</p>	<p>Significant change of light level in tunnel at entrance.</p>	<p>Interior lighting not adjusted to outside light conditions.</p>
<p>Difficulty with environmental orientation.</p>	X	X	S	X	S	X	S	S
<p>Understanding deficit.</p>	X	X	X	X	S	X	S	X
<p>Limited attention span.</p>	X	X	X	X	S	X	X	X
<p>Memory deficit.</p>	X	X	X	X	S	●	S	X
<p>Decreased ability to sequence, judge time, direction, distance, size.</p>	X	S	X	X	S	●	S	S
<p>Impaired night vision.</p>	X	X	X	X	S	X	S	S
<p>Impaired cutaneous sensation detection.</p>	S	X	X	X	X	X	X	X
<p>Chronic stooped posture.</p>	X	S	X	S	S	X	S	X
<p>Difficulty in maintaining equilibrium.</p>	X	S	X	S	S	●	S	S
<p>Moves at slow speed.</p>	X	S	X	S	S	●	X	X
<p>Swaying, shuffling, uneven, erratic or staggering gait.</p>	X	S	X	S	S	X	S	S
<p>Frequent need to rest during exercise.</p>	S	S	X	S	S	●	X	X

<p>KEY</p> <p>X = No problem for this group.</p> <p>S = Solution for this problem is known.</p> <p>● = Solution for this problem is not known.</p>	Resting places not under cover (wind, rain, sun).	Not enough places to stop and rest.	No provisions for scenic overlook.	Benches too high or low, too deep or shallow, or with no armrest.	No alternative route for flood condition structures.	No pedestrian emergency provisions.	Significant change of light level in tunnel at entrance.	Interior lighting not adjusted to outside light conditions.
Reduced tolerance to brisk exercise (need to move slowly).	S	S	X	S	S	X	X	X
Limited ability to stand for long periods.	S	S	X	S	S	●	X	X
Impaired bladder control.	S	S	X	X	X	●	X	X
Extreme of size (dwarfism, gigantism, obesity, etc.).	X	S	X	S	X	X	X	X
Cardiac Pacemaker affected by electrical interference.	S	S	X	S	X	●	X	X
Uses powered or manual wheelchair.	S	S	X	X	S	●	X	X
Uses walker, crutches, orthopedic cane.	S	S	X	S	S	●	X	X
Prosthesis (including braces) for lower extremities.	S	S	X	S	S	●	X	X
Decreased ability to tolerate smoke, dust, chemicals, pollens, cold winds.	S	S	X	X	X	●	X	X
Limited ability to grasp, release or manipulate with upper extremities (arms, wrist, hands).	X	X	X	X	X	X	X	X
Limited reach.	X	X	X	X	X	X	X	X

<p>KEY</p> <p>X = No problem for this group.</p> <p>S = Solution for this problem is known.</p> <p>● = Solution for this problem is not known.</p>	Resting places not under cover (wind, rain, sun).	Not enough places to stop and rest.	No provision for scenic overlook.	Benches too high or low, too deep or shallow, or with no armrest.	No alternative route for flood condition structures.	No pedestrian emergency provisions.	Significant change of light level in tunnel at entrance.	Interior lighting not adjusted to outside light conditions.
Limited manual dexterity.	X	X	X	X	X	X	X	X
Inability to turn head.	X	X	X	X	X	X	X	X
Decreased ability to stoop.	X	X	X	S	X	X	X	X
Difficulty standing from sitting position, or in sitting down.	S	S	X	S	X	X	X	X
Limited vertical motion with legs and feet.	X	S	X	S	X	X	X	X
Limited horizontal motion with legs and feet.	X	S	X	X	S	X	X	X
Decreased ability to tolerate heat and cold.	S	S	X	X	X	●	X	X
Speech disorder.	X	X	X	X	X	X	X	X
Loss of normal speed in motor coordination/slowed reflexes.	X	X	X	S	S	●	S	S
Fear of crime.	X	X	X	X	X	X	●	●
Fear of heights (vertigo).	X	X	X	X	X	X	X	X
Agoraphobia.	X	X	X	X	X	X	X	X
Claustrophobia.	X	X	X	X	X	X	●	●
Fear of loud noises.	X	X	X	X	X	X	X	X

<p>KEY</p> <p>X = No problem for this group.</p> <p>S = Solution for this problem is known.</p> <p>● = Solution for this problem is not known.</p>	Resting places not under cover (wind, rain, sun).	Not enough places to stop and rest.	No provision for scenic overlook.	Benches too high or low, too deep or shallow, or with no armrest.	No alternative route for flood condition structures.	No pedestrian emergency provisions.	Significant change of light level in tunnel at entrance.	Interior lighting not adjusted to outside light conditions.
Uses white cane for guidance (visually impaired).	X	X	X	S	S	●	X	X
Uses guide dog.	X	X	X	S	S	X	X	X
Limited ability to acquire or process visual stimuli.	X	X	X	S	S	X	S	S
Limited ability to perceive or process auditory stimuli.	X	X	X	X	X	X	X	X

<p>KEY</p> <p>X = No problem for this group.</p> <p>S = Solution for this problem is known.</p> <p>● = Solution for this problem is not known.</p>	Glare at end of tunnel.	Tunnel too dark.	Glare and flashing lights from vehicles.	Poor illumination.	No signage indicating location of rest areas.	Street signs too high, too low or far.	No special signage for the visually impaired.	Traffic lights with short green cycle.	Complicated instructions on signs.
Difficulty with environmental orientation.	S	S	●	S	●	S	X	●	●
Understanding deficit.	X	S	●	X	●	S	X	X	●
Limited attention span.	X	S	●	S	●	S	X	X	●
Memory deficit.	X	S	●	S	●	S	X	X	●
Decreased ability to sequence, judge time, direction, distance, size.	S	S	●	S	S	S	X	●	●
Impaired night vision.	S	S	●	S	S	●	●	●	●
Impaired cutaneous sensation detection.	X	S	X	S	X	X	X	X	X
Chronic stooped posture.	X	S	X	S	S	S	X	●	S
Difficulty in maintaining equilibrium.	S	S	●	S	X	X	X	●	S
Moves at slow speed.	X	X	X	X	S	S	X	●	S
Swaying, shuffling, uneven, erratic or staggering gait.	S	S	●	S	S	S	X	●	S
Frequent need to rest during exercise.	X	S	X	S	S	S	X	●	S

<p>KEY</p> <p>X = No problem for this group.</p> <p>S = Solution for this problem is known.</p> <p>● = Solution for this problem is not known.</p>	Glare at end of tunnel.	Tunnel too dark.	Glare and flashing lights from vehicles.	Poor illumination.	No signage indicating location of rest areas.	Street signs too high, too low or far.	No special signage for the visually impaired.	Traffic lights with short green cycle.	Complicated instructions on signs.
Reduced tolerance to brisk exercise (need to move slowly).	X	S	X	S	S	S	X	●	S
Limited ability to stand for long periods.	S	S	X	S	S	S	X	●	S
Impaired bladder control.	X	X	X	X	S	S	X	X	X
Extreme of size (dwarfism, gigantism, obesity, etc.).	X	S	X	S	X	S	X	●	X
Cardiac Pacemaker affected by electrical interference.	X	S	●	S	S	S	X	●	X
Uses powered or manual wheelchair.	X	S	●	S	S	S	X	●	S
Uses walker, crutches, orthopedic cane.	X	S	●	S	S	S	X	●	S
Prosthesis (including braces) for lower extremities.	X	S	●	S	S	S	X	●	S
Decreased ability to tolerate smoke, dust, chemicals, pollens, cold winds.	X	X	X	X	S	S	X	X	X
Limited ability to grasp, release or manipulate with upper extremities (arms, wrist, hands).	X	S	X	S	X	X	X	X	X
Limited reach.	X	S	X	S	X	X	X	X	X

KEY	Glare at end of tunnel.	Tunnel too dark.	Glare and Flashing lights from vehicles.	Poor illumination.	No signage indicating location of rest areas.	Street signs too high, too low or far.	No special signage for the visually impaired.	Traffic lights with short green cycle.	Complicated instructions on signs.
Limited manual dexterity.	X	S	X	S	X	X	X	X	X
Inability to turn head.	X	S	●	S	X	S	X	●	S
Decreased ability to stoop.	X	S	●	S	S	X	X	X	X
Difficulty standing from sitting position, or in sitting down.	X	X	X	X	X	X	X	X	X
Limited vertical motion with legs and feet.	X	S	●	S	S	S	X	●	S
Limited horizontal motion with legs and feet.	S	S	●	S	S	X	X	●	S
Decreased ability to tolerate heat and cold.	X	X	X	X	S	X	X	X	X
Speech disorder.	X	X	X	X	X	X	X	X	●
Loss of normal speed in motor coordination/slowed reflexes.	S	S	●	S	S	S	X	●	S
Fear of crime.	●	●	●	●	X	X	X	X	S
Fear of heights (vertigo).	X	X	X	X	X	X	X	X	●
Agoraphobia.	X	X	X	X	X	X	X	X	●
Claustrophobia.	X	●	X	●	X	X	X	X	●
Fear of loud noises.	X	X	X	X	X	X	X	X	X



<p>KEY</p> <p>X = No problem for this group.</p> <p>S = Solution for this problem is known.</p> <p>● = Solution for this problem is not known.</p>	Glare at end of tunnel.	Tunnel too dark.	Glare and flashing lights from vehicles.	Poor illumination.	No signage indicating location of rest areas.	Street signs too high, too low or far.	No special signage for the visually impaired.	Traffic lights with short green cycle.	Complicated instructions on signs.
Uses white cane for guidance (visually impaired).	X	X	●	S	●	●	●	●	●
Uses guide dog.	X	X	●	S	●	●	●	●	●
Limited ability to acquire or process visual stimuli.	S	S	●	S	●	●	●	●	●
Limited ability to perceive or process auditory stimuli.	X	S	●	S	S	●	X	X	S

<p>KEY</p> <p>X = No problem for this group.</p> <p>S = Solution for this problem is known.</p> <p>● = Solution for this problem is not known.</p>	No warning of potential hazards.	No orientation cue as to start of approach.	Lack of orientation cues generally.	Pathway junctions which are not at 90 degree angle or which curve.	No detectable orientation cue as to start of channelization.	Walkway not channelized.	Traffic noise.
Difficulty with environmental orientation.	●	●	●	●	●	●	●
Understanding deficit.	●	●	●	●	●	●	●
Limited attention span.	●	●	●	X	X	●	●
Memory deficit.	●	●	●	●	●	●	X
Decreased ability to sequence, judge time, direction, distance, size.	●	●	●	S	●	S	X
Impaired night vision.	●	●	●	X	●	●	X
Impaired cutaneous sensation detection.	X	X	X	X	X	X	X
Chronic stooped posture.	●	S	S	S	S	S	X
Difficulty in maintaining equilibrium.	S	S	S	X	X	X	X
Moves at slow speed.	S	S	S	X	S	S	X
Swaying, shuffling, uneven, erratic or staggering gait.	S	S	S	X	S	S	X
Frequent need to rest during exercise.	S	S	S	X	S	X	X

<p>KEY</p> <p>X = No problem for this group.</p> <p>S = Solution for this problem is known.</p> <p>● = Solution for this problem is not known.</p>	No warning of potential hazards.	No orientation cue as to start of approach.	Lack of orientation cues generally.	Pathway junctions which are not at 90 degree angle or which curve.	No detectable orientation cue as to start of channelization.	Walkway not channelized.	Traffic noise.
Reduced tolerance to brisk exercise (need to move slowly).	S	S	S	X	S	S	X
Limited ability to stand for long periods.	S	S	S	X	S	X	X
Impaired bladder control.	X	X	S	X	S	X	X
Extreme of size (dwarfism, giantism, obesity, etc.).	S	X	X	X	X	X	X
Cardiac Pacemaker affected by electrical interference.	S	X	S	X	X	X	X
Uses powered or manual wheelchair.	S	S	S	S	S	X	X
Uses walker, crutches, orthopedic cane.	S	S	S	X	S	X	X
Prosthesis (including braces) for lower extremities.	S	S	S	X	S	X	X
Decreased ability to tolerate smoke, dust, chemicals, pollens, cold winds.	X	X	S	X	X	X	X
Limited ability to grasp, release or manipulate with upper extremities (arms, wrist, hands).	S	X	S	X	X	X	X
Limited reach.	S	X	S	X	X	X	X

KEY	No warning of potential hazards.	No orientation cue as to start of approach.	Lack of orientation cues generally.	Pathway junctions which are not at 90 degree angle or which curve.	No detectable orientation cue as to start of channelization.	Walkway not channelized.	Traffic noise.
Limited manual dexterity.	S	X	S	X	X	X	X
Inability to turn head.	S	S	S	X	X	X	●
Decreased ability to stoop.	S	X	S	X	X	X	X
Difficulty standing from sitting position, or in sitting down.	S	X	S	X	X	X	X
Limited vertical motion with legs and feet.	S	S	S	X	S	X	X
Limited horizontal motion with legs and feet.	S	S	S	X	S	X	X
Decreased ability to tolerate heat and cold.	X	X	X	X	X	X	X
Speech disorder.	X	S	S	X	X	X	X
Loss of normal speed in motor coordination/slowed reflexes.	S	S	S	X	S	X	X
Fear of crime.	S	●	●	X	S	X	X
Fear of heights (vertigo).	S	●	S	X	X	X	X
Agoraphobia.	S	●	S	X	X	X	X
Claustrophobia.	S	●	S	X	X	X	X
Fear of loud noises.	S	S	●	X	X	X	●

<p>KEY</p> <p>X = No problem for this group.</p> <p>S = Solution for this problem is known.</p> <p>● = Solution for this problem is not known.</p>	<p>No warning of potential hazards.</p>	<p>No orientation cue as to start of approach.</p>	<p>Lack of orientation cues generally.</p>	<p>Pathway junctions which are not at 90 degree angle or which curve.</p>	<p>No detectable orientation cue as to start of channelization.</p>	<p>Walkway not channelized.</p>	<p>Traffic noise.</p>
<p>Uses white cane for guidance (visually impaired).</p>	●	●	●	●	●	●	●
<p>Uses guide dog.</p>	●	●	●	●	●	●	●
<p>Limited ability to acquire or process visual stimuli.</p>	●	●	●	●	●	●	●
<p>Limited ability to perceive or process auditory stimuli.</p>	S	S	S	X	S	X	●

<p>KEY</p> <p>X = No problem for this group.</p> <p>S = Solution for this problem is known.</p> <p>● = Solution for this problem is not known.</p>	High wind gusts present.	Wind generated by traffic.	Inadequate provision for rain-water runoff.	Walkways and sidewalks not kept clear of snow, ice and debris.
Difficulty with environmental orientation.	●	●	S	S
Understanding deficit.	●	●	S	S
Limited attention span.	●	●	S	S
Memory deficit.	X	X	S	S
Decreased ability to sequence, judge time, direction, distance, size.	●	●	S	S
Impaired night vision.	●	●	S	S
Impaired cutaneous sensation detection.	X	X	S	S
Chronic stooped posture.	●	●	S	S
Difficulty in maintaining equilibrium.	●	●	S	S
Moves at slow speed.	●	●	S	S
Swaying, shuffling, uneven, erratic or staggering gait.	●	●	S	S
Frequent need to rest during exercise.	●	●	S	S

<p>KEY</p> <p>X = No problem for this group.</p> <p>S = Solution for this problem is known.</p> <p>● = Solution for this problem is not known.</p>	High wind gusts present.	Wind generated by traffic.	Inadequate provisions for rain-water runoff.	Walkways and sidewalks not kept clear of snow, ice and debris.
Reduced tolerance to brisk exercise (need to move slowly).	●	●	S	S
Limited ability to stand for long periods.	●	●	S	S
Impaired bladder control.	X	X	X	S
Extreme of size (dwarfism, giantism, obesity, etc.).	●	●	S	S
Cardiac Pacemaker affected by electrical interference.	X	X	X	S
Uses powered or manual wheelchair.	●	●	S	S
Uses walker, crutches, orthopedic cane.	●	●	S	S
Prosthesis (including braces) for lower extremities.	●	●	S	S
Decreased ability to tolerate smoke, dust, chemicals, pollens, cold winds.	●	●	X	X
Limited ability to grasp, release or manipulate with upper extremities (arms, wrist, hands).	X	X	S	S
Limited reach.	X	X	S	S

<p>KEY</p> <p>X = No problem for this group.</p> <p>S = Solution for this problem is known.</p> <p>● = Solution for this problem is not known.</p>	High wind gusts present.	Wind generated by traffic.	Inadequate provision for rain-water runoff.	Walkways and sidewalks not kept clear of snow, ice and debris.
Limited manual dexterity.	X	X	S	S
Inability to turn head.	●	●	S	S
Decreased ability to stoop.	X	X	X	S
Difficulty standing from sitting position, or in sitting down.	X	X	S	S
Limited vertical motion with legs and feet.	●	●	S	S
Limited horizontal motion with legs and feet.	●	●	S	S
Decreased ability to tolerate heat and cold.	●	●	X	S
Speech disorder.	X	X	X	X
Loss of normal speed in motor coordination/slowed reflexes.	●	●	S	S
Fear of crime.	X	X	X	X
Fear of heights (vertigo).	X	X	X	X
Agoraphobia.	X	X	X	X
Claustrophobia.	X	X	X	X
Fear of loud noises.	X	X	X	X



<p>KEY</p> <p>X = No problem for this group.</p> <p>S = Solution for this problem is known.</p> <p>● = Solution for this problem is not known.</p>	High wind gusts present.	Wind generated by traffic.	Inadequate provisions for rain-water runoff.	Walkways and sidewalks not kept clear of snow, ice and debris.
Uses white cane for guidance (visually impaired).	●	●	S	S
Uses guide dog.	●	●	S	S
Limited ability to acquire or process visual stimuli.	●	●	S	S
Limited ability to perceive or process auditory stimuli.	●	X	X	X

# COST ESTIMATES

**H**  
appendix

## IMPEDIMENTS TO REACHING END CONDITION

**1**

### Alternative 1-Install signing, striping and curb cuts

#### COST ESTIMATE

<u>Item</u>	<u>Quantity</u>	<u>Unit Price</u>	<u>Total</u>
Painted X-walk stripes	40 l.f.	\$ .09/l.f.	\$ 4
Curb cuts	2 ea.	700.00/ea.	1,400
Sidewalk	.6 c.y.	200.00/c.y.	120
Traffic sign and post	1 ea.	100.00/ea.	100
			\$1,624
	Contingencies		476
	Total 1979 cost		<u>\$2,100</u>

l.f. = lineal feet      c.y. = cubic yards.

### Alternative 2 - Install Traffic Signal

#### COST ESTIMATE

The cost for a pedestrian actuated signal installation controlling a one-lane off ramp is \$10,000 assuming power is readily available. An isolated pedestrian actuated signal controlling a midblock crosswalk of a 4-lane roadway would cost approximately \$15,000. Fully actuated signalization of an intersection of a four lane and a two-lane road would amount to \$64,000.

Alternative 3 - Construct Ramp Undercrossing

COST ESTIMATE

<u>Item</u>	<u>Quantity</u>	<u>Unit Price</u>	<u>Total</u>
Mobilization	Lump sum		\$ 9,000
Clearing	4,000 s.f.	\$ .25/s.f.	1,000
Traffic Control	Lump sum		1,000
Shoring	1,200 s.f.	5.00/s.f.	6,000
Excavation	1,040 c.y.	9.00/c.y.	9,360
Backfill	432 c.y.	15.00/c.y.	6,480
Concrete	325 c.y.	275.00/c.y.	89,375
Reinforcing	65,000 lbs.	.40/lb.	26,000
Finishes	5,4000 s.f.	.50/s.f.	2,700
Sidewalks	2,400 s.f.	1.30/s.f.	3,120
Paving (AC)	500 s.f.	1.00/s.f.	500
Lighting/Electrical	10 fixtures	400.00/ea.	4,000
Landscaping/Drainage	2,000 s.f.	.50/s.f.	1,000
			\$159,535
	Contingencies		40,465
	Total 1979 cost		<u>\$200,000</u>
s.f. = square feet    l.f. = lineal feet    c.y. = cubic yards			

PATHWAY LEADING TO OVERCROSSING IS TOO STEEP AND/OR TOO LONG

2

Alternative 1-Construct new ramp with rest areas

COST ESTIMATE

<u>Item</u>	<u>Quantity</u>	<u>Unit Price</u>	<u>Total</u>
Construct off-path rest areas	2	\$500 ea	\$1,000
Remove existing 12.5% grade ramp	920 s.f.	1/s.f.	920
Construct new ramp	1,530	2/s.f.	3,060
Grading and compacting	Lump sum	500	500
Handrail along new ramp	360 l.f.	15.50/l.f.	5,580
Handrail along existing 8.33% grade ramp	170 l.f.	15.50/l.f.	2,635
			\$13,695
	Contingencies		3,405
			<hr/>
	TOTAL		\$17,100
s.f. = square feet	l.f. = lineal feet		

Alternative 2 - Overlay and extend ramp with rest areas

**COST ESTIMATE**

<u>Item</u>	<u>Quantity</u>	<u>Unit Price</u>	<u>Total</u>
Construct off-path rest areas	2 ea.	\$500 ea	\$ 1,000
Overlay and extend existing ramp	1,530 s.f.	2/s.f.	3,060
New embankment	340 c.y.	5/c.y.	1,700
Handrail along new ramp	360 l.f.	15.50/l.f.	5,580
Handrail along existing 8.33% grade ramp	170 l.f.	15.50/l.f.	2,635
			\$13,975
	Contingencies		3,425
		TOTAL 1979 cost	\$17,400
s.f. = square feet    l.f. = lineal feet    c.y. = cubic yards			

Alternative 3 - Install an elevator

**COST ESTIMATE**

<u>Item</u>	<u>Quantity</u>	<u>Unit Price</u>	<u>Total</u>
Mobilization	Lump sum		\$ 2,500
Drilling	20 l.f.	\$ 15.00/l.f.	300
Excavation	27 c.y.	8.00/c.y.	216
Backfill	16 c.y.	12.00/c.y.	192
Concrete	3 c.y.	400.00/c.y.	1,200
Reinforcing	500 lbs.	.50/lb.	250
Structural steel	9,000 lbs.	1.50/lb	13,500
Enclosure (wire)	1,000 s.f.	5.00/s.f.	5,000
Elevator (complete)	1 ea.	15,000 ea.	15,000
Equipment enclosure	lump sum		2,000
Power hook-up	lump sum		500
			\$40,658
	Contingencies		10,342
	Total 1979 Cost		<u>\$51,000</u>
l.f. = lineal feet      c.y. = cubic yards      s.f. - square feet			

**STAIRS ONLY ON APPROACH TO OVERCROSSING:  
STRAIGHT FLIGHT SPACE FOR RAMP ON BOTH SIDES**

**3**

Alternative 1 - Construct ramp to supplement stairs

**COST ESTIMATE**

Assume one ramp at 8 runs.

<u>Item</u>	<u>Quantity</u>	<u>Unit Price</u>	<u>Total</u>
Mobilization	Lump sum		\$ 4,500
Cleaning	1,500 s.f.	.50/s.f.	750
Excavation	50 c.y.	12.00/c.y.	600
Backfill	32 c.y.	12.00/c.y.	384
Concrete	180 c.y.	300.00/c.y.	54,000
Reinforcing	54,000 lbs	.40/lb	21,600
Finishes	4,000 s.f.	.30/s.f.	1,200
Railings	500 l.f.	15.00/l.f.	7,500
Sidewalk	400 s.f.	1.20/s.f.	480
Landscaping/drainage	1,500 s.f.	.50/s.f.	750
			\$ 91,764
	Contingencies		19,736
	<b>Total 1979 Cost</b>		<b>\$111,500</b>
l.f. = lineal feet      c.y. = cubic yards      s.f. = square feet			

Alternative 2 - Install elevators to supplement stairs

COST ESTIMATE

<u>Item</u>	<u>Quantity</u>	<u>Unit Price</u>	<u>Total</u>
Mobilization	Lump sum		\$ 5,000
Drilling	40 l.f.	\$ 15.00/l.f.	600
Excavation	54 c.y.	8.00/c.y.	432
Backfill	32 c.y.	12.00/c.y.	384
Concrete	6 c.y.	400.00/c.y.	2,400
Reinforcing	1,000 lb	.50/lb	500
Structural steel	18,000 lb	1.50/lb	27,000
Enclosure (wire)	2,000 s.f.	5.00s.f.	10,000
Elevator (complete)	2 ea.	15,000.00 ea	30,000
Equipment enclosure	Lump sum		4,000
Power hook-up	Lump sum		1,000
			81,316
	Contingencies		19,684
			<hr/>
	Total 1979 Cost		\$101,000

l.f. = lineal feet    s.f. = square feet    c.y. = cubic yards



STAIRS ONLY ON APPROACH TO OVERCROSSING: STRAIGHT FLIGHT  
SPACE FOR RAMP ON BOTH SIDES ONLY

4

Alternative 1 - Construct ramp to supplement stairs

COST ESTIMATE

<u>Item</u>	<u>Quantity</u>	<u>Unit Price</u>	<u>Total</u>
Curb removal	60 l. f.	\$ 3/l.f.	\$ 180
Sidewalk (remove/replace)	150 s.f.	2.50/l.f.	380
Ramp construction	605s.f.	2/s.f.	1,200
Railings	200 l.f.	15.50/l.f.	3,100
Retaining walls (Reinf. Conc.)	138 l.f.	116/l.f.	16,000
			\$20,860
	Contingencies		5,240
	TOTAL 1979 cost		\$26,100

l.f. = lineal feet      s.f. = square feet

**STAIRS ONLY ON APPROACH TO OVERCROSSING:  
STRAIGHT FLIGHT SPACE FOR RAMP ON ONE END AND ONE SIDE**

**5**

Alternative 1 - Construct ramp to supplement stairs

**COST ESTIMATE**

The cost estimate assumes ramp construction to serve one side of the structure.

<u>Item</u>	<u>Quantity</u>	<u>Unit Price</u>	<u>Total</u>
Mobilization	Lump sum		\$ 3,000
Clearing	1,500	.50/s.f.	750
Excavation	50 c.y.	12.00/c.y.	600
Backfill	32 c.y.	12.00/c.y.	384
Concrete	100 c.y.	300.00/c.y.	30,000
Reinforcing	32,000 lb	.40/lb	12,800
Finishes	3,000 s.f.	.30/s.f.	900
Railings	180 l.f.	15.00/l.f.	2,700
Sidewalks	400 s.f.	1.20/s.f.	480
Landscaping/Drainage	1,500 s.f.	.50/s.f.	750
			\$52,364
	Contingencies		12,636
	<b>TOTAL 1979 Cost</b>		<b>\$65,000</b>

s.f. = square feet    l.f. = lineal feet    c.y. = cubic yards

Alternative 2 - Install elevator to supplement stairs

COST ESTIMATE

<u>Item</u>	<u>Quantity</u>	<u>Unit Price</u>	<u>Total</u>
Mobilization	Lump sum		\$ 2,500
Drilling	20 l.f.	\$ 15.00/l.f.	300
Excavation	27 c.y.	8.00/c.y.	216
Backfill	16 c.y.	12.00/c.y.	192
Concrete	3 c.y.	400.00/c.y.	1,200
Reinforcing	500 lbs.	.50/lb.	250
Structural steel	9,000 lbs.	1.50/lb.	13,500
Enclosure (wire)	1,000 s.f.	5.00/s.f.	5,000
Elevator (complete)	1 ea.	15,000.00/ea	15,000
Equipment enclosure	Lump sum		2,000
Power hook-up	Lump sum		500
			\$40,658
	Contingencies		10,342
	Total 1979 cost		\$51,000
l.f. = lineal feet    c.y. = cubic yard    s.f. = square feet			

**RAMP ON APPROACH TOO LONG AND/OR TOO STEEP:  
STRAIGHT RAMP: SPACE AT END AND AT LEAST ONE SIDE**

**6**

Alternative 1 - Overlay and extend ramp with rest areas

**COST ESTIMATE**

<u>Item</u>	<u>Quantity</u>	<u>Unit Price</u>	<u>Total</u>
Embankment	860	\$ 5/c.y.	\$ 4,300
Paving	2,480	1/s.f.	2,900
Railing	720	15.50/l.f.	11,200
			\$18,400
	Contingencies		4,600
	TOTAL 1979 cost		\$23,000
s.f. = square feet    c.y. = cubic yards			

Alternative 2 - Overlay and extend ramp with off-ramp rest areas

**COST ESTIMATE**

<u>Item</u>	<u>Quantity</u>	<u>Unit Price</u>	<u>Total</u>
Embankment	750 c.y.	\$ 5/c.y.	\$ 3,750
Paving	2,560 s.f.	1/s.f.	2,560
Rest Areas	9	500/ea	4,500
Railing	730 l.f.	15.50/l.f.	8,395
			\$19,205
	Contingencies		4,795
	TOTAL 1979 cost		\$24,000
s.f. = square feet    l.f. = lineal feet    c.y. = cubic yards			

Alternative 3 - Construct new ramp with rest areas

COST ESTIMATE

<u>Item</u>	<u>Quantity</u>	<u>Unit Price</u>	<u>Total</u>
Same costs as Problem 6 ( Alt. 1)			\$18,400
Wooden 2" x 6" Headers	370 l.f.	\$2/l.f.	1,800
			<hr/> \$20,200
Deduct most of embankment			-3,800
			<hr/> \$16,400
		Contingencies	4,100
			<hr/> \$20,500
1.f. = lineal feet			

**RAMPS ON APPROACH TOO LONG AND/OR TOO STEEP:  
STRAIGHT RAMPS; SPACE ON ONE SIDE ONLY**

**7**

Alternative 1 - Construct new ramp V Pattern

**COST ESTIMATE**

<u>Item</u>	<u>Quantity</u>	<u>Unit Price</u>	<u>Total</u>
Grading Allowance		Lump sum	\$ 500
Wooden 2" x 6" headers	460 l.f.	\$ 2.50/s.f.	1,150
Paving	1,840 s.f.	1.00/l.f.	1,800
Railing	480 l.f.	15.50/l.f.	7,400
	Contingencies		\$10,850 2,750
	<b>TOTAL 1979 cost</b>		<b>\$13,600</b>
l.f. = lineal feet      s.f. = square feet			

Alternative 2 - Construct new ramp M Pattern

**COST ESTIMATE**

<u>Item</u>	<u>Quantity</u>	<u>Unit Price</u>	<u>Total</u>
Same cost as Problem 7 (Alt. 1)		.	\$10,850
Additional Length	20 ft.	\$13.00/ft.	260
	Contingencies		\$11,110 2,790
	<b>TOTAL 1979 cost</b>		<b>\$13,900</b>

**RAMPS ON APPROACH TOO LONG AND/OR TOO STEEP:  
STRAIGHT RAMP; SPACE AT END ONLY**

**8**

Alternative 1 - Construct new ramp over existing ramp

**COST ESTIMATE**

<u>Item</u>	<u>Quantity</u>	<u>Unit Price</u>	<u>Total</u>
Remove Existing Railing	80 l.f.	\$ 5/l.f.	\$ 400
New Railing	140 l.f.	15.50/l.f.	2,200
Concrete Overlay	7 c.y.	300/c.y.	2,100
Ramp Extention	5 c.y.	200/c.y.	1,000
Grading Allowance		Lump sum	500
			\$6,200
		Contingencies	1,100
		<b>Total 1979 cost</b>	<b>\$7,300</b>
l.f. = lineal feet      c.y. = cubic feet			

Alternative 2 - Demolish existing ramp and construct new ramp

**COST ESTIMATE**

<u>Item</u>	<u>Quantity</u>	<u>Unit Price</u>	<u>Total</u>
Demolish Existing Ramp		Lump sum	\$ 500
Construct Sidewall	90 l.f.	\$115/l.f.	5,800
Paving	910 s.f.	2/s.f.	1,200
Railing	140 l.f.	15.50/l.f.	2,200
Grading Allowance		Lump sum	800
			\$10,500
		Contingencies	2,600
		<b>TOTAL 1979 cost</b>	<b>\$13,100</b>
l.f. = lineal feet      s. f. square feet			



STRAIGHT RAMPS ON APPROACH TOO LONG, BUT NOT TOO STEEP

9

Alternative 1 - Construct off-ramp rest areas

COST ESTIMATE

<u>Item</u>	<u>Quantity</u>	<u>Unit Price</u>	<u>Total</u>
Rest Areas	5 ea	\$500/ea.	\$2,500
Railing	264/l.f.	15.50/l.f.	4,100
			\$6,600
	Contingencies		1,600
	TOTAL 1979 cost		\$8,200
1.f. = lineal feet			

Alternative 2 - Overlay existing ramp to create rest areas

COST ESTIMATE

<u>Item</u>	<u>Quantity</u>	<u>Unit Price</u>	<u>Total</u>
Rest Areas	5 ea	\$150/ea	\$ 750
Railing	318/l.f.	15.50/l.f.	4,929
			\$5,679
	Contingencies		1,421
	TOTAL 1979 cost		\$7,100
1.f. = lineal feet			

Alternative 3 - Construct on-ramp rest areas (Partial width)

**COST ESTIMATE**

<u>Item</u>	<u>Quantity</u>	<u>Unit Price</u>	<u>Total</u>
Rest Areas	5 ea.	\$300/ea.	\$1,500
Railings	293/l.f.	15.50/l.f.	4,542
			\$6,042
		Contingencies	1,458
		<b>TOTAL 1979 cost</b>	<b>\$7,500</b>
1.f. = lineal feet			

**RAMPS ON APPROACH TOO LONG AND/OR TOO STEEP:  
DOGLEG RAMP: SPACE AT ENDS ONLY**

**10**

Alternative 1 - Demolish and construct new ramp at one end

**COST ESTIMATE**

<u>Item</u>	<u>Quantity</u>	<u>Unit Price</u>	<u>Total</u>
Mobilization	Lump Sum		\$ 9,000
Demolition	200 c.y.	\$ 70.00/c.y.	14,000
Excavation	260 c.y.	10.00/c.y.	2,600
Backfill	170 c.y.	12.00/c.y.	2,040
Fill	10 c.y.	25.00/c.y.	250
Reinforcing	74,000 lbs.	.40/lb.	29,600
Concrete	300 c.y.	300.00/c.y.	90,000
Finishes	7,000 s.f.	.30/s.f.	2,100
Railings	270 s.f.	15.00/l.f.	4,050
Sidewalk	400 s.f.	1.20/s.f.	480
Landscape/drainage	2,000 s.f.	.50/s.f.	1,000
			\$155,120
	Contingencies		38,880
	<b>TOTAL 1979 Cost</b>		<b>\$194,000</b>

c.y. = cubic yards    s.f. = square feet    l.f. = lineal feet

Alternative 2-Rebuild existing ramp

COST ESTIMATE

Reconstruction would include constructing additional columns and walls to support the raised ramp. Estimated total cost would be 50 percent of demolishing the existing ramp and rebuilding a new one or approximately \$100,000.

Alternative 3 - Install an elevator

COST ESTIMATE

Basic equipment cost remain the same as those developed for Problem 5 - Alternative 2 which equals \$51,000.

RAMPS ON APPROACH TOO LONG AND /OR TOO STEEP:  
 DOGLEG RAMP: SPACE AT ONE END ONLY AND ONE SIDE

11

Alternative 1-Jack End of Existing Ramp

COST ESTIMATE

<u>Item</u>	<u>Quantity</u>	<u>Unit Price</u>	<u>Total</u>
Mobilization	Lump sum		\$ 4,000
Demolition	50 c.y.	\$100.00/c.y.	5,000
Shoring	2,000 s.f.	3.00/s.f.	6,000
Excavation	100 c.y.	15.00/c.y.	1,650
Backfill	80 c.y.	20.00/c.y.	1,600
Fill	240 c.y.	20.00/c.y.	4,800
Jacking	Lump sum		4,000
Concrete	62 c.y.	400.00/c.y.	24,800
Reinforcing	22,000 lbs.	.50/lb.	11,000
Finishes	600 s.f.	1.00/s.f.	600
Railings	200 l.f.	15.00/l.f.	3,000
Sidewalk	800 s.f.	1.20/s.f.	960
Landscaping/drainage	3,000 s.f.	.50/s.f.	1,500
			\$68,910
		Contingencies	17,090
		<b>TOTAL 1979 Cost</b>	<b>\$86,000</b>

c.y. = cubic yards      s.f. = square feet      l.f. = lineal feet

Alternative 2 - Demolish and rebuild ramps

**COST ESTIMATE**

The work requirements and construction quantities are essentially identical to those detailed for prototypical Problem 10 - Alternative 1. Therefore, the cost can be assumed to be the same or \$194,000.

Alternative 3 - Install an elevator

**COST ESTIMATE**

The work requirements and construction quantities are essentially identical to those detailed for prototypical Problem 5 - Alternative 2. Therefore, the cost can be assumed to be the same or \$51,000.

**RAMPS ON APPROACH TOO LONG AND/OR TOO STEEP;  
MULTILEVEL DOGLEG RAMP; SPACE AT BOTH ENDS**

**12**

Alternative 1 - Demolish and rebuild ramps

**COST ESTIMATE**

Review of the major items of work shows that basic quantities almost double quantities developed for a similar situation detailed in Problem 10 - Alternative 1. Therefore, the cost estimated is 1.8 times \$194,000 (Problem 10 - Alternative 1) or \$349,200.

Alternative 2 - Install an elevator

**COST ESTIMATE**

Basic equipment costs remain the same as those developed from Problem 5 - Alternative 2; however, the structure portrayed in Problem 12 is higher. Estimated increase in cost can be found by multiplying elevator cost detailed in Problem 5 by a factor of 1.15 ( $1.15 \times \$51,000 = \$59,000$ ).

**RAMPS ON APPROACH TOO LONG AND/OR TOO STEEP:  
DOGLEG RAMPS WITH HELICAL ENDS INSTEAD OF LANDINGS**

**13**

Alternative 1 - Demolish and rebuild

**COST ESTIMATE**

<u>Item</u>	<u>Quantity</u>	<u>Unit Price</u>	<u>Total</u>
Mobilization	Lump sum		\$ 9,000
Demolition	200 c.y.	\$ 70.00/c.y.	14,000
Excavation	260 c.y.	10.00/c.y.	2,600
Backfill	170 c.y.	12.00/c.y.	2,040
Fill	10 c.y.	25.00/c.y.	250
Reinforcing	74,000 lbs.	.40/lb.	29,600
Concrete	300 c.y.	300.00/c.y.	90,000
Finishes	7,000 s.f.	.30/s.f.	2,100
Railings	270 l.f.	15.00/l.f.	4,050
Sidewalk	400 s.f.	1.20/s.f.	480
Landscape/drainage	2,000 s.f.	.50/s.f.	1,000
			\$155,120
	Contingencies		38,880
	<b>Total 1979 cost</b>		<b>\$194,000</b>
l.f. = lineal feet    s.f. = square feet    c.y. = cubic yards			

Alternative 2 - Install an elevator

**COST ESTIMATE**

<u>Item</u>	<u>Quantity</u>	<u>Unit Price</u>	<u>Total</u>
Mobilization	Lump sum		\$ 2,500
Drilling	20 l.f.	\$ 15.00/l.f.	300
Excavation	27 c.y.	8.00/c.y.	216
Backfill	16 c.y.	12.00/c.y.	192
Concrete	3 c.y.	400.00/c.y.	1,200
Reinforcing	500 lbs.	.50/lb.	250
Structural steel	9,000 lbs.	1.50/lb.	13,500
Enclosure (wire)	1,000 s.f.	5.00/s.f.	5,000
Elevator (complete)	1 ea.	15,000.00/ea.	15,000
Equipment enclosure	Lump sum		2,000
Power hook-up	Lump sum		500
			\$40,658
	Contingencies		10,342
	Total 1979 cost		<u>\$51,000</u>
l.f. = lineal feet    s.f. = square feet    c.y. = cubic yards.			



**RAMPS ON APPROACH TOO LONG AND/OR TOO STEEP:  
RANDOM RAMP CONFIGURATION SOMETIMES FOLLOWS GROUND  
CONTOUR**

**14**

Alternative 1 - Overlay portion of existing ramp and construct new ramp extension

**COST ESTIMATE**

<u>Item</u>	<u>Quantity</u>	<u>Unit Price</u>	<u>Total</u>
Demolition	Lump sum		\$ 1,000
Grading allowance	Lump sum		1,000
Concrete overlay	11 c.y.	\$300.00/c.y.	3,300
Ramp extension	19 c.y.	200.00/c.y.	3,800
Railing	360 l.f.	15.50/l.f.	5,600
			\$14,700
	Contingencies		3,700
	Total 1979 cost		<u>\$18,400</u>
l.f. = linear feet    c.y. = cubic yards.			

Alternative 2 - Install an elevator

**COST ESTIMATE**

Basic equipment costs remain the same as those developed from Problem 5 - Alternative 2 which equals \$51,000

HELICAL APPROACH RAMPS TOO LONG AND/OR TOO STEEP

15

Alternative 1 - Demolish and rebuild helical ramp

**COST ESTIMATE**

<u>Item</u>	<u>Quantity</u>	<u>Unit Price</u>	<u>Total</u>
Mobilization	Lump sum		\$ 10,000
Demolition	200 c.y.	\$ 60.00/c.y.	12,000
Site preparation	2,500 s.f.	1.00/s.f.	2,500
Excavation	150 c.y.	10.00/c.y.	1,500
Backfill	100 c.y.	15.00/c.y.	1,500
Concrete	300 c.y.	300.00/c.y.	96,000
Reinforcing	94,000 lbs.	.40/lb.	37,600
Finishes	4,800 s.f.	.30/s.f.	1,440
Railing	800 l.f.	15.00/l.f.	12,000
Sidewalk	800 s.f.	1.20/s.f.	960
Landscaping/drainage	2,500 s.f.	.50/s.f.	1,250
			\$176,750
	Contingencies		44,250
	<b>TOTAL 1979 Cost</b>		<b>\$221,000</b>
s.f. = square feet    l.f. = lineal feet    c.y. = cubic yards			

Alternative 2 - Install elevator

**COST ESTIMATE**

Basic equipment costs remain the same as those developed from Problem 5 - Alternative 2; however, the structure portrayed in Problem 15 is higher. Estimated increase in cost can be found by multiplying elevator cost detailed in Problem 5 by a factor of 1.15 ( $1.15 \times \$51,000 = \$59,000$ ).

Alternative 3 - Construct new ramp to supplement existing helical ramp

**COST ESTIMATE**

Quantities and costs are similar though slightly less than those listed for Alternative 1. The major portion of the cost savings accrue by not demolishing the existing helical ramp. The cost estimate for a new box ramp structure amounts to \$200,000 as compared to \$220,000 required to demolish and rebuild the helical ramp.

**STEEP CROSS SLOPE ON RAMP**

**16**

Alternative 1 - Overlay existing ramp

**COST ESTIMATE**

Material cost to construct an overlay of the type shown in the sketch amounts to approximately \$300.00 per 100 lineal feet of an eight-foot wide ramp. Cost of installation could vary widely depending upon whether the overlay is built by local forces or a contractor and whether the project is only for the individual site or is an element of a larger or on-going contract where the contractor is already working in the area and therefore would not need to charge a relatively high price for mobilization.

STAIRS ON APPROACH TO UNDERCROSSING (ROOM FOR RAMP)

17

Alternative 1 - Construct new ramp to supplement stairs

**COST ESTIMATE**

<u>Item</u>	<u>Quantity</u>	<u>Unit Price</u>	<u>Total</u>
Grading allowance	Lump sum		\$ 200
Demolition	Lump sum		500
Concrete (side ramp)	4.5 c.y.	\$200.00/c.y.	900
Concrete (overlay)	5.5 c.y.	200.00/c.y.	1,100
Railing	50.0 l.f.	15.50/l.f.	775
			\$3,475
	Contingencies		825
	Total 1979 cost		\$4,300
l.f. = lineal feet    c.y. = cubic yards			

STAIRS ONLY ON APPROACH TO UNDERCROSSING (RESTRICTED SPACE)

18

Alternative 1 Install elevator to supplement stairs

COST ESTIMATE

<u>Item</u>	<u>Quantity</u>	<u>Unit Price</u>	<u>Total</u>
Mobilization	Lump sum		\$ 3,000
Demolition	6 c.y.	\$100.00/c.y.	600
Drilling	20 l.f.	30.00/l.f.	600
Shoring	900 8.00/s.f.		7,200
Excavation	215 c.y.	12.00/c.y.	2,580
Backfill	140c.y.	20.00/c.y.	2,800
Concrete	65 c.y.	250.00/c.y.	16,250
Reinforcing	12,400 lbs.	.40/lb	4,960
Finishes	2,000 s.f.	.50/s.f.	1,000
Elevator (1) complete	Lump sum		15,000
Equipment enclosure	Lump sum		3,000
Power hook-up	Lump sum		1,000
			\$57,990
	Contingencies		15,010
	TOTAL 1979 cost		\$73,000
c.y. = cubic yards      l.f. = lineal feet      s.f. = square feet			

Alternative 2 - Replace stairs with new ramp

**COST ESTIMATE**

<u>Item</u>	<u>Quantity</u>	<u>Unit Price</u>	<u>Total</u>
Mobilization	Lump sum		\$ 7,000
Demolition	6 c.y.	\$100.00/c.y.	600
Excavation	1,900 c.y.	8.00/c.y.	15,200
Backfill	715 c.y.	10.00/c.y.	7,150
Concrete	210 c.y.	250.00/c.y.	52,500
Reinforcing	52,000 lbs	.40/lb	20,800
Shoring	3,200 s.f.	8.00/s.f.	25,600
Finishes	4,800 s.f.	.30/s.f.	1,440
Railing	410 l.f.	15.00/l.f.	6,150
Lighting/electrical	5 fixtures	500.00 ea.	2,500
			\$138,940
		Contingencies	35,060
		<b>TOTAL 1979 Cost</b>	<b>\$174,000</b>
c.y. = cubic yards      s.f. = square feet      l.f. = lineal feet			

Alternative 3- Install pedestrian actuated traffic signal

**COST ESTIMATE**

Installation of a new pedestrian-actuated signal at a typical four-legged intersection, including all striping, signing and curb cuts for wheelchair access, will cost approximately \$64,000 including design.

Alternative 1 - Construct stairs to supplement ramp

## COST ESTIMATE

<u>Item</u>	<u>Quantity</u>	<u>Unit Price</u>	<u>Total</u>
Mobilization	Lump sum		\$ 2,000
Excavation	50 c.y.	\$ 10.00/c.y.	500
Backfill	16 c.y.	12.00/c.y.	192
Concrete	60 c.y.	350.00/c.y.	21,000
Reinforcing	17,000 lb	.45/s.f.	7,650
Finishes	2,100 s.f.	.40/s.f.	840
Railings	160 l.f.	15.00/l.f.	2,400
			\$34,582
	Contingencies		9,418
	TOTAL 1979 Cost		<u>\$44,000</u>
c.y. = cubic yards      s.f. = square feet      l.f. = lineal feet			

**SIDEWALK TOO NARROW ACROSS OVERCROSSING**

**20**

Alternative 1 - Widen sidewalk within original structure

**COST ESTIMATE**

Alternative 1(a)-Assuming 100 foot length of structure

<u>Item</u>	<u>Quantity</u>	<u>Unit Price</u>	<u>Total</u>
Mobilization	Lump sum		\$ 500
Prepare concrete surface	500 s.f.	\$ 1.00/s.f.	500
Bonding agent	500 s.f.	.70/s.f.	350
Concrete/finish	20 c.y.	75.00/c.y.	1,500
New barrier rail	100 l.f.	25.00/l.f.	2,500
Restripe	200 l.f.	2.00/l.f.	400
			\$5,750
	Contingencies		1,550
	Total 1979 cost		\$7,300
	Equivalent to \$73.00/lineal foot of structure		
l.f. = lineal feet    s.f. = square feet    c.y. = cubic yards.			



**COST ESTIMATE**

Alternative 1(b)-Assuming 100 foot length of structure

<u>Item</u>	<u>Quantity</u>	<u>Unit Price</u>	<u>Total</u>
Mobilization	Lump sum		\$ 500
Remove existing railing	100 l.f.	\$ 5.00/l.f.	500
Prepare concrete	100 s.f.	1.00/s.f.	100
New railing base	200 s.f.	20.00/s.f.	4,000
New railing	100 l.f.	25.00/l.f.	2,500
			\$7,600
	Contingencies		1,900
	<b>TOTAL 1979 cost</b>		<b>\$9,500</b>
	Equivalent to \$95.00/lineal foot of structure		
l.f. = lineal feet    s.f. = square feet    c.y. = cubic yards.			

Alternative 2 - Widen original structure to accommodate sidewalk

**COST ESTIMATE**

Alternative 2 Assuming 100 foot length of structure

<u>Item</u>	<u>Quantity</u>	<u>Unit Price</u>	<u>Total</u>
Mobilization	Lump sum		\$ 1,300
Remove existing railing	100 l.f.	\$ 10.00/l.f.	1,000
Temporary railing	100 l.f.	10.00/l.f.	1,000
Structural steel brackets	10 ea.	750.00/ea.	7,500
Deck (grating)	800 s.f.	15.00/s.f.	12,000
Railing	100 l.f.	25.00/l.f.	2,500
Finishes	800 s.f.	2.00/s.f.	1,600
			\$ 26,900
	Contingencies		3,700
	Total 1979 Cost		\$ 30,600
	Equivalent to \$306/lineal foot of structure or \$38/square foot of structure		
l.f. = lineal feet      s.f. = square feet			

Alternative 1 - Construct off ramp rest areas

COST ESTIMATE

Cost of implementing the alcove seats is \$2,100 to \$2,400 each (see Appendix I). A cantilevered landing four feet wide and six feet long would be in the same cost range. However, this may vary depending upon the type of structure being appended.

Alternative 2 - Overlay existing ramp to create rest areas

COST ESTIMATE

The cost of an individual rest area of this type is approximately \$200.

Alternative 3 - Construct on-ramp rest areas (partial width)

COST ESTIMATE

The cost of an individual rest area of this type is approximately \$400.

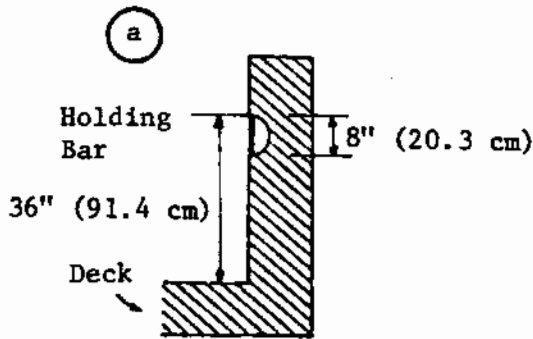
Alternative 4 - Demolish and rebuild

COST ESTIMATES

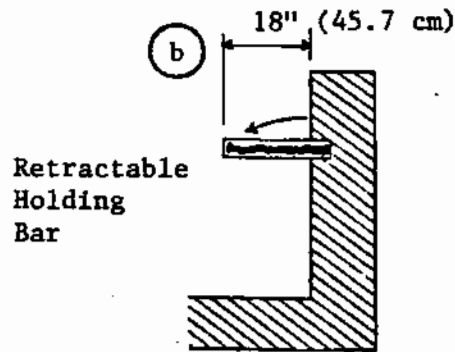
Cost of building a new structure varies depending upon site conditions, therefore no cost breakdown was made.

# REST AREA ALTERNATIVES

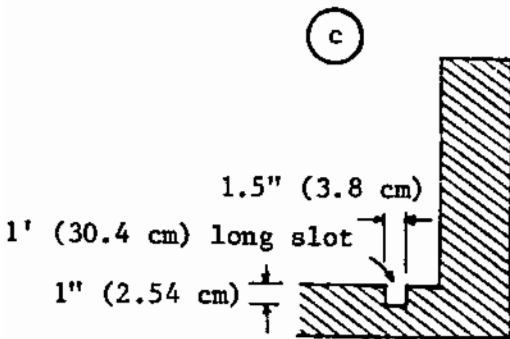
appendix



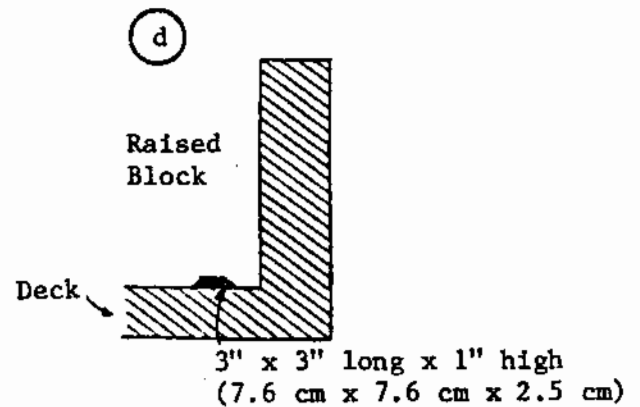
Cost Estimate \$50



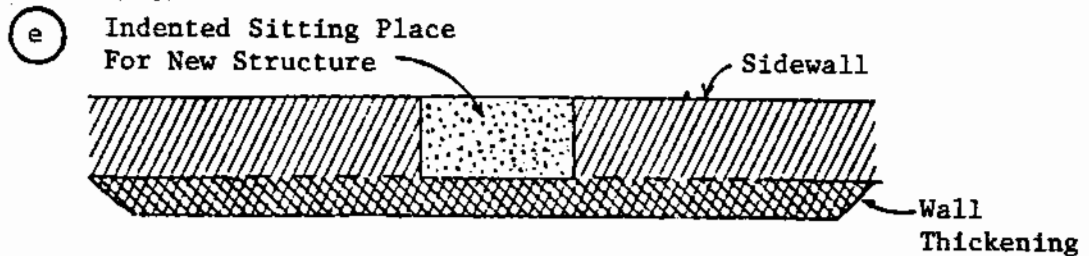
Cost Estimate \$70



Cost Estimate \$30

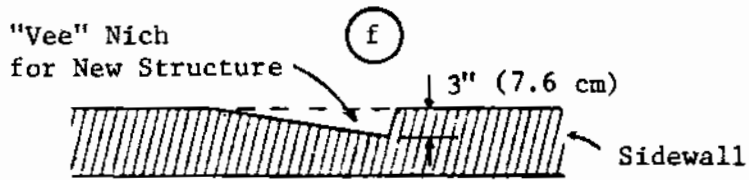


Cost Estimate \$15



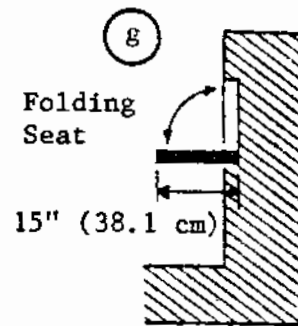
Plan View

No Estimate

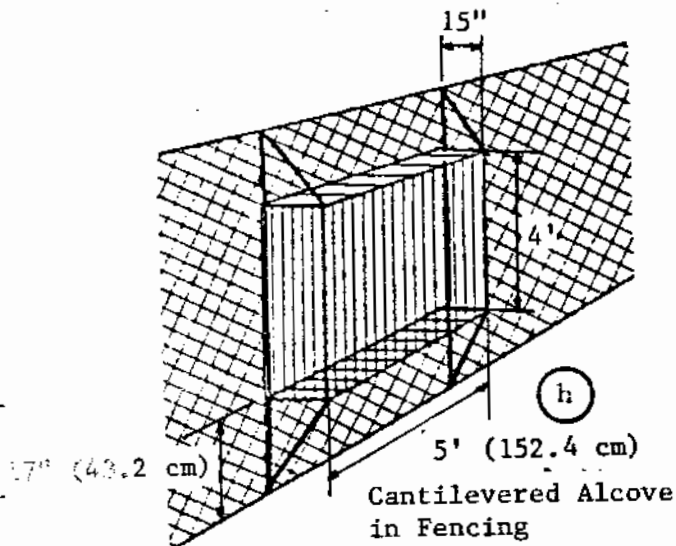


Plan View

Cost Estimate \$30

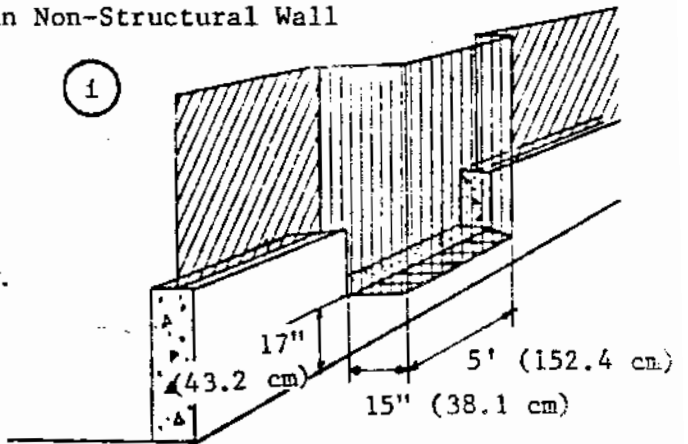


Cost Estimate \$65



Cost Estimate \$2100

Cantilevered Alcove  
in Non-Structural Wall



Cost Estimate \$2400



## FEDERALLY COORDINATED PROGRAM (FCP) OF HIGHWAY RESEARCH AND DEVELOPMENT

The Offices of Research and Development (R&D) of the Federal Highway Administration (FHWA) are responsible for a broad program of staff and contract research and development and a Federal-aid program, conducted by or through the State highway transportation agencies, that includes the Highway Planning and Research (HP&R) program and the National Cooperative Highway Research Program (NCHRP) managed by the Transportation Research Board. The FCP is a carefully selected group of projects that uses research and development resources to obtain timely solutions to urgent national highway engineering problems.\*

The diagonal double stripe on the cover of this report represents a highway and is color-coded to identify the FCP category that the report falls under. A red stripe is used for category 1, dark blue for category 2, light blue for category 3, brown for category 4, gray for category 5, green for categories 6 and 7, and an orange stripe identifies category 0.

### *FCP Category Descriptions*

#### **1. Improved Highway Design and Operation for Safety**

Safety R&D addresses problems associated with the responsibilities of the FHWA under the Highway Safety Act and includes investigation of appropriate design standards, roadside hardware, signing, and physical and scientific data for the formulation of improved safety regulations.

#### **2. Reduction of Traffic Congestion, and Improved Operational Efficiency**

Traffic R&D is concerned with increasing the operational efficiency of existing highways by advancing technology, by improving designs for existing as well as new facilities, and by balancing the demand-capacity relationship through traffic management techniques such as bus and carpool preferential treatment, motorist information, and rerouting of traffic.

#### **3. Environmental Considerations in Highway Design, Location, Construction, and Operation**

Environmental R&D is directed toward identifying and evaluating highway elements that affect

the quality of the human environment. The goals are reduction of adverse highway and traffic impacts, and protection and enhancement of the environment.

#### **4. Improved Materials Utilization and Durability**

Materials R&D is concerned with expanding the knowledge and technology of materials properties, using available natural materials, improving structural foundation materials, recycling highway materials, converting industrial wastes into useful highway products, developing extender or substitute materials for those in short supply, and developing more rapid and reliable testing procedures. The goals are lower highway construction costs and extended maintenance-free operation.

#### **5. Improved Design to Reduce Costs, Extend Life Expectancy, and Insure Structural Safety**

Structural R&D is concerned with furthering the latest technological advances in structural and hydraulic designs, fabrication processes, and construction techniques to provide safe, efficient highways at reasonable costs.

#### **6. Improved Technology for Highway Construction**

This category is concerned with the research, development, and implementation of highway construction technology to increase productivity, reduce energy consumption, conserve dwindling resources, and reduce costs while improving the quality and methods of construction.

#### **7. Improved Technology for Highway Maintenance**

This category addresses problems in preserving the Nation's highways and includes activities in physical maintenance, traffic services, management, and equipment. The goal is to maximize operational efficiency and safety to the traveling public while conserving resources.

#### **0. Other New Studies**

This category, not included in the seven-volume official statement of the FCP, is concerned with HP&R and NCHRP studies not specifically related to FCP projects. These studies involve R&D support of other FHWA program office research.

\* The complete seven-volume official statement of the FCP is available from the National Technical Information Service, Springfield, Va. 22161. Single copies of the introductory volume are available without charge from Program Analysis (HRD-3), Offices of Research and Development, Federal Highway Administration, Washington, D.C. 20590.

