

2012 ENTERPRISE GREEN COMMUNITIES SINGLE & MULTIFAMILY UNIVERSAL DESIGN SPECIFICATIONS

About Enterprise Green Communities

Enterprise Green Communities is the first national green building program focused entirely on affordable housing. Launched by Enterprise in fall 2004, Green Communities is designed to help developers, investors, builders and policymakers make the transition to a greener future for affordable housing. To date, Enterprise has invested \$1.8 billion in grants, loans and equity to support the development and preservation of over 27,000 green affordable homes. Visit *nnnv.EnterpriseCommunity.org/green*.

About Enterprise

Enterprise is a leading provider of the development capital and expertise it takes to create decent, affordable homes and rebuild communities. For 30 years, Enterprise has introduced solutions through public–private partnerships with financial institutions, governments, community organizations and other partners that share our vision that one day, every person will have an affordable home in a vibrant community, filled with promise and the opportunity for a good life. Since 1982, Enterprise has raised and invested more than \$11 billion in equity, grants and loans to help build or preserve nearly 300,000 affordable rental and for-sale homes to create vital communities and more than 410,000 jobs nationwide. Visit *www.EnterpriseCommunity.org.*

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Introduction

Thank you for your interest in creating a greener and socially sustainable future for affordable housing. Enterprise has developed this model specification to be used by affordable housing developers to integrate Universal Design (UD) principles into single and multifamily projects. This specification has been designed as a companion to the 2011 Enterprise Green Communities Criteria ¹, in order to provide project teams with a translation of the Universal Design criteria 1.2a and 1.2b:

1.2a Universal Design: New Construction

Design a minimum of 15% of the dwelling units (no fewer than one) in accordance with ICC/ANSI A117.1, Type A, Fully Accessible guidelines. The remainder of the ground-floor units and elevator-reachable units should be designed in accordance with ICC/ANSI A117.1, Type B.

1.2b Universal Design: Substantial and Moderate Rehab

Design a minimum of 10% of the dwelling units (no fewer than one) in accordance with ICC/ANSI A117.1, Type A, Fully Accessible guidelines. [2 points] AND, for 1 additional point, the remainder of the ground-floor units and elevator-reachable units should have accessible unit entrances.

The Enterprise Green Communities Criteria were developed collaboratively by a number of leading national organizations and experts for providing a clear, cost-effective framework for all affordable housing development types, including New Construction and Rehabilitation in both single and multifamily projects. Green building integrates materials and methods that promote environmental quality, economic vitality, and social benefit through design, construction, and operations of the built environment.

Enterprise sees the development of this model specification as a logical next step in this effort, and an important contribution to the ongoing national conversation regarding social sustainability and housing. Given the sweeping demographic and environmental changes that are so significantly impacting the design and construction industries throughout the United States, Enterprise also believes that the timing of the creation of this specification is particularly appropriate. Lastly, Enterprise appreciates the fact that professional expertise in the fields of accessibility and Universal Design is not easy to find in many parts of the country, and we are hopeful that this specification will be a great aid in addressing this problem.

Accessibility and Universal Design

Universal Design has been defined as "the design of products and environments to be usable by all people, to the greatest extent possible, without the need for adaptation or specialized design." ² As a framework for design, it is distinct from the goals of accessible or "barrier-free" design. More importantly, it is also distinct from legally-mandated accessibility requirements. These and other federal accessibility laws and regulations provide a base for Universal Design, but serve primarily to define only a minimum level of performance to serve persons with disabilities. Furthermore, these laws focus overwhelmingly on requirements for wheelchair users, largely overlooking the broader spectrum of physical, sensory, and cognitive disabilities that are far more representative of demographic realities in the United States today. As applied to residential projects, the principles of Universal Design acknowledge these realities by anticipating and planning for a greater diversity of residents' abilities and needs, both today and in the future, thereby supporting and facilitating both safety and independence for all residents.

¹ http://www.enterprisecommunity.com/solutions-and-innovation/enterprise-green-communities/criteria.

² The Center for Universal Design (1997). The Principles of Universal Design, Version 2.0. Raleigh, NC: North Carolina State University.

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Accessibility Laws and the Universal Design Criteria

During the initial drafting of the Enterprise Green Communities Criteria, "Universal Design" was defined simply as the design of a certain percentage of International Code Council / American National Standards Institute (ICC/ANSI) Type A and Type B accessible units, as described above. Now, with this Universal Design specification, Enterprise has developed a broader and richer articulation of UD principles as they apply to residential projects. Project teams that elect to use this specification will be able to easily and confidently design and construct the ICC/ANSI Type A and Type B units which meet the minimum requirements of the Enterprise UD criteria. Additionally, project teams will receive clear and tangible guidance on broader, best practice recommendations for the application of Universal Design principles which will greatly enhance the value of the project to both residents and owners. However, it is imperative for the project team to understand that **adherence to this UD Specification does** *not* guarantee a project's compliance with local, state, or federal accessibility laws and regulations.

The relationships between the Enterprise Green Communities Criteria requirements and the prevailing federal accessibility laws may be understood as follows:

1.2a Universal Design: New Construction

For new construction of four or more residential units in a single building, the Federal Fair Housing Act requires that all ground floor units and all units reachable by an elevator meet certain accessibility requirements. For this document, the requirements of the ICC/ANSI 2009 Type B unit are the basis for design. In addition, all common use areas of the project must meet the requirements of the ICC/ANSI standard. Public areas must meet the requirements of the 2010 ADA Standards. ³

The Enterprise UD Criterion for new construction states that the project must meet the above-mentioned requirements [which are required by federal law], and design 15% of the project units to meet the requirements of the ICC/ANSI Type A unit. Thus, the only recognizable difference between the UD Criteria requirements and the Fair Housing Act requirements are those Type A units. It should be noted that the International Building Code and most derivative codes require a number of Type A units in all residential (R-2) projects with 20 or more units. In residential projects classified as R-1, there are a minimum number of Accessible units required in all projects irrespective of size.

1.2b Universal Design: Substantial and Moderate Rehab

For substantial and moderate rehabilitation projects, the federal Fair Housing Act *does not apply*. Thus, the FHA requirements for compliance with the ICC/ANSI standards for dwelling units and public and common use areas do not exist. The ICC/ANSI standards and the 2010 ADA Standards *do* apply to these projects as incorporated by local code and the Americans with Disabilities Act.

The Enterprise UD Criterion for substantial and moderate rehabilitation states that 10% of the units must meet the requirements of the ICC/ANSI Type A unit. However, it is important to realize that the inclusion of Type A units will have a direct impact on public and common use areas, as every Type A unit is required to have an accessible primary entrance *on an accessible route* from public and common use areas. In addition, public and common use areas must be accessible. ⁴

For an additional, optional point under Criterion 1.2b, the remainder of the ground floor units and units reachable by an elevator would be required to have an accessible unit entrance.

³ Certain areas of any residential project will fall under the jurisdiction of other federal, state, or local accessibility laws, but this fact is not relevant to the comparison being made in this section of the Introduction. The UD Specification's primary role is to assist project teams in meeting the requirements of the ANSI Type A and Type B units, *not* to systematically address all applicable accessibility laws.

⁴ Again, certain areas will fall under the jurisdiction of other federal, state, or local accessibility laws.

Project Type	Legal Requirements	Enterprise Requirements
New Construction	 Public Spaces per ADA & ANSI Common Areas per ANSI Percentage of Type A Units as required by IBC or other derivative code All ground floor and elevator units Type B 	 Legal Requirements + 15% Units Type A
Substantial & Moderate Rehabilitation	 Public Spaces per ADA & ANSI Common Spaces per ICC/ANSI. Scoping may be increased if Type A or Accessible units are provided No requirements for units under Fair 	2 points: Legal Requirements + 10% Units Type A 1 additional point:
	Housing – see notes above	Other units with accessible entrance

These relationships are summarized in the following table:

In summary, it is important for the project team to realize that although the percentage of units required for the Enterprise UD criteria appear to be low, their inclusion in a project can have major design and construction implications from the point of arrival, throughout the site, and into the units. In many of these areas, the inclusion of Universal Design principles will provide the project team with significant opportunities to improve accessibility and the overall quality of the project.

Using this Specification

For project teams wishing to use this specification to help them meet the Enterprise Green Communities Criteria:

Because the Enterprise Green Communities Criteria make reference to ICC/ANSI guidelines for dwelling units, and because of the above-mentioned relationships between accessibility and Universal Design, this specification has been written to assist project teams with the design and construction of the Type A or Type B units required in the Criteria. It also will be useful to project teams in the satisfaction of the majority of federal accessibility laws that are most likely to apply to residential projects for which the specification is being used, specifically the Department of Justice's 2010 ADA Standards for Accessible Design, and the Federal Fair Housing Act. Again, it is important to remember that adherence to this UD Specification does *not* guarantee a project's full compliance with local, state, or federal accessibility laws and regulations.

The requirements and recommendations found in this specification were created for single and multifamily projects – both new construction and substantial or moderate rehabilitation – which are being designed under the Enterprise Green Communities Criteria, and they must be reviewed and adapted to your specific project requirements. The specification has been modeled after the Enterprise Green Communities Multifamily Rehabilitation Specifications, so that project teams already familiar with this document will find the UD Specification simple to use. It is important to understand that designations such as "required," "minimum," or "mandatory" relate only to the Enterprise Criteria, and *not* to applicable accessibility laws. Similarly, the specification format allows for additional strategies that are recommended but not required by the Enterprise Green Communities Criteria. These strategies are indicated in light green text within the body of each specification section, and at the end of each section under the heading "Best Practice Recommendations."

For project teams wishing to use this specification to incorporate Universal Design principles into a project:

The requirements and recommendations found in this specification were also created to be used in the planning, design, and construction of residential projects which are not seeking to meet the Enterprise Green Communities Criteria – but which simply wish to incorporate Universal Design principles into their project. In such an instance, Enterprise strongly recommends that the

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project team consider implementing the Best Practice Recommendations found in the specification, depending on the project's target population and specific Universal Design goals. These project teams should also bear in mind that the implementation of recommended measures from the specification in no way guarantees a project's compliance with local, state, or federal accessibility laws and regulations.

"Green Synergies"

In addition to required and recommended measures, the specification also features "Green Synergies" which highlight areas in which Universal Design recommendations will easily and inexpensively overlap with environmental considerations. The Green Synergies are tabulated at the end of this Introduction and called out within the individual specification sections.

Construction Costs and Pricing Information

Although construction cost data is certainly available for many accessibility- and Universal Design-related strategies, this specification does not provide construction cost or pricing information. In many cases, and particularly with new construction, the UD recommendations found herein are "cost-neutral," and would require only minor, incremental increases in square footage requirements for unit design. In other cases, and particularly in substantial & moderate rehab projects, the same UD recommendations may require a significant capital investment. Project teams may wish to consider hiring a Universal Design professional and/or use industry publications such as the 2004 RS Means ADA Compliance Pricing Guide or the 2010 RS Means Building Construction Cost Data to determine estimated increases in construction costs that may result from the implementation of particular UD strategies.

Integration of the UD Specification

Because accessibility and Universal Design considerations are equally critical to the planning, design, and construction phases of a residential project, the ideal integration of the UD Specifications should include:

- Involvement of a Universal Design consultant as a sub-consultant to the project architect
- Training regarding the use of this specification for all project team members including the owner, designer(s), and contractor at the beginning of the project, not just prior to the drafting of the overall project specification
- Customization of the specification and the design based on the project's target population and specific Universal Design goals
- Engagement of residents and/or user-experts in the project planning, design, and evaluation process

Figure 1. Legend for Specification Edits

		-
	09 60 00 / FLOORING / 09600	
	Integrative Design 1.2a Universal Design (New Construction Only) [Mandatory]	
	Integrative Design 1.2b Universal Design (Substantial and Moderate Rehab Only) [Mandatory]	Enterprise Green
	PART 1 - GENERAL	Communities Criteria
	1.1 Summary	
	A. Applicability:	
	 Public and common use areas: all tiled floor surfaces forming part of an accessible route. 	
	 Dwelling units: all tiled floor surfaces forming part of an accessible route inside Type A units. 	
	Dwelling units: all tiled floor surfaces forming part of an accessible route inside Type B units and ground floor units and elevator-reachable units.	
	B. Related sections:	
	1. 09 30 00 Tile	
	2. 09 68 00 Carpeting	
	PART 2 - PRODUCTS	
	2.1 Flooring	
	A. Thresholds: limit to ½ ² overall height. Changes in level of ½ ⁿ maximum may be vertical. Bevel thresholds creating a change in level between ½ ⁿ and ½ ⁿ with a slope not greater than 1:2.	
	B. Slip resistance: in wet and exterior areas, select products with coefficient of friction of 0.60 or greater (wet).	
	PART 3 - EXECUTION	[Tan]: not required by Enterprise Universal
	3.1 Installation	Design Criteria,
	A. Threshold conditions: set differing floor surfaces at identical elevations with flush threshold trim.	but recommended
	Recommendations:	
	Use maintenance products on tile and grout that do not reduce the slip resistance of the flooring,	
	Use matte finishes in product choice and polishing products to eliminate glare.	[Crovil: Post Practico
	Contrin hard surface flooring meets SCS PloorScore program requirements.	Recommendation
	Green Synergy:	
	Use of flooring that meets SCS FloorScore requirements (Criterion 7.2 Environmentally Preferable	
	Plooring).	[Grev] [.] Green
		Synergy
_		

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Figure 2. Green Synergies Matrix

Universal Design Green Synergies	4.1 Water-Conserving Fixtures	4.2 Advanced Water-Conserving Appliances and Fixtures	5 Energy Efficiency	5.1 Building Performance Standard	5.4 ENERGY STAR Appliances	5.5 Efficient Lighting	6.6 Recycled Content Material	6.9b Reducing Heat Island Effect: Paving	7.1 Composite Wood Products That Emit Low/No Formaldehyde	7.2 Environmentally Preferable Flooring	7.4 Exhaust Fans	7.6 Ventilation	8.1 Building Maintenance Manual	8.3 Resident and Property Manager Orientation
DIVISION 01: GENERAL REQUIREMENTS														
01 77 00 Closeout														
DIVISION 03: CONCRETE														
03 30 00 Cast-In-Place Concrete														
DIVISION 06: WOOD, PLASTICS AND COMPOSITES														
06 10 53 Misc. Rough Carpentry														
06 41 00 Architectural Wood Casework														
DIVISION 09: FINISHES														
09 60 00 Flooring														
09 68 00 Carpeting														
DIVISION 11: EQUIPMENT														
11 31 00 Residential Appliance														
11 31 23 Residential Laundry Appliances														
DIVISION 12: FURNISHINGS														
12 35 00 Residential Casework														
DIVISION 22: Plumbing														
22 40 00 Plumbing Fixtures	•													
DIVISION 23: HVAC														
23 34 00 Ventilation Fans														
DIVISION 26: ELECTRICAL														
26 51 00 Interior Lighting														

Division 1: General Requirements (Division 01: General Requirements)

01 41 00 / REGULATORY REQUIREMENTS / 01410

Integrative Design 1.2a Universal Design (New Construction Only) [Mandatory] Integrative Design 1.2b Universal Design (Substantial and Moderate Rehab Only) [Mandatory]

PART 1 – GENERAL

1.1 Summary

- A. The Fair Housing Act requires all "covered multifamily dwellings" designed and constructed for first occupancy after March 13, 1991 to be accessible to and usable by people with disabilities. Covered multifamily dwellings are all dwelling units in buildings containing four or more units with one or more elevators, and all ground floor units in buildings containing four or more units, without an elevator.
- B. The areas of a complex that are for public use at "covered multifamily dwellings" under the Fair Housing Act must meet the 2010 ADA Standards for Accessible Design (ADA Standards). For example, a rental office in a multifamily residential development or a convenience store located in that development would be covered under Title III of the ADA if they are constructed for first occupancy after January 26, 1993. Common use areas that are for use only by the residents and their guests are not covered by the ADA.
- **C.** A housing provider is covered by Section 504 of the 1973 Rehabilitation Act if the provider is a recipient of federal financial assistance. Section 504 requires that "programs and activities" such as a rental office be accessible.
- D. Most current building codes, including the International Building Code, require common use areas for use by residents of Accessible Units, Type A Units, and Type B Units to be accessible as described in the scoping provisions of the code (e.g. Chapter 11) and the technical provisions of the referenced edition of ANSI A117.1.
- E. Related sections:
 - 1. 01 42 00 References and Definitions
 - 2. 01 81 14 Accessible Design Requirements

1.2 Fair Housing Act

- **A.** Safe Harbors: confirm the safe harbor applicable to the project. As of February 2012, the following are recognized safe harbors for compliance with the accessibility provisions of the Fair Housing Act. Following, in full, the requirements of any one of the following will provide safe harbor for the purposes of compliance with Fair Housing Act design and construction.
 - HUD Fair Housing Accessibility Guidelines published on March 6, 1991 and the Supplemental Notice to Fair Housing Accessibility Guidelines: Questions and Answers about the Guidelines, published on June 28, 1994.
 - 2. HUD Fair Housing Act Design Manual
 - 3. ANSI A117.1 (1986), used with the Fair Housing Act, HUD's regulations, and the Guidelines.
 - 4. CABO/ANSI A117.1 (1992), used with the Fair Housing Act, HUD's regulations, and the Guidelines.
 - 5. ICC/ANSI A117.1 (1998), used with the Fair Housing Act, HUD's regulations, and the Guidelines.

- 6. Code Requirements for Housing Accessibility 2000 (CRHA).
- 7. International Building Code 2000 as amended by the 2001 Supplement to the International Codes.
- 8. International Building Code 2003, with one condition. Effective February 28, 2005 HUD determined that the IBC 2003 is a safe harbor, conditioned upon ICC publishing and distributing a statement to jurisdictions and past and future purchasers of the 2003 IBC stating, "ICC interprets Section 1104.1, and specifically, the exception to Section 1104.1, to be read together with Section 1107.4, and that the Code requires an accessible pedestrian route from site arrival points to accessible building entrances, unless site impracticality applies. Exception 1 to Section 1107.4 is not applicable to site arrival points for any Type B dwelling units because site impracticality is addressed under Section 1107.7.
- 9. ICC/ANSI A117.1 (2003) used with the Fair Housing Act, HUD's regulations, and the Guidelines
- 10. 2006 International Building Code ®, with the January 31, 2007 erratum available from www.iccsafe.org/codes/errata/2006IBC.html.

PART 2 – PRODUCTS (No Comments)

PART 3 - EXECUTION (No Comments)

Best Practice Recommendation:

• Consider working with a Universal Design consultant. An experienced consultant can assist with the programming and design process, cost effective incorporation of minimum required elements, and construction administration.

Regional Consideration:

 Current building and zoning codes vary widely from state to state and sometimes from one local jurisdiction to the next. Some states have buildings codes that have been adopted statewide, while zoning continues to be handled on a local level. In other states, both building codes and zoning are strictly local and may, in some cases, not exist. Wherever the project will be located, it is import to understand that the Federal requirements are consistent and must be incorporated into project design and construction. Where local requirements are more stringent than Federal, the local requirements must be incorporated as well.

Resources:

- http://www.access-board.gov/ada/ ADA STANDARDS: on this webpage are hyperlinks to the following:
 - DOJ's 2010 ADA Standards (effective March 15, 2012)
 - Which Standard to Follow (a guide available from the Access Board)
 - Guide to the Standards
- http://www.access-board.gov/ufas/ufas-html/ufas.htm UFAS: hyperlink to searchable copy for residential facilities covered by HUD's standards.

3. http://www.fairhousingfirst.org/

Fair Housing technical assistance: the site provides links to resources, FAQs, training information, telephone hotline and assistance concerning the accessibility design and construction requirements of the Fair Housing Act as amended in 1988.

4. http://www.iccsafe.org

International Code Council home page provides links to publications, information about the ANSI Standards Development Committee and current proposals under consideration.

01 42 00 / REFERENCES AND DEFINITIONS / 01420

Integrative Design 1.2a Universal Design (New Construction Only) [Mandatory] Integrative Design 1.2b Universal Design (Substantial and Moderate Rehab Only) [Mandatory]

PART 1 – GENERAL

1.1 References & Resources

- A. ICC/ANSI A117.1-2003 and 2009: American National Standards, Accessible and Usable Buildings and Facilities, available from the International Code Council. Copies of the referenced standard may be obtained from the International Code Council, 5203 Leesburg Pike, Suite 600, Falls Church, Virginia 22041.
- B. ICC/IBC 2009: International Building Code together with additional related volumes. Copies of the referenced standard may be obtained from the International Code Council, 5203 Leesburg Pike, Suite 600, Falls Church, Virginia 22041. Previous editions of IBC are also available from the ICC.
- **c**. 2010 ADA Standards for Accessible Design, Title II (28 CFR part 35) and Title III (28 CFR part 36), available from the Department of Justice and from the Access Board.
- **D**. ABA: Architectural Barriers Act, available from the Access Board.
- E. UFAS: Uniform Federal Accessibility Standards, available from the Access Board.
- F. State and Local Codes and Standards (partial listing):
 - Massachusetts State Building Code: available from the Massachusetts Executive Office of Public Safety and Security, based on the IBC (available from ICC).
 - 2. New York, Building Code of New York State: available from ICC.
 - 3. New York City Building Code: available from ICC. New York City also has "Inclusive Design Guidelines" which are voluntary, prescriptive technical guidance, also available from ICC.
 - 4. California Building Code: available from the California Building Standards Commission.
 - 5. Florida Building Code: available through the Florida Department of Business & Professional Regulation.
 - 6. Texas Building Code: based on IBC. Accessibility standards are the Texas Accessibility Standards (TAS), available from the Texas Department of Licensing and Regulation.
- G. Fair Housing Accessibility Guidelines, available from Housing and Urban Development (HUD).
- H. Supplement to Notice of Fair Housing Accessibility Guidelines, available from HUD.

1.1 Abbreviations

- A. ADA: Americans with Disabilities Act
- B. AFF: above finished floor
- C. ANSI: American National Standards Institute
- D. CFR: Code of Federal Regulations
- E. HUD: Housing and Urban Development
- F. IBC: International Building Code
- G. ICC: International Code Council

1.3 Definitions

- A. "Accessible route": a continuous unobstructed path connecting accessible elements and spaces in a building or within a site that complies with the appropriate requirements of ICC/ANSI A117.1–2003 or a comparable standard. Accessible routes consist of one or more of the following components: walking surfaces with a running slope not steeper than 1:20 (including sidewalks and crosswalks), doorways, ramps, curb ramps excluding the flared sides, elevators, and platform lifts.
- **B.** "Building entrance on an accessible route": an accessible entrance to a building that is connected by an accessible route to public transportation stops, to accessible parking and passenger loading zones, or to public streets or sidewalks, if available.
- C. "Circulation path": an exterior or interior way of passage provided for pedestrian travel, including but not limited to, walks (including sidewalks and crosswalks), hallways, courtyards, elevators, platform lifts, ramps, stairways, and landings.
- D. "Common use area": rooms, spaces or elements inside or outside of a residential building that are made available for the use of residents of a building or the guests thereof, but not to the general public. These areas include elements such as hallways, lounges, lobbies, laundry rooms, refuse rooms, roof decks, pools, playgrounds, mail rooms, recreational areas, and passageways among and between buildings.
- **E.** "Cross slope": the slope that is perpendicular to the direction of travel (see running slope).
- F. "Entrance": any access point to a building or portion of a building or facility used for the purpose of entering. An entrance includes the approach walk, the vertical access leading to the entrance platform, the entrance platform itself, vestibule if provided, the entry door or gate, and the hardware of the entry door or gate.
- **G.** "Ground floor": a floor of a building with a building entrance on an accessible route. A building may have more than one ground floor.
- **H.** "Protruding object": an object with a leading edge more than 27 inches and equal to or less than 80 inches above the finished floor or ground that protrudes more than 4 inches horizontally into the circulation path.
- I. "Public use area": an interior or exterior room or space of a building that is made available to the general public. These areas include elements such as rental offices or community centers and dining areas that are open to area-wide residents. Public use may be provided at a building that is privately or publicly owned.
- J. "Ramp": a walking surface that has a running slope steeper than 1:20 (5%).
- K. "Running slope": the slope that is parallel to the direction of travel (see "Cross slope").
- PART 2 PRODUCTS (No Comments)
- PART 3 EXECUTION (No Comments)

01 77 00 / CLOSEOUT PROCEDURES / 01770

Integrative Design 1.2a Universal Design (New Construction Only) [Recommended] Integrative Design 1.2b Universal Design (Substantial and Moderate Rehab Only) [Recommended]

PART 1 – GENERAL

1.1 Summary

- A. Applicability: all areas affected by accessibility or Universal Design requirements.
- B. Related sections:
 - 1. 01 42 00 Definitions and References
 - 2. 01 81 14 Accessible Design Requirements
 - 3. 06 10 53 Rough Carpentry (blocking)
 - 4. 22 10 00 Plumbing/Piping
 - 5. 26 05 00 Basic Electrical Materials and Methods

1.2 Pre-drywall Inspections

- **A.** During rough inspections, inspect framing and rough-ins for the following components related to accessibility and Universal Design:
 - 1. Blocking for items such as grab bars, closet fittings, counter tops, fixtures and accessories, wall-mounted shower seats, shelving either required or future.
 - 2. Heights of rough-ins for all devices and controls. Verify compliance with required reach ranges and lateral dimensions for electrical outlets and switches, doorbells, intercoms, security panels, thermostats, entertainment controls, window hardware, tub and shower controls, and similar items.
 - 3. Widths of corridors and doorways, ensuring that dimensions will meet minimum requirements even after finishes are installed.
 - 4. Clearances for approach to doors, fixtures, appliances, equipment and other elements. Clearances include provisions for maneuvering into the area and clear floor space (30 inches by 48 inches minimum in most cases) positioned at the center of the element.
 - 5. Continuity of accessible routes.
 - Slopes of surfaces such as roll-in showers, saunas, and similar flooring substrates. Verify compliance with 1:50 (2%) maximum cross slopes at all substrates and finished floor and ground surfaces that exist at the time of the inspection.
 - 7. Cross slopes (max. slope 1:50) and running slopes of surfaces at walkways (max. slope 1:20) and ramps (max. slope 1:12).
 - 8. Rise, run, nosings, and clear widths of stairs, ensuring that dimensions will meet minimum requirements even after handrails and other items are installed.

1.3 Final Inspections

- A. Inspect completed project for the following components related to accessibility and Universal Design:
 - 1. All items in Section 1.2, above (re-confirm).

- 2. Running and cross slopes, changes in level, and other barriers at all parking areas, access aisles, ramps, curb ramps, sidewalks, and other walking surfaces that are part of an accessible route.
- 3. Door thresholds, hardware, closer settings, and locks.
- 4. Sconces and pendant lights, wall hung fixtures, fire extinguishers, hand dryers, shelving, coat hooks, signs, drinking fountains, standpipes, sprinkler valves and siamese connections, overhead piping, and similar items for protrusions into circulation spaces.
- 5. Required signage.
- 6. Appliance and furnishing selections and locations.
- 7. Installation of all required elements such as closet shelving, toilet accessories, and similar items.

1.4 Management Requirements

- A. Operating/management manual: incorporate policies related to facility management which address:
 - 1. Maintenance of accessible features including but not limited to items such as automatic door openers, door operating forces and closing speeds, and toilet stall hardware.
 - 2. Maintenance of accessible furnishings such as desks, rent drop boxes, and entertainment equipment.
 - 3. Maintenance of required maneuvering clearances at doors, lavatories, and other accessible items through proper location of movable trash cans, storage of supplies, etc.
 - 4. Maintenance of walking surfaces, parking areas, paths to trash receptacles, pet waste posts, and similar outdoor exterior amenities and accessible routes including snow and ice removal policies.

PART 2 – PRODUCTS

- A. "Smart level" or digital level: an electronic level that reads in degrees, percent slope, and pitch is useful for confirming running and cross slopes. A 24-inch long level will suffice for most locations and elements, although levels are available in 48-inch lengths as well.
- **B**. Door pressure gauge: an instrument specifically designed to measure the forces typically encountered with doors, locks, flush valves, control buttons, and other operable components.

PART 3 - EXECUTION (No Comments)

Best Practice Recommendations:

- Coordinate a pre-drywall accessibility inspection with pre-drywall insulation inspection and preliminary blower door testing of building envelope for air infiltration.
- Coordinate final inspections with final blower door testing and site inspection for compliance with Green Communities requirements. Projects should develop a checklist that includes both accessibility/Universal Design and Green features to be verified during final inspection.
- Operations and Maintenance Manual should be developed to include relevant policies and protocols related to maintaining accessibility as well as maintaining energy and water use performance and Green features and finishes. Building management training should focus on both of these issues as well.

Green Synergies:

- Criterion 5.1 Building Performance Standard.
- Criterion 8.1 Building Maintenance Manual.
- Criterion 8.3 Resident and Property Manager Orientation.

01 81 14 / ACCESSIBLE DESIGN REQUIREMENTS / 01814

Integrative Design 1.2a Universal Design (New Construction Only) [Mandatory] Integrative Design 1.2b Universal Design (Substantial and Moderate Rehab Only) [Mandatory]

PART 1 – GENERAL

1.1 General Requirements & Policies

- **A.** Final inspections must be performed in order to ensure compliance with accessibility and Universal Design requirements.
- **B.** Calculation of percentages: where the required number of elements or facilities to be provided is determined by calculations of ratios or percentages and remainders or fractions result, the next greater whole number shall be provided. Where the determination of the required size or dimension of an element or facility involves ratios or percentages, rounding down for values less than one half shall be permitted.
- **c.** Accessible routes: a continuous accessible route must be provided from site arrival points to all public areas and to covered dwelling units. The continuous accessible route must connect to all accessible site amenities.
- **D.** Training and certification for in-house maintenance staff and construction team: comply with EPA RRP requirements.

1.2 Accessible Routes

- A. Accessible routes consist of one or more of the following components: level and sloped walking surfaces, doorways, ramps, curb ramps excluding the flared sides, elevators, and platform lifts. Level walking surfaces must have running slopes not steeper than 1:50 (2%). Sloped walking surfaces must have running slopes not steeper than 1:20 (5%). Other components of accessible routes, such as ramps and curb ramps, are permitted to be more steeply sloped.
- B. Passing spaces: an accessible route with a clear width less than 60 inches shall provide passing spaces at intervals of 200 feet maximum. Passing spaces shall be either: a space 60 inches minimum by 60 inches minimum; or, an intersection of two walking surfaces providing a T-shaped space where the base and arms of the T-shaped space extend 48 inches minimum beyond the intersection
- c. Revolving doors, gates, and turnstiles cannot be part of an accessible route.
- D. Clear width: provide a 36 inch minimum the clear width at all walking surfaces. The clear width may be reduced to 32 inches minimum for a length of 24 inches maximum provided that reduced width segments are separated by segments that are 48 inches long minimum and 36 inches wide minimum.
- E. Clear width at turn: where the accessible route makes a 180 degree turn around an element which is less than 48 inches wide, the minimum required clear width approaching the turn is 48 inches minimum at the turn and 42 inches minimum leaving the turn.
- F. Location of accessible routes: wherever possible, and particularly in facilities where a large percentage of users will benefit from them, design all pedestrian circulation to meet requirements for accessible routes.

1.3 Clear Floor or Ground Space

- A. Floor or ground surfaces:
 - 1. Changes in level are not permitted.
 - 2. Slopes not steeper than 1:50 (2%) are permitted.
- **B.** Size: clear floor or ground space must be 30 inches minimum by 48 inches minimum. Unless otherwise specified, clear floor or ground space may include knee and toe clearance positioned for either forward or parallel approach to an element.
- **c.** Approach: provide one full unobstructed side of the clear floor or ground space adjoining an accessible route or adjoining another clear floor or ground space.
- **D**. Maneuvering clearance: where a clear floor or ground space is located in an alcove or otherwise confined on all or part of three sides, provide additional maneuvering clearance as follows:
 - 1. Forward approach: make alcove(s) 36 inches wide minimum where the depth exceeds 24 inches.
 - 2. Parallel approach: make alcove(s) 60 inches wide minimum where the depth exceeds 15 inches.

1.4 Knee and Toe Clearance

A. Where space beneath an element is included as part of clear floor or ground space or turning space, the space shall comply with the following section. Additional space is not prohibited beneath an element, but it cannot be considered as part of the clear floor or ground space or turning space.

Note: Clearances are measured in relation to the usable clear floor space, not necessarily to the vertical support for an element. When determining clearance under an object for required turning or maneuvering space, care should be taken to ensure the space is clear of any obstructions.

- **B.** Toe clearance:
 - 1. Space under an element between the finished floor or ground and 9 inches above the finished floor or ground is considered toe clearance.
 - 2. Maximum depth: toe clearance can extend 25 inches maximum under an element.
 - 3. Minimum required depth: provide a minimum 17 inches of clear depth under the fixture or surface where toe clearance is required at an element as part of a clear floor space.
 - 4. Space extending greater than 6 inches beyond the available knee clearance at 9 inches above the finished floor or ground is not considered toe clearance.

5. Toe clearance width: 30 inches wide minimum.



NOTE: All dimensions in inches (above) and millimeters (below).

- **C.** Knee clearance:
 - 1. Space under an element between 9 inches and 27 inches above the finished floor or ground is considered knee clearance.
 - 2. Maximum depth: knee clearance can extend 25 inches maximum under an element at 9 inches above the finished floor or ground.
 - 3. Minimum required depth: where knee clearance is required under an element as part of a clear floor space, provide knee clearance 11 inches deep minimum at 9 inches above the finished floor or ground, and 8 inches deep minimum at 27 inches above the finished floor or ground.
 - 4. Clearance reduction: between 9 inches and 27 inches above the finished floor or ground, the knee clearance may reduce at a rate of 1 inch in depth for each 6 inches in height.
 - 5. Width: 30 inches wide minimum.



NOTE: All dimensions in inches (above) and millimeters (below).

1.5 Doors and Doorways

A. Design requirements (public and common use areas, and Type A units): primary entries and all other doors intended for user passage must comply with the maneuvering requirements below. In Type A units, toilet and bathing rooms that are not required to be accessible are not required to have maneuvering clearances. Primary entries at ground floor units required for the third point on Integrative Design 1.2b are required to comply with the maneuvering requirements below. For Type B units, refer to the safe haven documentation selected for the project.

- B. Automatic and power-assisted doors and gates: automatic doors and automatic gates are not required in any locations, however, installation of power assisted doors and gates can improve accessibility for many people with disabilities. These units are particularly important at exterior doors subject to wind or mechanical pressure loads that will prohibit setting closers at 5 pounds or less. If installed, full-powered automatic doors must comply with ANSI/BHMA A156.10. Low-energy and power-assisted doors must comply with ANSI/BHMA A156.19 (1997 or 2002 edition).
- **c.** Door opening widths: provide a clear width of 32 inches minimum except as noted below. To verify the clear width, measure the clear opening between the face of the door and the frame with the door open 90 degrees.
- D. Openings more than 24 inches deep: provide a clear width of 36 inches minimum.
- **E.** Double-leaf doors and gates: provide the required clear width at least one of the active leaves. The clear width may not be determined by measuring the width provided when both leaves are opened simultaneously.
- F. Projections into the required clear widths:
 - Projections into the clear width are prohibited at lower than 34 inches above the finished floor or ground.
 - 2. Projections into the clear width between 34 inches and 80 inches above the finished floor or ground: 4 inches maximum.
- **G.** Extend maneuvering clearances the full width of the doorway and the required latch, hinge, or pocket side clearance. See Section 01 81 14 for complete discussion of maneuvering clearance requirements.
- H. Maneuvering clearances at manual swinging doors and gates:
 - Approach direction: From front Door or gate side: Pull Perpendicular to doorway: 60 inches Parallel to doorway: 18 inches
 - Approach direction: From front Door or gate side: Push Perpendicular to doorway: 48 inches Parallel to doorway: 0 inches. Add 12 inches if closer and latch are provided.
 - Approach direction: From hinge side Door or gate side: Pull Perpendicular to doorway: 60 inches Parallel to doorway: 36 inches
 - Approach direction: From hinge side Door or gate side: Pull Perpendicular to doorway: 54 inches Parallel to doorway: 42 inches
 - Approach direction: From hinge side Door or gate side: Push Perpendicular to doorway: 42 inches. Add 6 inches if closer and latch are provided. Parallel to doorway: 22 inches beyond hinge side.
 - Approach direction: From latch side Door or gate side: Pull Perpendicular to doorway: 48 inches. Add 6 inches if closer is provided. Parallel to doorway: 24 inches

- Approach direction: From latch side Door or gate side: Push Perpendicular to doorway: 42 inches. Add 6 inches if closer is provided. Parallel to doorway: 24 inches
- I. Doorways without doors or gates, sliding doors, and folding doors: doorways less than 36 inches wide without doors or gates, sliding doors, or folding doors are to have maneuvering clearances as follows:
 - From front: Perpendicular to doorway: 48 inches Parallel to doorway: 0 inches
 - 2. From side (openings with no door only): Perpendicular to doorway: 42 inches Parallel to doorway: 22 inches
 - From pocket/hinge side: Perpendicular to doorway: 42 inches Parallel to doorway: 22 inches beyond pocket/hinge side.
 - From stop/latch side: Perpendicular to doorway: 42 inches Parallel to doorway: 24 inches
- J. Provide maneuvering clearances for forward approach when any obstruction within 18 inches of the latch side of a doorway projects more than 8 inches beyond the face of the door.
- **K.** The minimum distance between two hinged or pivoted doors or gates in series is 48 inches minimum plus the width of doors or gates swinging into the space.
- PART 2 PRODUCTS (No Comments)

PART 3 - EXECUTION (No Comments)

Best Practice Recommendation:

Consider working with a consultant specializing in accessibility and Universal Design for housing.

01 89 10 / CONSTRUCTION PERFORMANCE REQUIREMENTS / 01890

Integrative Design 1.2a Universal Design (New Construction Only) [Mandatory] Integrative Design 1.2b Universal Design (Substantial and Moderate Rehab Only) [Mandatory]

PART 1 – GENERAL

1.1 Summary

- **A.** Applicability: all work.
- PART 2 PRODUCTS (No Comments)

PART 3 - EXECUTION

- 3.1 Construction Tolerances & Conventions
- A. Dimensions: dimensions that are not stated as "maximum" or "minimum" are absolute.
- **B.** Construction and manufacturing tolerances: all dimensions are subject to conventional industry tolerances except where the requirement is stated as a range with specific minimum and maximum end points. For example, where grab bars or hand rails must be installed between 33 inches and 36 inches above the floor, the range provides an adequate tolerance and therefore no tolerance outside of the range at either end point is permitted.

Best Practice Recommendations:

• In general, best practice is to avoid designing to the maximum or minimum extents of a range or dimensional requirement. To follow the example given in B. above, if the drawings call for grab bars to be installed at 35 inches above the finished floor, the bars will most probably end up in a position that is compliant even if the installer is measuring to the center of the bar rather than the top, or if the flooring is changed after the bars are in place.

Similarly, designers will help to ensure compliance with minimum standards and will greatly improve the usability of a space or facility by designing ramp slopes that are shallower than the maximum allowable (7.5 percent instead of 8.33 percent), clear floor spaces that are wider than the minimum allowable (36 inches instead of 30 inches), etc. This practice will also improve speed and ease of construction by allowing for field adjustments and errors without jeopardizing a project's compliance with requirements.

Division 03: Concrete (Division 03: Concrete)

03 30 00 / CAST-IN-PLACE CONCRETE / 03300

Integrative Design 1.2a Universal Design (New Construction Only) [Mandatory] Integrative Design 1.2b Universal Design (Substantial and Moderate Rehab Only) [Mandatory]

PART 1 – GENERAL

1.1 Summary & Applicability

- A. Applicability:
 - 1. Public and common areas: interior ramps, breezeways, covered building patios and walkways, garage interiors, and similar locations.
 - 2. Dwelling units: interior accessible routes, patios, and balconies.
- **B.** Related sections:
 - 1. 01 77 00 Closeout Procedures
 - 2. 01 89 10 Construction Performance Requirements (Construction Tolerances)
 - 3. 32 13 00 Rigid Paving

1.2 Submittals at Closeout

A. Floor, walkway, landing, and ramp surface flatness and levelness measurements indicating compliance with specific tolerances and design requirements.

PART 2 – PRODUCTS

2.1 Construction & Control Joints

A. Fillers and sealants: select products that fill joints completely and result in an even surface free of cracks and gaps. Use products designed to perform over long periods of time in exposed conditions. Products such as fiberboard fillers can fail and result in gaps and cracks that trap casters and become trip hazards for people with mobility related disabilities.

PART 3 – EXECUTION

3.1 Formwork & Preparation of Substrates

- A. Set formwork as required to comply with specified slopes.
- **B.** Hold back concrete floor slab at shower, entrance mat locations, and other areas for separate pours to provide for level conditions.

3.2 Cast-in-place Concrete

- **A.** Changes in level:
 - 1. Changes in level of $\frac{1}{4}$ inch high maximum may be vertical.

- 2. Changes in level between ¹/₄ inch high minimum and ¹/₂ inch high maximum: bevel with a slope not steeper than 1:2.
- 3. Changes in level greater than 1/2 inch high and less than 6 inches: ramp at 1:12 (8.33%) maximum.
- 4. Changes in level greater than 6 inches: ramp at 1:12 (8.33%) maximum: edge protection, landings, and handrails are required.
- B. Landings and turning spaces: bottom and top of ramp surfaces are to be flush with adjacent landing.
 - 1. If there is a door in a landing there needs to be at least 2 feet of landing on the latch side.
- C. Slopes:
 - 1. Landings and level areas may not exceed 1:50 (2%) slope in either direction.
 - Sloped walking surfaces (which are not ramps) may not exceed 1:20 (5%) in running slope and 1:50 (2%) in cross slope. Landings are not required.
 - 3. Ramp surfaces may not exceed 1:12 (8.33%) in running slope and 1:50 (2%) in cross slope. Ramps are required to have landings at the top, bottom, and intermediate resting or turning spaces.
- D. Finishes:
 - 1. Provide broom finish or similar non-slip surface treatment in exterior environments.
 - 2. Exposed aggregate finishes can be very slippery when wet and can be challenging to maintain. If working with an exposed aggregate product, test the surface for performance under wet conditions.
 - 3. High levels of fly ash or slag (recycled content opportunities) may result in surfaces that are slippery when wet. When working with these products, test the surface for performance under wet conditions.
- **E.** Decks, patios, and porches at dwelling units (not common or public use areas):
 - 1. At Type A units only: where exterior patios, balconies, or similar areas are impervious and exposed to the elements, the surface may be held 4 inches maximum below the adjacent floor level.

Best Practice Recommendations:

- Design concrete slopes to at least 0.5 percent less than the maximum permitted for the use. For example, a ramp surface would be designed to 7.5 percent running slope and 0 percent cross slope, and the landing at the ramp would be designed to 1.5 percent cross slope each way.
- Note on design drawings that there are no tolerances for slopes exceeding maximums (e.g. 2.2 percent exceeds permitted cross slope maximum of 2 percent and is non-compliant).
- Design exterior accessible routes to drain water away from walking and parking surfaces without exceeding running and cross slope limits.
- There are some exceptions to the maximum slopes listed above in ANSI A117.1 and ADA. Use of these exceptions should be limited to instances where existing structural conditions make other solutions impossible.

Green Synergy:

• Criterion 6.6 Recycled Content Material.

Division 05: Metals (Division 05: Metals)

05 50 00 / METAL FABRICATIONS / 05500

Integrative Design 1.2a Universal Design (New Construction Only) [Mandatory] Integrative Design 1.2b Universal Design (Substantial and Moderate Rehab Only) [Mandatory]

PART 1 – GENERAL

1.1 Summary

- A. Applicability:
 - 1. Public and common use areas: handrails, guardrails, grates, and miscellaneous metals. Handrails are required on ramp runs with a rise greater than 6 inches and on certain stairways. Guardrails are required at certain landings and edges of platforms. Guardrails may also be used to provide protection from protrusions and obstacles in a circulation path.
 - 2. Dwelling units: interior ramps and steps in Type A units.
- B. Related sections:
 - 1. 01 89 10 Construction Performance Requirements
 - 2. 03 30 00 Cast-in-place Concrete

PART 2 - PRODUCTS

2.1 Grates

A. Openings in grates: openings in grates may be a maximum ¹/₂ inch in the direction of pedestrian travel. Using a product with maximum ¹/₂ openings in all directions provides for pedestrian movement in more than one direction, which is desirable in many outdoor locations.

2.2 Handrails

- A. Handrails:
 - 1. Top of gripping surfaces: gripping surfaces may be located between 34 inches minimum and 38 inches maximum vertically above walking surfaces, stair nosings, and ramp surfaces.
 - 2. Clearance between handrail gripping surfaces and an adjacent vertical surface: 1-1/2 inches minimum.
 - 3. Handrail configuration:
 - a. Handrails must be continuous along their length, with no breaks in runs.
 - b. Handrails must not have obstructions along the top or sides, and may have obstructions for no more than 20 percent of the total length along the bottom.
 - c. Horizontal projections must be located 1-1/2 inches minimum below the bottom of the handrail.
 - 4. Handrail gripping surfaces:
 - a. Handrail gripping surfaces with a circular cross section must have an outside diameter of 1-1/4 inches minimum and 2 inches maximum.

- Handrail gripping surfaces with non-circular cross sections must have a perimeter dimension of 4 inches minimum and 6-1/4 inches maximum, and a cross-section dimension of 2-1/4 inches maximum.
- c. Handrail gripping surfaces and adjacent surfaces must be free of sharp or abrasive elements, and all edges must be rounded.
- d. Rotation of handrails in fittings is prohibited.
- B. Handrail extensions.
 - 1. Handrail extensions are not required for continuous handrails at the inside turn of switchback or dogleg stairs and ramps.
 - 2. Top and bottom extension at ramps: handrails must extend horizontally for 12 inches minimum at the required landing at the top and bottom of ramp runs. Extensions must return to a wall, guard, or the landing surface, or continue to the handrail of an adjacent ramp run.
 - 3. Top extension at stairs: handrails must extend handrails horizontally or 12 inches minimum from a point directly above the first riser nosing. Extensions must to a wall, guard, or the landing surface, or continue to the handrail of an adjacent stair flight.
 - 4. Bottom extension at stairs: handrails must extend at the slope of the stair flight for a horizontal distance at least equal to one tread depth from a point directly above the last riser nosing. Extensions must return to a wall, guard, or the landing surface, or continue to the handrail of an adjacent stair flight.

2.3 Protective Rails

A. Protective rails at stairs & protrusions: provide guardrails or other barriers where the vertical clearance is less than 80 inches high. Locate the leading edge of such guardrail or barrier at 27 inches maximum above the finished floor or ground.

2.4 Miscellaneous Metals

- A. Expansion joint floor plates: select product that will not result in changes in level more than permitted:
 - 1. Changes in level of $\frac{1}{4}$ inch high maximum may be vertical.
 - 2. Changes in level between ¹/₄ inch high minimum and ¹/₂ inch high maximum must be beveled with a slope not steeper than 1:2.
 - Changes in level greater than ¹/₂ inch high and less than 6 inches must be ramped at 1:12 (8.33%) maximum.
- B. Diamond plate flooring: coat product with non-slip surfacing if used in an exterior environment.

PART 3 - EXECUTION

- 3.1 Horizontal Surfaces
- **A.** Grates: locate grates with no gaps greater than $\frac{1}{2}$ inch in the direction of travel.

3.2 Installation of Handrails and Protective Rails

A. Install handrails and protective rails at consistent heights within allowed ranges.

Best Practice Recommendation:

[•] Always provide a handrail at both sides of each flight of stairs, even when not required by code.

Division 06: Wood, Plastics & Composites (Division 06: Wood and Plastics)

06 10 53 / MISCELLANEOUS ROUGH CARPENTRY / 06100

Integrative Design 1.2a Universal Design (New Construction Only) [Mandatory] Integrative Design 1.2b Universal Design (Substantial and Moderate Rehab Only) [Mandatory]

PART 1 – GENERAL

1.1 Summary

- **A.** Applicability:
 - 1. Public and common use areas.
 - 2. Dwelling units: Type A and Type B units.

B. Related sections:

- 10 21 13 Toilet Compartments
- 10 28 13 Toilet Accessories
- 10 28 16 Bath Accessories
- 10 57 00 Wardrobe and Closet Specialties
- 22 10 00 Plumbing/Piping

PART 2 - PRODUCTS

2.1 Blocking & Similar Items

A. Use plywood and composite wood products with no added formaldehyde (NAF) CARB certification.

PART 3 - EXECUTION

3.1 Blocking

- **A.** Provide blocking at all walls where grab bars will be installed during construction and at all walls where preblocking is required for future installation of grab bars.
- **B.** Provide blocking as needed for countertops with knee spaces, countertops at removable cabinets, closet fittings, wall mounted handrails, coat hooks, shower rods, toilet accessories, wall hung plumbing fixtures and similar elements.
- **C.** Blocking is to provide support for vertical or horizontal force of 250 pounds applied at any point on the grab bar mounted at each location.
- **D.** Provide blocking at corners and other locations that are vulnerable to impact from motorized wheelchairs and scooters.
- E. Provide blocking over larger areas than required in restrooms, bathrooms, etc. to provide greater flexibility for installation of individually-adjusted grab bar locations over time. Consider installing continuous plywood blocking from 24 inches AFF to 72 inches AFF at showers and tubs.

3.2 Floor Framing at Roll-in Showers

A. Hold down floor joists and subfloor at roll-in showers.

Best Practice Recommendations:

- Stair framing: frame stair openings a minimum of 42 inches wide to accommodate future installation of an incline platform lift. A width of 48 inches is preferred. Include blocking in side wall of stair at the heights required for installation of side rails for incline platform. Rough-in power for lift at either top or bottom.
- Provide blocking for handrails on both sides of all stairs, even when not required by code.
- Design and frame stairs to an 11-12 inch tread and 7 inch maximum riser. Make sure the treads are deep enough for a person's entire foot to be placed on the surface with each step taken.
- Avoid open risers even when permitted by local code.

Green Synergy:

Criterion 7.1 Composite Wood Products that Emit Low/No Formaldehyde.

06 41 00 / ARCHITECTURAL WOOD CASEWORK / 06410

Integrative Design 1.2a Universal Design (New Construction Only) [Mandatory] Integrative Design 1.2b Universal Design (Substantial and Moderate Rehab Only) [Mandatory]

PART 1 – GENERAL

1.1 Summary

- **A.** Applicability:
 - 1. Common use kitchens.
 - 2. Type A units.
- **B.** Related sections:
 - 1. 22 40 00 Plumbing Fixtures
 - 2. 11 31 00 Residential Appliances
- **C.** Design requirements:
 - 1. Unit bathrooms:
 - a. Open knee space (Type A units): a minimum 30-inch wide knee space must be provided, centered on the lavatory bowl. Include drawings of panel protecting pipes if part of the project. See below for knee and toe clearance requirements.
 - b. Removable bases (optional at Type A & Type B units): cabinetry must be removable without removal or replacement of the lavatory and without specialized tools or carpentry skills.
 - c. If vanity counter top space is provided in non-accessible dwelling or sleeping units within the same facility, equivalent counter space in terms of size and proximity to the lavatory is to be provided in all Type A units.
 - **d.** Installation of a lavatory with a drain located towards the rear of the fixture and providing a pipe protection kit will provide greater accessibility should the cabinets be removed in the future.
 - e. If there is room available, consider providing permanent, fixed storage by installing cabinet base sections with finished end panels on either side of the knee space.
 - 2. Unit kitchen sink bases:
 - a. Open knee space at sink (Type A units): a minimum 30-inch wide knee space must be provided, centered on the sink bowl. Include drawings of panel protecting pipes if part of the project. See below for knee and toe clearance requirements.
 - b. Removable bases (not permitted in common use kitchen): cabinetry must be removable without removal or replacement of the sink and without specialized tools or carpentry skills. Provide finished end panels at surrounding cabinet base sections.
 - **c.** Installation of a sink with a drain located towards the rear of the fixture and providing a pipe protection kit will provide greater accessibility should the cabinets be removed in the future.
 - **d.** If an under-counter dishwasher is provided, consider locating it on one side of the open knee space at the sink and provide a finished end panel.

- 3. Accessible unit kitchen work area:
 - a. A minimum 30-inch wide knee space must be provided under a work surface. Note that this work space is in addition to the required knee space at the sink. See below for knee and toe clearance requirements.
 - **b.** If the kitchen layout allows, consider providing this work area adjacent to the knee space under the sink in order to provide 60 inches minimum of contiguous knee space under the kitchen counter.
 - **c.** If a kitchen range is being provided in lieu of a cooktop and wall oven, consider locating it at the opposite end of the above-mentioned 60 inches of contiguous knee space.
- 4. Common use kitchen:
 - a. Open knee-space at sink: a minimum 30-inch wide knee space must be provided, centered on the sink. Include drawings of panel protecting pipes if part of the project.
 - b. Open knee-space at work area: a minimum 30-inch wide knee space must be provided under a work surface. Note that this work space is in addition to the required knee space at the sink.
 - c. Height of the front of the sink: the sink may be installed 34 inches maximum above the floor. A sink and counter that is adjustable to variable heights between 29 inches minimum and 36 inches maximum may be provided instead of a fixed counter. The counter and fixture must be installed such that they can be relocated without cutting the counter, damaging adjacent cabinets, or requiring adjustments to plumbing.
- 5. Public and common use restroom lavatories: a minimum 30-inch wide open knee space must be provided, centered on the lavatory bowl. Include drawings of panel protecting pipes if part of the project. See below for knee and toe clearance requirements.
- 6. Toe clearance:
 - a. Space under an element between the finished floor or ground and 9 inches AFF is considered toe clearance.
 - b. Maximum depth: toe clearance can extend 25 inches maximum under an element.
 - c. Minimum required depth: provide a minimum 17 inches of clear depth under the fixture or surface where toe clearance is required at an element as part of a clear floor space.
 - d. Space extending greater than 6 inches beyond the available knee clearance at 9 inches AFF is not considered toe clearance.
 - e. Toe clearance width: 30 inches wide minimum.



NOTE: All dimensions in inches (above) and millimeters (below).

- 7. Knee clearance:
 - a. Space under an element between 9 inches and 27 inches AFF is considered knee clearance.
 - b. Maximum depth: knee clearance can extend 25 inches maximum under an element at 9 inches AFF.
 - c. Minimum required depth: where knee clearance is required under an element as part of a clear floor space, provide knee clearance 11 inches deep minimum at 9 inches AFF, and 8 inches deep minimum at 27 inches AFF.
 - d. Clearance reduction: between 9 inches and 27 inches AFF, the knee clearance may reduce at a rate of 1 inch in depth for each 6 inches in height.
 - e. Width: 30 inches wide minimum.



NOTE: All dimensions in inches (above) and millimeters (below).

1.2 Shop Drawings

- **A.** Prior to submission, check shop drawings for compliance with all requirements detailed in Section 1.1, above, for the location and type required.
- **B.** Shop drawings should include clear dimensions and notes to confirm required dimensions and clearances. Highlight work such as blocking which is by others.

PART 2 - PRODUCTS

2.1 Casework Hardware

- **A.** Drawer and door pulls: provide U-shaped or similar style handles that are able to be operated without tight grasping, pinching, or twisting.
- **B.** Consider providing hardware for adjustable shelving in cabinets provide additional opportunities to customize cabinet interiors to individual needs.

2.2 Plywood and Composite Products

A. Use plywood and composite wood products with no added formaldehyde (NAF) CARB certification.

2.3 Casework Features

- A. Removable base cabinets: cabinetry must be removable without removal, damage, or replacement of fixture or counter, and without specialized tools or carpentry skills. Surrounding cabinet base sections are to have finished end panels. Removing the cabinets should not disturb surrounding finishes.
- **B.** Where providing removable cabinetry, design the removable sections without a back so that plumbing and wiring are undisturbed during the removal process.

- **c.** Casework features: the following features add to the flexibility of cabinetry and provide a more universally designed kitchen space:
 - 1. Pull-out and roll-out drawers instead of shelves.
 - 2. Under-cabinet lighting.
 - 3. Adjustable sink height.
 - 4. Separated cooktop and oven units with wall ovens provided.
 - 5. Pantry space or cabinet with extra storage available at all heights.
 - 6. Refrigerator located out of any corners so that the door can open close to 180 degrees.
 - 7. Pull out spray on kitchen faucet.

PART 3 - EXECUTION

3.1 Fabrication

- A. Required clearances: blocking and concealed supports may not overlap required clearances.
- **B.** Field-verify required overall and internal dimensions. Notify architect and owner immediately of any compromised clearances.

Best Practice Recommendation:

 Design and construct open knee spaces at sinks and lavatories to provide 31 to 32 inches or more clear space. By designing for increased clearances, minor changes and adjustments in the field will not result in noncompliant conditions. Increasing the widths of knee spaces to 36 inches will provide more comfortable working spaces.

Green Synergy:

Criterion 7.1 Composite Wood Products that Emit Low/No Formaldehyde.

06 43 16 / WOOD RAILINGS / 06430

Integrative Design 1.2a Universal Design (New Construction Only) [Mandatory] Integrative Design 1.2b Universal Design (Substantial and Moderate Rehab Only) [Mandatory]

PART 1 – GENERAL

1.1 Summary

- **A.** Applicability:
 - Public and common use areas: handrails, guardrails, grates, and miscellaneous metals. Handrails are
 required on ramp runs with a rise greater than 6 inches and on certain stairways. Guardrails are required
 at certain landings and edges of platforms. Guardrails may also be used to provide protection from
 protrusions and obstacles in a circulation path.
 - 2. Type A units: interior ramps and steps.
- B. Related Sections:
 - 1. 01 89 10 Construction Performance Requirements
 - 2. 03 30 00 Cast-in-place Concrete

PART 2 - PRODUCTS

2.1 Handrails

- A. Handrails:
 - 1. Top of gripping surfaces: gripping surfaces may be located between 34 inches minimum and 38 inches maximum vertically above walking surfaces, stair nosings, and ramp surfaces.
 - 2. Clearance between handrail gripping surfaces and an adjacent vertical surface: 1-1/2 inches minimum.
 - 3. Handrail configuration:
 - a. Handrails must be continuous along their length, with no breaks in runs.
 - b. Handrails must not have obstructions along the top or sides, and may have obstructions for no more than 20 percent of the total length along the bottom.
 - c. Horizontal projections must be located $1-\frac{1}{2}$ inches minimum below the bottom of the handrail.
 - 4. Handrail gripping surfaces:
 - a. Handrail gripping surfaces with a circular cross section must have an outside diameter of 1-1/4 inches minimum and 2 inches maximum.
 - Handrail gripping surfaces with non-circular cross sections must have a perimeter dimension of 4 inches minimum and 6-1/4 inches maximum, and a cross-section dimension of 2-1/4 inches maximum.
 - c. Handrail gripping surfaces and adjacent surfaces must be free of sharp or abrasive elements, and all edges must be rounded.
 - d. Rotation of handrails in fittings is prohibited.

B. Handrail extensions:

- 1. Handrail extensions are not required for continuous handrails at the inside turn of switchback or dogleg stairs and ramps.
- 2. Top and bottom extension at ramps: handrails must extend horizontally for 12 inches minimum at the required landing at the top and bottom of ramp runs. Extensions must return to a wall, guard, or the landing surface, or continue to the handrail of an adjacent ramp run.
- Top extension at stairs: handrails must extend handrails horizontally or 12 inches minimum from a point directly above the first riser nosing. Extensions must to a wall, guard, or the landing surface, or continue to the handrail of an adjacent stair flight.
- 4. Bottom extension at stairs: handrails must extend at the slope of the stair flight for a horizontal distance at least equal to one tread depth from a point directly above the last riser nosing. Extensions must return to a wall, guard, or the landing surface, or continue to the handrail of an adjacent stair flight.

2.2 Protective Rails

A. Protective rails at stairs & protrusions: provide guardrails or other barriers where the vertical clearance is less than 80 inches high. Locate the leading edge of such guardrail or barrier at 27 inches maximum above the finished floor or ground.

PART 3 – EXECUTION

3.1 Installation

A. Install handrails and protective rails at consistent heights within allowed ranges.

Best Practice Recommendation:

• Always provide a handrail at both sides of each flight of stairs, even when not required by code.

06 63 00 / PLASTIC RAILINGS / 06650

Integrative Design 1.2a Universal Design (New Construction Only) [Mandatory] Integrative Design 1.2b Universal Design (Substantial and Moderate Rehab Only) [Mandatory]

PART 1 – GENERAL

1.1 Summary

- **A.** Applicability:
 - Public and common use areas: handrails, guardrails, grates, and miscellaneous metals. Handrails are
 required on ramp runs with a rise greater than 6 inches and on certain stairways. Guardrails are required
 at certain landings and edges of platforms. Guardrails may also be used to provide protection from
 protrusions and obstacles in a circulation path.
 - 2. Type A units: interior ramps and steps.
- B. Related sections:
 - 1. 01 89 10 Construction Performance Requirements
 - 2. 03 30 00 Cast-in-place Concrete

PART 2 - PRODUCTS

2.1 Handrails

- A. Handrails:
 - 1. Top of gripping surfaces: gripping surfaces may be located between 34 inches minimum and 38 inches maximum vertically above walking surfaces, stair nosings, and ramp surfaces.
 - 2. Clearance between handrail gripping surfaces and an adjacent vertical surface: 1-1/2 inches minimum.
 - 3. Handrail configuration:
 - a. Handrails must be continuous along their length, with no breaks in runs.
 - b. Handrails must not have obstructions along the top or sides, and may have obstructions for no more than 20 percent of the total length along the bottom.
 - c. Horizontal projections must be located $1-\frac{1}{2}$ inches minimum below the bottom of the handrail.
 - 4. Handrail gripping surfaces:
 - a. Handrail gripping surfaces with a circular cross section must have an outside diameter of 1-1/4 inches minimum and 2 inches maximum.
 - Handrail gripping surfaces with non-circular cross sections must have a perimeter dimension of 4 inches minimum and 6-1/4 inches maximum, and a cross-section dimension of 2-1/4 inches maximum.
 - c. Handrail gripping surfaces and adjacent surfaces must be free of sharp or abrasive elements, and all edges must be rounded.
 - d. Rotation of handrails in fittings is prohibited.

- B. Handrail extensions:
 - 1. Handrail extensions are not required for continuous handrails at the inside turn of switchback or dogleg stairs and ramps.
 - 2. Top and bottom extension at ramps: handrails must extend horizontally for 12 inches minimum at the required landing at the top and bottom of ramp runs. Extensions must return to a wall, guard, or the landing surface, or continue to the handrail of an adjacent ramp run.
 - 3. Top extension at stairs: handrails must extend handrails horizontally or 12 inches minimum from a point directly above the first riser nosing. Extensions must to a wall, guard, or the landing surface, or continue to the handrail of an adjacent stair flight.
 - 4. Bottom extension at stairs: handrails must extend at the slope of the stair flight for a horizontal distance at least equal to one tread depth from a point directly above the last riser nosing. Extensions must return to a wall, guard, or the landing surface, or continue to the handrail of an adjacent stair flight.

2.2 Protective Rails

A. Protective rails at stairs & protrusions: provide guardrails or other barriers where the vertical clearance is less than 80 inches high. Locate the leading edge of such guardrail or barrier at 27 inches maximum above the finished floor or ground.

PART 3 - EXECUTION

3.1 Installation

A. Install handrails and protective rails at consistent heights within allowed ranges.

Best Practice Recommendation:

• Always provide a handrail at both sides of each flight of stairs, even when not required by code.
06 81 00 / COMPOSITE RAILINGS / 06850

Integrative Design 1.2a Universal Design (New Construction Only) [Mandatory] Integrative Design 1.2b Universal Design (Substantial and Moderate Rehab Only) [Mandatory]

PART 1 – GENERAL

1.1 Summary

- **A.** Applicability:
 - Public and common use areas: handrails, guardrails, grates, and miscellaneous metals. Handrails are
 required on ramp runs with a rise greater than 6 inches and on certain stairways. Guardrails are required
 at certain landings and edges of platforms. Guardrails may also be used to provide protection from
 protrusions and obstacles in a circulation path.
 - 2. Type A units: interior ramps and steps.
- B. Related sections:
 - 1. 01 89 10 Construction Performance Requirements
 - 2. 03 30 00 Cast-in-place Concrete

PART 2 - PRODUCTS

2.1 Handrails

- A. Handrails:
 - 1. Top of gripping surfaces: gripping surfaces may be located between 34 inches minimum and 38 inches maximum vertically above walking surfaces, stair nosings, and ramp surfaces.
 - 2. Clearance between handrail gripping surfaces and an adjacent vertical surface: 1-1/2 inches minimum.
 - 3. Handrail configuration:
 - a. Handrails must be continuous along their length, with no breaks in runs.
 - b. Handrails must not have obstructions along the top or sides, and may have obstructions for no more than 20 percent of the total length along the bottom.
 - c. Horizontal projections must be located 1-1/2 inches minimum below the bottom of the handrail.
 - 4. Handrail gripping surfaces:
 - a. Handrail gripping surfaces with a circular cross section must have an outside diameter of 1-1/4 inches minimum and 2 inches maximum.
 - Handrail gripping surfaces with non-circular cross sections must have a perimeter dimension of 4 inches minimum and 6-1/4 inches maximum, and a cross-section dimension of 2-1/4 inches maximum.
 - c. Handrail gripping surfaces and adjacent surfaces must be free of sharp or abrasive elements, and all edges must be rounded.
 - d. Rotation of handrails in fittings is prohibited.

- B. Handrail extensions:
 - 1. Handrail extensions are not required for continuous handrails at the inside turn of switchback or dogleg stairs and ramps.
 - 2. Top and bottom extension at ramps: handrails must extend horizontally for 12 inches minimum at the required landing at the top and bottom of ramp runs. Extensions must return to a wall, guard, or the landing surface, or continue to the handrail of an adjacent ramp run.
 - 3. Top extension at stairs: handrails must extend handrails horizontally or 12 inches minimum from a point directly above the first riser nosing. Extensions must to a wall, guard, or the landing surface, or continue to the handrail of an adjacent stair flight.
 - 4. Bottom extension at stairs: handrails must extend at the slope of the stair flight for a horizontal distance at least equal to one tread depth from a point directly above the last riser nosing. Extensions must return to a wall, guard, or the landing surface, or continue to the handrail of an adjacent stair flight.

2.2 Protective Rails

A. Protective rails at stairs & protrusions: provide guardrails or other barriers where the vertical clearance is less than 80 inches high. Locate the leading edge of such guardrail or barrier at 27 inches maximum above the finished floor or ground.

PART 3 - EXECUTION

3.1 Installation

A. Install handrails and protective rails at consistent heights within allowed ranges.

Best Practice Recommendation:

• Always provide a handrail at both sides of each flight of stairs, even when not required by code.

Division 08: Doors & Windows (Division 08: Doors and Windows)

08 10 00 / DOORS AND FRAMES / 08100

Integrative Design 1.2a Universal Design (New Construction Only) [Mandatory] Integrative Design 1.2b Universal Design (Substantial and Moderate Rehab Only) [Mandatory]

PART 1 – GENERAL

1.1 Summary

- A. Applicability:
 - 1. Public and common use areas: all doors forming part of an accessible route.
 - 2. Dwelling units: all doors forming part of an accessible route inside Type A units.
 - 3. Dwelling units: primary entry doors to Type B units and ground floor units and elevator-reachable units.
- B. Related sections:
 - 1. 01 81 14 Accessible Design Requirements
 - 2. 08 41 00 Entrances and Storefronts
 - 3. 08 71 00 Door Hardware

1.2 Design Requirements

- **A.** Door opening widths: provide a clear width of 32 inches minimum except as noted below. To verify the clear width, measure the clear opening between the face of the door and the frame with the door open 90 degrees.
- B. Openings more than 24 inches deep: provide a clear width of 36 inches minimum.
- **c.** Double-leaf doors and gates: provide the required clear width at least one of the active leaves. The clear width may not be determined by measuring the width provided when both leaves are opened simultaneously.
- **D.** Projections into the required clear widths:
 - 1. Projections into the clear width are prohibited at lower than 34 inches AFF.
 - 2. Projections into the clear width between 34 inches and 80 inches AFF: 4 inches maximum.
- **E.** Extend maneuvering clearances the full width of the doorway and the required latch, hinge, or pocket side clearance. See Section 01 81 14 for complete discussion of maneuvering clearance requirements.
- **F.** Thresholds: limit to ¹/₂ inches overall height. Changes in level of ¹/₄ inch maximum may be vertical. Bevel thresholds creating a change in level between ¹/₄ inch and ¹/₂ inch with a slope not greater than 1:2.
- **G** Automatic and power-assisted entry doors: automatic entry doors are not required in any locations. However, installation of power assisted doors can improve accessibility for many people with disabilities. These units are particularly important at exterior doors subject to wind or mechanical pressure loads that will prohibit setting closers at 5 pounds or less. If installed, full-powered automatic doors must comply with ANSI/BHMA A156.10. Low-energy and power-assisted doors must comply with ANSI/BHMA A156.19 (1997 or 2002 edition).

1.3 Shop Drawings

- A. Indicate location, use, type of hardware, minimum clear width, height of bottom rail, height of hardware, and maximum sill height for each door on shop drawings. Coordinate hardware type with requirements (see Section 08 71 00 Door Hardware).
- **B.** Include detail of installation indicating installed height of threshold for each door on shop drawings, including allowance for height of sealant bed and any irregularities in concrete or other substrate.
- C. Indicate items by others (e.g. power door strike connections) on shop drawings to aid in coordination.

PART 2 - PRODUCTS

2.1 Door and Gate Surfaces

- **A.** Bottom rail at door: 10 inches minimum height. Tempered glass doors without stiles and having a bottom rail or shoe with the top leading edge tapered at 60 degrees minimum from the horizontal are not required to meet this requirement.
- **B.** Swinging door surfaces within 10 inches of the finished floor or ground measured vertically must include a smooth surface on the push side extending the full width of the door.
 - 1. Parts creating horizontal or vertical joints in these surfaces are to be within 1/16 inch of the same plane as the other.
 - 2. Cap any cavities created by added kick plates.

2.2 Hardware

A. Hardware provided with doors or door systems must be operable with one hand and must not require tight grasping, pinching, or twisting of the wrist. See Section 08 71 00 Door Hardware.

2.3 Vision Panels

- **A.** If one or more vision panels permitting viewing through a door, gate, or sidelight is provided at a given location, at least one panel must be located such that the bottom is 43 inches maximum above the finished floor. Doors with vision lights with the lowest part more than 66 inches from the finished floor or ground are not subject to this specification.
- **B.** Vision panels: locate the bottom of at least one glazed panel 24 inches above the finished floor at all doors, gates and sidelights with glazing. The lowered height requirement permits use by children and others with sightlines lower than 43 inches.

PART 3 - EXECUTION

3.1 Installation

- **A.** Threshold: set with maximum ¹/₂ inch height. For exterior doors, coordinate installation as necessary to cover perimeter insulation at slab.
- **B.** Interior hinged doors, gates, sliding or folding doors must be set to 5 pounds maximum opening force; 15 pounds for exterior doors.
- **C.** All door closers and gate closers must be adjusted so that from an open position of 90 degrees, the time required to move the door to a position of 12 degrees from the latch is 5 seconds minimum.
- **D.** Spring hinges must be adjusted so that from an open position of 70 degrees, the time required to move the door to a closed position is 1.5 seconds minimum.

E. When installing pocket doors, the edge of the door and the pull hardware must remain clear of the closed part of the frame. As a user approaches, the pull on the face of the door must be useable with a closed fist and without pinching or twisting motions.

Best Practice Recommendations:

- Door surfaces, particularly bottom rails, are subject to high abuse and impacts from a variety of sources including bikes, strollers, footrests, and other equipment. Extending the height and durability of the flat surface at the bottom of doors that will be subject to these uses will increase their overall life span.
- Consider applying opaque, graphic decals across the central area of glass doors at 60 inches above the finished floor, in order to decrease the likelihood of a user accidentally walking into the glass of the door while in a closed position.
- The installation of pocket doors in lieu of swing doors can greatly improve the maneuvering and furnishing space in residential units. Consider installing pocket doors at bedrooms, bathrooms, and other interior locations.
- Many 32-inch nominal pocket door kits depend on recessed door hardware to allow the door leaf to disappear entirely into the pocket in order to achieve a 32-inch clear opening. Specify 36-inch or even 42-inch door leafs in order to allow the use of surface-mounted, U-shaped handles that will still allow clear openings of 32 inches or greater.

08 32 00 / SLIDING GLASS DOORS / 08320

Integrative Design 1.2a Universal Design (New Construction Only) [Mandatory] Integrative Design 1.2b Universal Design (Substantial and Moderate Rehab Only) [Mandatory]

PART 1 – GENERAL

1.1 Summary

- **A.** Applicability:
 - 1. Public and common use areas: all doors forming part of an accessible route.
 - 2. Dwelling units: all doors leading to a porch and/or deck in Type A units.

B. Related sections:

- 1. 01 81 14 Accessible Design Requirements
- 2. 08 10 00 Doors and Frames
- 3. 08 41 00 Entrances and Storefronts
- 4. 08 71 00 Door Hardware

1.2 Design Requirements

- **A.** Door opening widths: provide a clear width of 32 inches minimum except as noted below. To verify the clear width, measure the clear opening between the face of the door and the frame with the door open 90 degrees.
- B. Openings more than 24 inches deep: provide a clear width of 36 inches minimum.
- **c.** Double-leaf doors and gates: provide the required clear width at least one of the active leaves. The clear width may not be determined by measuring the width provided when both leaves are opened simultaneously.
- **D.** Projections into the required clear widths:
 - 1. Projections into the clear width are prohibited at lower than 34 inches AFF.
 - 2. Projections into the clear width between 34 inches and 80 inches AFF: 4 inches maximum.
- **E.** Extend maneuvering clearances the full width of the doorway and the required latch, hinge, or pocket side clearance. See Section 01 81 14 for complete discussion of maneuvering clearance requirements.
- F. Thresholds: limit to ¹/₂ inch overall height. Changes in level of ¹/₄ inch maximum may be vertical. Bevel thresholds creating a change in level between ¹/₄ inch and ¹/₂ inch with a slope not greater than 1:2. Exception: in Type A units, thresholds at exterior sliding doors are permitted to be ³/₄ inch high maximum. This exception does not apply to public and common use areas.
- **G** Automatic and power-assisted entry doors: automatic entry doors are not required in any locations. However, installation of power assisted doors can improve accessibility for many people with disabilities. These units are particularly important at exterior doors subject to wind or mechanical pressure loads that will prohibit setting closers at 5 pounds or less. If installed, full-powered automatic doors must comply with ANSI/BHMA A156.10. Low-energy and power-assisted doors must comply with ANSI/BHMA A156.19 (1997 or 2002 edition).
- **H.** Consider avoiding thresholds higher than $\frac{1}{2}$ inch at all sliding glass doors.

1.3 Shop Drawings

- A. Indicate location, use, type of hardware, minimum clear width, height of bottom rail, height of hardware, and maximum sill height for each door on shop drawings. Coordinate hardware type with requirements (see Section 08 71 00 Door Hardware).
- **B.** Include detail of installation indicating installed height of threshold for each door on shop drawings, including allowance for height of sealant bed and any irregularities in concrete or other substrate.
- C. Indicate items by others (e.g. power door strike connections) on shop drawings to aid in coordination.

PART 2 - PRODUCTS

2.1 Door and Gate Surfaces

A. Bottom rail at door: 10 inch minimum height. Tempered glass doors without stiles and having a bottom rail or shoe with the top leading edge tapered at 60 degrees minimum from the horizontal are not required to meet this requirement.

2.2 Hardware

- **A.** Hardware provided with doors or door systems must be operable with one hand and must not require tight grasping, pinching, or twisting. See Section 08 71 00 Door Hardware.
- **B.** Hardware: when sliding doors are in the fully open position, operating hardware shall be exposed and usable from both sides.

PART 3 - EXECUTION

3.1 Installation

- **A.** Threshold: set with maximum ¹/₂ inch height. For exterior doors, coordinate installation as necessary to cover perimeter insulation at slab.
- **B.** Interior hinged doors, gates, sliding or folding doors must be set to 5 pounds maximum opening force; 15 pounds for exterior doors.

Best Practice Recommendations:

- Door surfaces, particularly bottom rails, are subject to high abuse and impacts from a variety of sources including bikes, strollers, footrests, and other equipment. Extending the height and durability of the flat surface at the bottom of doors that will be subject to these uses will increase their overall life span.
- Consider applying opaque, graphic decals across the central area of glass doors at 60 inches above the finished floor, in order to decrease the likelihood of a user accidentally walking into the glass of the door while in a closed position.

08 41 00 / ENTRANCES AND STOREFRONTS / 08410

Integrative Design 1.2a Universal Design (New Construction Only) [Mandatory] Integrative Design 1.2b Universal Design (Substantial and Moderate Rehab Only) [Mandatory]

PART 1 – GENERAL

1.1 Summary

- **A.** Applicability:
 - 1. Public and common use areas: all doors forming part of an accessible route.

B. Related sections:

- 1. 01 81 14 Accessible Design Requirements
- 2. 08 10 00 Doors and Frames
- 3. 08 32 00 Sliding Glass Doors
- 4. 08 71 00 Door Hardware

1.2 Design Requirements

- **A.** Door opening widths: provide a clear width of 32 inches minimum except as noted below. To verify the clear width, measure the clear opening between the face of the door and the frame with the door open 90 degrees.
- **B.** Openings more than 24 inches deep: provide a clear width of 36 inches minimum.
- **c.** Double-leaf doors and gates: provide the required clear width at least one of the active leaves. The clear width may not be determined by measuring the width provided when both leaves are opened simultaneously.
- **D.** Projections into the required clear widths:
 - 1. Projections into the clear width are prohibited at lower than 34 inches AFF.
 - 2. Projections into the clear width between 34 inches and 80 inches AFF: 4 inches maximum.
- **E.** Extend maneuvering clearances the full width of the doorway and the required latch, hinge, or pocket side clearance. See Section 01 81 14 for complete discussion of maneuvering clearance requirements.
- **F.** Thresholds: limit to 1/2 inch overall height. Changes in level of 1/4 inch maximum may be vertical. Bevel thresholds creating a change in level between 1/4 inch and 1/2 inch with a slope not greater than 1:2.
- **G.** Automatic and power-assisted entry doors: automatic entry doors are not required in any locations. However, installation of power assisted doors can improve accessibility for many people with disabilities. These units are particularly important at exterior doors subject to wind or mechanical pressure loads that will prohibit setting closers at 5 pounds or less. If installed, full-powered automatic doors must comply with ANSI/BHMA A156.10. Low-energy and power-assisted doors must comply with ANSI/BHMA A156.19 (1997 or 2002 edition).

1.3 Shop Drawings

A. Indicate location, use, type of hardware, minimum clear width, height of bottom rail, height of hardware, and maximum sill height for each door on shop drawings. Coordinate hardware type with requirements (see Section 08 71 00 Door Hardware).

- **B.** Include detail of installation indicating installed height of threshold for each door on shop drawings, including allowance for height of sealant bed and any irregularities in concrete or other substrate.
- C. Indicate items by others (e.g. power door strike connections) on shop drawings to aid in coordination.

PART 2 – PRODUCTS

2.1 Door and Gate Surfaces

- **A.** Bottom rail at door: 10 inch minimum height. Tempered glass doors without stiles and having a bottom rail or shoe with the top leading edge tapered at 60 degrees minimum from the horizontal are not required to meet this requirement.
- **B.** Swinging door surfaces within 10 inches of the finished floor or ground measured vertically must include a smooth surface on the push side extending the full width of the door.
 - 1. Parts creating horizontal or vertical joints in these surfaces are to be within 1/16 inch of the same plane as the other.
 - 2. Cap any cavities created by added kick plates.

2.2 Hardware

- **A.** Hardware provided with doors or door systems must be operable with one hand and must not require tight grasping, pinching, or twisting of the wrist. See Section 08 71 00 Door Hardware.
- **B.** Hardware: when sliding doors are in the fully open position, operating hardware shall be exposed and usable from both sides.

PART 3 - EXECUTION

3.1 Installation

- **A.** Threshold: set with maximum ¹/₂ inch height. For exterior doors, coordinate installation as necessary to cover perimeter insulation at slab.
- **B.** Interior hinged doors, gates, sliding or folding doors must be set to 5 pounds maximum opening force; 15 pounds for exterior doors.
- **c.** All door closers and gate closers must be adjusted so that from an open position of 90 degrees, the time required to move the door to a position of 12 degrees from the latch is 5 seconds minimum.
- **D.** Spring hinges must be adjusted so that from an open position of 70 degrees, the time required to move the door to a closed position is 1.5 seconds minimum.

Best Practice Recommendations:

- Door surfaces, particularly bottom rails, are subject to high abuse and impacts from a variety of sources including bikes, strollers, footrests, and other equipment. Extending the height and durability of the flat surface at the bottom of doors that will be subject to these uses will increase their overall life span.
- Consider applying opaque, graphic decals across the central area of glass doors at 60 inches above the finished floor, in order to decrease the likelihood of a user accidentally walking into the glass of the door while in a closed position.

08 50 00 / WINDOWS / 08500

Integrative Design 1.2a Universal Design (New Construction Only) [Mandatory]

Integrative Design 1.2b Universal Design (Substantial and Moderate Rehab Only) [Mandatory in part]

PART 1 – GENERAL

1.1 Summary

- **A.** Applicability:
 - 1. Public and common use areas: where windows are provided in accessible rooms or spaces for operation by occupants, at least one opening must be accessible.
 - 2. Dwelling units: for Type A units, the following windows must be accessible.
 - a. Operable windows required to provide an emergency escape.
 - b. Operable windows required to provide natural ventilation.
- B. Related section: 01 81 14 Accessible Design Requirements

1.2 Design Requirements

- **A.** Location: provide a clear floor space adjacent to each required window's hardware and operating mechanisms.
- **B.** Install at least one window in each sleeping, living, and dining area in a location so that all operable parts are within an accessible reach range. Operable parts include locks, latches, cranks, pulls, and sash rails that are used as part of window operation.
- C. Reach range heights:
 - 1. Unobstructed forward reach: minimum 15 inches and maximum 48 inches AFF.
 - 2. Obstructed forward reach:
 - a. Where the obstruction (reach depth) is 20 inches maximum: 48 inches maximum AFF.
 - b. Where the obstruction (reach depth) is between 20 inches and 25 inches: 44 inches maximum AFF.
 - c. Obstructions more than 25 inches deep not permitted.
 - d. Clear floor space can extend beneath the element for a distance not less than the required reach depth over the obstruction.
 - 3. Unobstructed side reach: minimum 15 inches and maximum 48 inches AFF.
 - 4. Obstructed side reach.
 - a. Where the obstruction (reach depth) is 10 inches maximum: 48 inches maximum AFF.
 - b. Where the reach depth is between 10 inches and 24 inches: the maximum height of the obstruction is 34 inches and the maximum side reach is 46 inches AFF.
 - c. Obstructions more than 24 inches deep not permitted.

1.3 Submittals

- **A.** Submit window schedule noting locations of all accessible windows. Indicate maximum heights for accessible installations.
- B. Product literature: provide information on all hardware and operable parts of windows.

PART 2 - PRODUCTS

A. Powered operators for casement and awning windows require less force and dexterity than standard hardware and are more easily accessed by a wide range of users. In addition to powered openers, there is a variety of opening assist devices on the market that reduce the effort required to open and close a double hung or side pivot window sash.

PART 3 - EXECUTION

A. After final installation, check each required windows for ease of operation and verify hardware compliance with reach range limitations.

Best Practice Recommendation:

• Consider setting window in living areas at a height that allows occupants to see the ground outside from a seated position.

08 71 00 / DOOR HARDWARE / 08770

Integrative Design 1.2a Universal Design (New Construction Only) [Mandatory] Integrative Design 1.2b Universal Design (Substantial and Moderate Rehab Only) [Mandatory in part]

PART 1 – GENERAL

1.1 Summary

- **A.** Applicability:
 - 1. Public and common use areas: all doors forming part of an accessible route.
 - 2. Dwelling units: all doors forming part of an accessible route inside Type A units.
 - 3. Dwelling units: primary entry doors to Type B units and ground floor units and elevator-reachable units.

B. Related sections:

- 1. 01 81 14 Accessible Design Requirements
- 2. 08 10 00 Doors and Frames
- 3. 08 32 00 Sliding Glass Doors
- 4. 08 41 00 Entrances and Storefronts

1.2 Submittals

- **A.** Submit hardware schedule indicating types and locations of all door hardware, including mounting heights and use (location) of door.
- **B.** Product literature: provide information on all lock and latch-sets, closers, panic bars, peepholes, thresholds, and hinges.

PART 2 - PRODUCTS

2.1 Locks and Latches

- **A.** Lever handles, locks, latches and all other operating parts must be operable with one hand and must not require tight grasping, pinching, or twisting of the wrist.
- B. Use hardware that requires 5 pounds maximum to operate all components.
- **C.** Punch locks: set up for single button operation only. The sequence and functions should permit operation using a wand, knuckle, or other element. Do not set up to require simultaneous operation of two buttons or elements to open the door.

2.2 Thresholds

A. Thresholds: limit to ¹/₂ inch overall height. Changes in level of ¹/₄ inch maximum may be vertical. Bevel thresholds creating a change in level between ¹/₄ inch and ¹/₂ inch with a slope not greater than 1:2.

2.3 Peepholes

A. Wide angle peephole units provide better visual information at the entry doors.

PART 3 – EXECUTION

3.1 Locks and Latches

A. Mount hardware at 34 inches minimum and 48 inches maximum above the finished floor or ground.

3.2 Thresholds

A. Set with maximum ¹/₂ inch height. For exterior doors, coordinate installation as necessary to cover perimeter insulation at slab.

3.3 Door Closing Hardware

- **A.** Interior hinged doors, gates, sliding or folding doors must be set to 5 pounds maximum opening force; 15 pounds for exterior doors.
- **B.** All door closers and gate closers must be adjusted so that from an open position of 90 degrees, the time required to move the door to a position of 12 degrees from the latch is 5 seconds minimum.
- **c.** Spring hinges must be adjusted so that from an open position of 70 degrees, the time required to move the door to a closed position is 1.5 seconds minimum.
- D. Automatic and power-assisted entry doors: Automatic entry doors are not required in any locations. However, installation of power assisted doors can improve accessibility for many people with disabilities. These units are particularly important at exterior doors subject to wind or mechanical pressure loads that will prohibit setting closers at 5 pounds or less. If installed, full-powered automatic doors must comply with ANSI/BHMA A156.10. Low-energy and power-assisted doors must comply with ANSI/BHMA A156.19 (1997 or 2002 edition).

3.4 Peepholes

A. When installing two peepholes, install the upper at 60 inches above the finished floor or ground and the lower one between 36 inches and 42 inches above the finished floor or ground. When installing only one peephole, install it at 42 inches above the finished floor or ground.

3.5 Pocket Door Tracks and Frames

A. When installing pocket doors, the edge of the door and the pull hardware must remain clear of the closed part of the frame. As a user approaches, the pull on the face of the door must be useable with a closed fist and without pinching or twisting motions.

Best Practice Recommendation:

• A schedule for maintenance of door closing hardware, locks, latches and hinges should be included in the project maintenance manual. Maintenance requirements should include a copy of this specification section, installation and adjustment recommendations from the manufacturer, and information on the local supplier of parts and service.

08 74 00 / ACCESS CONTROL / 08740

Integrative Design 1.2a Universal Design (New Construction Only) [Mandatory]

Integrative Design 1.2b Universal Design (Substantial and Moderate Rehab Only) [Mandatory]

PART 1 – GENERAL

1.1 Summary

- **A.** Applicability: multi-unit buildings with door release and other communications system between a shared entrance and individual dwelling unit(s).
- B. Related sections: 08 71 00 Door Hardware

PART 2 - PRODUCTS

2.1 Access Control Devices

- A. Residential dwelling unit communication systems:
 - 1. Common use or public use system interface: include the capability of supporting voice and TTY communication with the residential dwelling unit interface.
 - 2. Residential dwelling unit interface: include a telephone jack capable of supporting voice and TTY communication with the common use or public use system interface.
- **B.** Arrange numeric keys in a 12-key ascending or descending telephone keypad layout. Make the number five key tactilely distinct from the other keys.
- **c.** Characters and symbols on key surfaces to contrast visually from key surfaces. Visual contrast is to be either light-on-dark or dark-on-light.
- D. Handset cords must be 29 inches long minimum, if provided.
- E. Devices that do not require handsets are easier to use by people who have a limited reach or dexterity.
- F. Provide audible and visual indicators of connections and of door release.
- **G.** Provide device with volume control at common/public use interface.
- **H.** If a handset is provided, ensure that the door release cycle is not dependent on the handset position. The door release period must accommodate visitors who move slowly and/or have difficulty operating doors and door hardware.

PART 3 – EXECUTION

3.1 Installation

A. Mount controls so that the highest operable part is between 34 inches 48 inches above the finished floor or ground.

08 83 00 / MIRRORS / 08810

Integrative Design 1.2a Universal Design (New Construction Only) [Mandatory] Integrative Design 1.2b Universal Design (Substantial and Moderate Rehab Only) [Mandatory]

PART 1 – GENERAL

1.1 Summary

- **A.** Applicability:
 - 1. Public and common use areas: mirrors in restrooms and exercise facilities.
 - 2. Dwelling units: mirrors above accessible lavatories in Type A units.

B. Related sections:

- 1. 10 28 16 Bath Accessories
- 2. 22 40 00 Plumbing Fixtures

PART 2 – PRODUCTS

2.1 Mirrors

A. Size: a single full-length mirror can accommodate a greater number of people, including children and seated users. Consider a 5'-0" tall mirror or larger.

PART 3 - EXECUTION

3.1 Installation – Public and Common Use Areas

- A. Height above lavatory: install mirrors located above lavatories or countertops with the bottom edge of the reflective surface 40 inches maximum AFF. Specify frameless mirrors to avoid the common mistake of mounting the bottom of the frame, and not the bottom of the reflective surface, at 40 inches AFF.
- **B.** Height(s) for wall mirror: install mirrors not located above lavatories or countertops with the bottom edge of the reflecting surface 35 inches maximum AFF.
- **C.** In order for mirrors to be usable by people in a standing or seated position, the top edge of the reflective surface should be installed 74 inches minimum AFF and the bottom edge at a maximum of 24 inches AFF.

3.1 Installation – Type A Unit Bathrooms

A. Height above lavatory: install mirrors located above lavatories or countertops with the bottom edge of the reflective surface 40 inches maximum AFF. Specify frameless mirrors to avoid the common mistake of mounting the bottom of the frame, and not the bottom of the reflective surface, at 40 inches AFF.

Division 09: Finishes (Division 09: Finishes)

09 30 00 / TILE / 09300

Integrative Design 1.2a Universal Design (New Construction Only) [Mandatory] Integrative Design 1.2b Universal Design (Substantial and Moderate Rehab Only) [Mandatory]

PART 1 – GENERAL

1.1 Summary

- A. Applicability:
 - 1. Public and common use areas: all tiled floor surfaces forming part of an accessible route.
 - 2. Dwelling units: all tiled floor surfaces forming part of an accessible route inside Type A units.
 - 3. Dwelling units: all tiled floor surfaces forming part of an accessible route inside Type B units and ground floor units and elevator-reachable units.
- B. Related section: 09 60 00 Flooring

1.2 References

A. Tile Council of America: TCNA Handbook. Refer to sections on shower construction and steam shower detailing for assistance with roll-in shower detailing.

PART 2 – PRODUCTS

2.1 Floor Tile

- **A.** Thresholds: limit to $\frac{1}{2}$ inch overall height. Changes in level of $\frac{1}{4}$ inch maximum may be vertical. Bevel thresholds creating a change in level between $\frac{1}{4}$ inch and $\frac{1}{2}$ inch with a slope not greater than 1:2.
- **B.** Slip resistance: for flooring applications, use slip-resistant tile with a coefficient of friction of 0.60 or greater (wet) as identified by the Ceramic Tile Institute.
- **c.** Size: consider using small or mosaic tiles on floors in wet areas in order to increase the traction provided by grout lines and to provide greater control in establishing proper drainage slopes for floor drains.

PART 3 - EXECUTION

3.1 Installation

- **A.** Surface characteristics: install tiles with even surfaces and with close grout joints so that surfaces are smooth and do not catch casters.
- B. Threshold conditions: set differing floor surfaces at identical elevations with flush threshold trim.

3.2 Roll-in Shower Floors and Walls:

A. Roll-in shower floors and walls require water-proof detailing techniques. Use impervious products and solidsurface materials or a 40 mil minimum membrane behind tile assemblies. Double installation of screws on cementitious backer board is recommended (install, back out, dip in silicone, reinstall).

Best Practice Recommendations:

- Use maintenance products on tile and grout that do not reduce the slip resistance of the flooring. Use of green cleaning products is to be encouraged due to the fact that they are less likely to leave a film or damage the surface over time.
- Detailing a roll-in shower should be approached carefully. Maintain a complete water-tight assemble from walls to the drain. Make sure that the water does not puddle or create slippery conditions outside the shower space.

09 60 00 / FLOORING / 09600

Integrative Design 1.2a Universal Design (New Construction Only) [Mandatory] Integrative Design 1.2b Universal Design (Substantial and Moderate Rehab Only) [Mandatory]

PART 1 – GENERAL

1.1 Summary

- **A.** Applicability:
 - 1. Public and common use areas: all tiled floor surfaces forming part of an accessible route.
 - 2. Dwelling units: all tiled floor surfaces forming part of an accessible route inside Type A units.
 - 3. Dwelling units: all tiled floor surfaces forming part of an accessible route inside Type B units and ground floor units and elevator-reachable units.
- B. Related sections:
 - 1. 09 30 00 Tile
 - 2. 09 68 00 Carpeting

PART 2 - PRODUCTS

2.1 Flooring

- **A.** Thresholds: limit to ¹/₂ inch overall height. Changes in level of ¹/₄ inch maximum may be vertical. Bevel thresholds creating a change in level between ¹/₄ inch and ¹/₂ inch with a slope not greater than 1:2.
- B. Slip resistance: in wet and exterior areas, select products with coefficient of friction of 0.60 or greater (wet).

PART 3 - EXECUTION

3.1 Installation

A. Threshold conditions: set differing floor surfaces at identical elevations with flush threshold trim.

Best Practice Recommendations:

- Use maintenance products on tile and grout that do not reduce the slip resistance of the flooring.
- Use matte finishes in product choice and polishing products to eliminate glare.
- · Confirm hard surface flooring meets SCS FloorScore program requirements.

Green Synergy:

Criterion 7.2 Environmentally Preferable Flooring.

09 68 00 / CARPETING / 09680

Integrative Design 1.2a Universal Design (New Construction Only) [Mandatory] Integrative Design 1.2b Universal Design (Substantial and Moderate Rehab Only) [Mandatory]

PART 1 – GENERAL

1.1 Summary

- **A.** Applicability:
 - 1. Public and common use areas: all tiled floor surfaces forming part of an accessible route.
 - 2. Dwelling units: all tiled floor surfaces forming part of an accessible route inside Type A units.
 - 3. Dwelling units: all tiled floor surfaces forming part of an accessible route inside Type B units and ground floor units and elevator-reachable units.
- B. Related section: 09 60 00 Flooring

PART 2 - PRODUCTS

2.1 Carpeting

- A. Pad: firm. Installation without pad or cushion is recommended.
- B. Carpeting: level loop, textured loop, level cut pile, or level cut/uncut pile texture. Pile height ½ inch maximum.
- **C.** Carpet trim: limit to ½ inch overall height. Changes in level of ¼ inch maximum may be vertical. Bevel thresholds creating a change in level between ¼ inch and ½ inch with a slope not greater than 1:2.
- **D.** Nap and carpet types: most carpet nap has directional characteristics which can pull casters on wheeled mobility devices in one direction or another. The increased effort to maintain motion contrary to the pull of the nap can be considerable. Check products for directional pull before selection.

PART 3 - EXECUTION

3.1 Installation

- A. Installation methods: securely attached. No loose-laid products.
- B. Exposed edges of carpet shall be fastened to floor surfaces and shall have trim along the entire edge.
- **c.** Threshold conditions: set differing floor surfaces at identical elevations with flush threshold trim.

Best Practice Recommendations:

- Carpets and permanently affixed mats can increase the amount of force (roll resistance) needed to propel a
 wheeled mobility device over a surface. The firmer the carpet and backing, the lower the roll resistance. A
 pile thickness up to ½ inch is allowed, although a lower pile provides easier wheelchair maneuvering.
- Specify Carpet and Rug Institute Green Label plus materials to reduce the health impact of emissions.

Green Synergy:

Criterion 7.2 Environmentally Preferable Flooring.

Division 10: Specialties (Division 10: Specialties)

10 11 00 / VISUAL DISPLAY UNITS / 10110

Integrative Design 1.2a Universal Design (New Construction Only) [Mandatory]

Integrative Design 1.2b Universal Design (Substantial and Moderate Rehab Only) [Mandatory in part]

PART 1 – GENERAL

1.1 Summary

- **A.** Applicability: building directories, menus, seat and row designations in assembly areas, occupant names, building addresses, and company names and logos are not be required to comply with signage requirements detailed in other sections.
- B. Related sections: 10 14 00 Signage

PART 2 - PRODUCTS

- A. Contrast: a light to dark contrast of at least 70 percent is recommended for all visual display units.
- **B.** Variable message signs are a fairly new technology and not covered by current (2012) IBC code and 2010 ADA Standards. For best practices on VMS, see ANSI A117.1-2009, 703.7.

PART 3 – EXECUTION

3.1 Mounting Heights

- **A.** Community bulletin boards for common use: at least two-thirds of the board area should be located 48 inches maximum above the floor.
- **B.** Mount community bulletin boards in an unobstructed location with clear space for forward or parallel approach by a person using a wheelchair.

Best Practice Recommendation:

• Consider providing significant information, as well as menus, in large print (18 pt. font) as standard practice for building operators and managers. In addition to posting information on a bulletin board, make it available in a 'pocket' angled from the wall next to the bulletin board so that with low vision can take it and position it at a readable distance.

10 14 00 / SIGNAGE / 10400

Integrative Design 1.2a Universal Design (New Construction Only) [Mandatory] Integrative Design 1.2b Universal Design (Substantial and Moderate Rehab Only) [Mandatory]

PART 1 – GENERAL

1.1 Summary

- A. Applicability: public and common use areas.
- **B.** Related sections:
 - 1. 01 42 00 References and Definitions
 - 2. 10 11 00 Visual Display Units

PART 2 - PRODUCTS

2.1 Directional & Informational Signs (including Areas of Refuge)

- A. Characters:
 - 1. Characters must be sans serif and conventional in form: no italics, oblique forms, scripts, or highly decorative characters.
 - 2. Minimum character height: comply with the following requirements. Base the minimum character height on the uppercase letter I.

Height to Finished Floor or Ground from Baseline of Character	Horizontal Viewing Distance	Min. Character Height
40 inches to less than or equal to 70 inches	less than 72 inches	5/8 inch
	72 inches and greater	5/8 inch, plus 1/8 inch per foot of viewing distance above 72 inches
Greater than 70 inches to less than or equal to 120 inches	less than 180 inches	2 inches
	180 inches and greater	2 inches, plus 1/8 inch per foot of viewing distance above 180 inches
Greater than 120 inches	less than 21 feet	3 inches
	21 feet and greater	3 inches, plus 1/8 inch per foot of viewing distance above 21 feet

- 3. Stroke thickness of the uppercase letter I: 10 percent minimum and 30 percent maximum of the height of the character.
- 4. Character spacing:
 - a. Measure spacing between the two closest points of adjacent characters, excluding word spaces.

- b. Spacing between individual characters: 10 percent minimum and 35 percent maximum of character height.
- 5. Line spacing: spacing between the baselines of separate lines of characters within a message shall be 135 percent minimum and 170 percent maximum of the character height.
- **B.** Finish and contrast: Use non-glare characters and backgrounds. Contrast characters with their background with either light characters on a dark background or dark characters on a light back ground.

2.2 Room Identification

- A. Room identification signs must use raised characters, duplicated in Braille, with the following characteristics:
 - 1. Raised characters: 1/32 inch minimum above their background.
 - 2. Case: uppercase only.
 - 3. Characters must be sans serif and conventional in form: no italics, oblique forms, scripts, or highly decorative characters.
 - 4. Character proportions: select characters from fonts where the width of the uppercase letter O is 55 percent minimum and 110 percent maximum of the height of the uppercase letter I.
 - 5. Character height measured vertically from the baseline of the character: 5/8 inch minimum and 2 inches maximum based on the height of the uppercase letter I. Note: Where separate raised and visual characters with the same information are provided, raised character height may be permitted to be ¹/₂ inch minimum.
 - 6. Stroke thickness of the uppercase letter I: 15 percent maximum of the height of the character.
 - 7. Character spacing:
 - a. Measure spacing between the two closest points of adjacent characters, excluding word spaces.
 - b. Where characters have rectangular cross sections, provide space between individual raised characters 1/8 inch minimum and 4 times the raised character stroke width maximum. Where characters have other cross sections, provide space between individual raised characters 1/16 inch minimum and 4 times the raised character stroke width maximum at the base of the cross sections, and 1/8 inch minimum and 4 times the raised character stroke width maximum at the top of the cross sections.
 - c. Separate characters from raised borders and decorative elements 3/8 inch minimum.
 - 8. Spacing between the baselines of separate lines of raised characters within a message: 135 percent minimum and 170 percent maximum of the raised character height.
- **B.** Non-glare finish and contrast required. Contrast characters with their background with either light characters on a dark background or dark characters on a light background.
- C. Braille: contracted (Grade 2) Braille.
 - 1. Dimensions and capitalization: domed or rounded shape Braille dots. Use the indication of an uppercase letter or letters only before the first word of sentences, proper nouns and names, individual letters of the alphabet, initials, and acronyms.

2. Braille dimensions:

Measurement Range	Minimum in Inches to Maximum in Inches
Dot base diameter	0.059 to 0.063
Distance between two dots in the same cell, measured center to center	0.090 to 0.100
Distance between corresponding dots in adjacent cells, measured center to center	0.241 to 0.300
Dot height	0.025 to 0.037
Distance between corresponding dots from one cell directly below, measured center to center	0.395 to 0.400

- 3. Braille location: position Braille below the corresponding text. If text is multi-lined, position Braille below the entire text. Separate Braille 3/8 inch minimum from any other tactile characters and 3/8 inch minimum from raised borders and decorative elements.
- D. Pictograms:
 - 1. Pictogram field height: 6 inches minimum. Do not locate characters and Braille in the pictogram field.
 - 2. Pictograms and their field: non-glare finishes only. Contrast pictograms with their field with either a light pictogram on a dark field or a dark pictogram on a light field.
 - 3. Text descriptors: locate text descriptors directly below the pictogram field.

2.3 Means of Egress Signs

A. Doors at exit passageways, exit discharge, and exit stairways must be identified by tactile signs complying with section 2.2 above.

2.4 Parking Space Signage

- A. Parking space identification signs must include the International Symbol of Accessibility.
- B. Signs identifying van parking spaces must contain the designation "van accessible."

2.5 International Symbol of Accessibility

A. Image: the following is a graphic extracted from the ADA/ABA Guidelines issued by the Access Board.



PART 3 - EXECUTION

3.1 Mounting Heights & Locations

- **A.** Signs with tactile characters:
 - 1. Heights: mount tactile characters on signs 48 inches minimum AFF measured from the baseline of the lowest tactile character, and 60 inches maximum AFF, measured from the baseline of the highest tactile character.
 - 2. Location: where a tactile sign is provided at a door, locate the sign alongside the door at the latch side. Where a tactile sign is provided at double doors with one active leaf, locate the sign on the inactive leaf. Where a tactile sign is provided at double doors with two active leafs, locate the sign to the right of the right hand door. Where there is no wall space at the latch side of a single door or at the right side of double doors, locate signs on the nearest adjacent wall.

Locate signs containing tactile characters so that a clear floor space of 18 inches minimum by 18 inches minimum, centered on the tactile characters, is provided beyond the arc of any door swing between the closed position and 45 degree open position.

Note: Signs with tactile characters are permitted on the push side of doors with closers and without hold-open devices.

B. Parking space designations: locate signs 60 inches minimum above the finished floor or ground, measured to the bottom of the sign.

Best Practice Recommendation:

• Consider working with a signage and wayfinding consultant with experience in the field of accessibility.

Regional Consideration:

• Parking signage requirements vary widely between municipalities. Verify local requirements before specifying parking signage.

10 21 13 / TOILET COMPARTMENTS / 10210

Integrative Design 1.2a Universal Design (New Construction Only) [Mandatory] Integrative Design 1.2b Universal Design (Substantial and Moderate Rehab Only) [Mandatory in part]

PART 1 – GENERAL

1.1 Summary

- A. Applicability: public and common use toilet rooms.
- **B.** Related sections:
 - 1. 01 81 14 Accessible Design Requirements
 - 2. 08 71 00 Door Hardware
 - 3. 10 28 13 Toilet Accessories

1.2 Design Requirements

- **A.** Water closet location:
 - 1. Wheelchair accessible stalls: layout compartment with the water closet positioned with a wall or partition to the rear and to one side. The centerline of the water closet must be 16 inches minimum to 18 inches maximum from the finished surface of the side wall or partition.
 - Ambulatory stalls (required where 6 or more toilets or toilets + urinals are provided): layout compartment with the centerline of the water closet 17 inches minimum and 19 inches maximum from the side wall or partition.
- B. Compartment dimensions:
 - 1. Wheelchair accessible compartments dimensions: 60 inches wide minimum measured perpendicular to the side wall, and 56 inches deep minimum for wall hung water closets and 59 inches deep minimum for floor-mounted water closets measured perpendicular to the rear wall.
 - 2. Ambulatory compartment dimensions: 60 inches minimum depth and a width of 35 inches minimum and 37 inches maximum.
- **C.** Overlap: required clearances around the water closet may overlap the water closet, associated grab bars, dispensers, sanitary napkin disposal units, coat hooks, shelves, accessible routes, clear floor space and clearances required at other fixtures, and the turning space. Other fixtures or obstructions not on this list are prohibited from the required clear floor space.
- **D.** Urinals: maintain a minimum 30 inch wide space for approach. The clear space for use must extend 48 inches from the nose of the fixture. The width cannot be obstructed with panel supports or accessories.

1.3 Product Literature

- A. Include the following components:
 - 1. Compartment door closing characteristics (gravity hinges and similar items).
 - 2. Door latches.
 - 3. Toe space standards.
 - 4. Accessories provided with the panels.

PART 2 – PRODUCTS

2.1 Compartment Panels

- **A.** Toe space: provide 9 inch minimum toe space AFF at the front partition and at least one side partition. Toe space must be 6 inches deep beyond the compartment-side face of the partition, exclusive of partition supports. Toe clearance at the front partition is not required in a compartment greater than 62 inches deep with a wall-hung water closet or 65 inches deep with a floor-mounted water closet. Toe clearance at the side partition is not required in a compartment greater than 66 inches wide.
- B. Toilet compartment doors:
 - 1. Door approach clearances described in Section 01 81 14 apply to the accessible stall doors except if the approach is to the latch side of the compartment door, in which case clearance between the door side of the compartment and any obstruction is to be 42 inches minimum.
 - 2. Locate doors in the front partition or in the side wall or partition farthest from the water closet. When in the front partition, locate the door opening 4 inches maximum from the side wall or partition farthest from the water closet. When in the side wall or partition, locate the door opening 4 inches maximum from the front partition.
 - 3. Provide self-closing doors.
 - 4. Do not swing doors into the minimum required compartment area.

2.2 Door Hardware

- **A.** Install a door pull complying with Section 08 71 00 on both sides of the door near the latch.
- **B.** Provide door handles, pulls, latches, locks, and other operable parts that are operable with one hand and do not require tight grasping, pinching, or twisting of the wrist. The maximum allowed force to activate operable parts is 5 pounds maximum. Mount operable parts between 34 inches and 48 inches AFF.

2.3 Accessories

A. Accessories: refer to Section 10 28 13 Toilet Accessories.

PART 3 - EXECUTION

3.1 Installation - Maintenance of Required Clearances

A. Panel layout: refer to shop drawings for required clearances. If field conditions will result in changes to the layout, notify Architect and Owner immediately.

3.2 Installation of Accessories

A. Locations: refer to Section 10 28 13 Toilet Accessories.

Best Practice Recommendation:

• Design to maximum dimensions (e.g. coat hook at 48 inches above the floor) may result in panels, accessories and other elements being installed in non-compliant locations. Drawings should indicate locations that are within ranges (e.g. coat hook at 44 inches above the floor).

Regional Consideration:

• Restroom design requirements vary in some states and localities. Verify compliance with both local and federal requirements.

10 28 13 / TOILET ACCESSORIES / 10280

Integrative Design 1.2a Universal Design (New Construction Only) [Mandatory]

Integrative Design 1.2b Universal Design (Substantial and Moderate Rehab Only) [Mandatory]

PART 1 – GENERAL

1.1 Summary

- **A.** Applicability:
 - 1. Public and common use toilet rooms.
 - 2. Type A units. Note: in some residential dwelling units, grab bars may not be required to be installed in toilet or bathrooms provided that reinforcement has been installed in walls and located so as to permit future the installation of grab bars.
- B. Related sections:
 - 1. 06 10 53 Miscellaneous Rough Carpentry
 - 2. 10 21 13 Toilet Compartments
 - 3. 22 40 00 Plumbing Fixtures

1.2 Product Literature

A. Submit product literature for all components. Include dimensions of all elements including toilet paper holder and towel dispenser depths and mounting alternatives.

PART 2 - PRODUCTS

2.1 Grab Bars

- A. Cross section:
 - 1. Circular cross section: outside diameter of 1-1/4 inches minimum and 2 inches maximum.
 - 2. Non-circular cross sections: cross-section dimension of 2 inches maximum and a perimeter dimension of 4 inches minimum and 4.8 inches maximum.
- B. Spacing:
 - 1. Space between the wall and the grab bar: $1-\frac{1}{2}$ inches.
 - 2. Space between the grab bar and projecting objects below and at the ends: $1-\frac{1}{2}$ inches minimum.
 - 3. Space between the grab bar and projecting objects above: 12 inches minimum.

2.2 Toilet Paper Holders/Dispensers

- **A**. Dispensers must be operable with one hand and designed so that tight grasping, pinching, or twisting of the wrist is not required to access paper.
- **B**. Dispensers that control delivery or paper flow are prohibited.

2.3 Hand Drying

A. Protruding objects: where paper towel dispensers or electric hand dryers are installed in or adjacent to a circulation path, maximum protrusion from wall is 4 inches.

2.4 Miscellaneous Accessories

- A. Soap dispensers: pull forward on a side wall adjacent to a lavatory to shorten the required reach.
- B. Seats:
 - 1. Rectangular seats:
 - a. Rear edge of a rectangular seat: $2-\frac{1}{2}$ inches maximum.
 - b. Front edge of the seat: 15 inches minimum and 16 inches maximum from the seat wall.
 - c. Side edge of the seat: 1-1/2 inches maximum from the adjacent wall.
 - 2. L-Shaped seats.
 - a. Gap between rear (long) edge of an L-shaped seat and the wall: 2-1/2 inches maximum.
 - b. Gap between side/rear (short) edge of an L-shaped seat and the wall: 1-1/2 inches maximum.
 - c. Depth of the L portion of the seat off the rear/side wall: 14 inches minimum and 15 inches maximum.
 - d. Depth of the front of the long portion of the seat off the rear/back wall: 15 inches minimum and 16 inches maximum.
 - e. End of the L: 22 inches minimum and 23 inches maximum from the main seat wall.



NOTE: All dimensions in inches (above) and millimeters (below).

- 3. Strength: do not exceed allowable stresses for materials used when a vertical or horizontal force of 250 pounds is applied at any point on the seat, fastener, mounting device, or supporting structure.
- **C.** Diaper decks: mount with handle within required reach range as specified below. Top edge of deck must be no more than 34 inches AFF and bottom of deck to be above 27 inches AFF. The diaper deck unit must be 4 inches or less in overall thickness if mounted overhanging circulation space.

PART 3 – EXECUTION

3.1 Installation Requirements

- **A.** Objects with leading edges more than 27 inches and equal to or less than 80 inches AFF may protrude a maximum of 4 inches horizontally into the circulation path.
- **B.** Vertical clearance: 80 inches high minimum. Provide guardrails or other barriers where the vertical clearance is less than 80 inches high. Locate the leading edge of such guardrails or barriers at 27 inches maximum AFF.

3.2 Grab Bar Mounting Requirements

- **A.** Water closet grab bars: mount on the side wall(s) closest to the water closet and on the rear wall. In ambulatory toilet stalls, provide two side-wall grab bars and no rear-wall grab bars.
 - 1. Side-wall grab bars:
 - a. Horizontal: 42 inches long minimum, located 12 inches maximum from the rear wall and extending 54 inches minimum from the rear wall.
 - b. Vertical (public and common use areas only): 18 inches long minimum located 39 inches minimum and 41 inches maximum out from the rear wall, with the bottom end 39 inches minimum and 41 inches maximum from the finished floor.
 - 2. Rear-wall grab bar: 36 inches long minimum and extend from the centerline of the water closet 12 inches minimum on one side and 24 inches minimum on the other side.
 - 3. Install horizontal side and one rear grab bars in a horizontal position, 33 inches minimum and 36 inches maximum AFF measured to the top of the gripping surface.
- **B**. Bathtub grab bars bathtubs with permanent seats:
 - Rear wall: install two grab bars on the rear wall, one 33 inches minimum and 36 inches maximum AFF and the other located 8 inches minimum and 10 inches maximum above the rim of the bathtub. Extend each grab bar 15 inches maximum from the head end wall and 12 inches maximum from the control-end wall.
 - 2. Control-end wall: install one horizontal and one vertical grab bar on the control-end wall.
 - a. Horizontal: 24 inches long minimum, installed at the front edge of the bathtub, 33 inches minimum and 36 inches maximum AFF.
 - b. Vertical: 18 inches long minimum, installed 3 inches minimum and 6 inches maximum above the top surface of the horizontal bar, 4 inches maximum in from the front edge of the bathtub.
 - 3. In dwelling units, grab bars are not required to be installed provided that reinforcement has been installed in walls and located so as to permit the future installation of grab bars (see Section 06 10 53).
- **C**. Bathtubs without permanent seats:
 - 1. Rear wall: install two minimum 24-inch grab bars on the back wall, one 33 inches minimum and 36 inches maximum AFF and the other located 8 inches minimum and 10 inches maximum above the rim of the bathtub. Install grab bars 24 inches maximum from the head end wall and 12 inches maximum from the control end wall.

- 2. Control-end wall:
 - a. Horizontal: install one 24-inch minimum grab bar on the control-end wall at the front edge of the bathtub, 33 inches minimum and 36 inches maximum AFF.
 - b. Vertical: install one 18-inch minimum grab bar 3 inches minimum and 6 inches maximum above the top surface of the horizontal bar, 4 inches maximum in from the front edge of the bathtub.
- 3. Head-end wall: install a horizontal grab bar 12 inches long minimum on the head end wall at the front edge of the bathtub.
- 4. In dwelling units, grab bars are not required to be installed provided that reinforcement has been installed in walls and located so as to permit the future installation of grab bars (see Section 06 10 53).
- D. Showers:
 - In transfer type compartments, provide horizontal grab bars across the control wall and rear wall to a
 point 18 inches from the control wall. In addition, provide one vertical grab bar 18 inches long
 minimum on the control end wall. Locate the vertical bar 6 inches maximum above the horizontal bar
 and 4 inches maximum inward from the front edge of the shower. Horizontal bar heights: 33 inches
 minimum and 36 inches maximum AFF to the top of the bar.
 - 2. Where a seat is provided in standard roll-in type shower compartments, provide grab bars on the rear wall and the side wall opposite the seat. Do not install grab bars above the seat. Where a seat is not provided in standard roll-in type shower compartments, provide grab bars on three walls. Extend grab bars 6 inches maximum from adjacent walls.
 - 3. In alternate roll-in type shower compartments, provide grab bars on the back wall and the side wall farthest from the compartment entry. Do not install grab bars above the seat. Extend grab bars 6 inches maximum from adjacent walls.

3.3 Mounting Requirements for Accessories

- A. Seats:
 - 1. Bathtub seats: mount with top of bathtub seats 17 inches minimum and 19 inches maximum above the bathroom finished floor.
 - a. Removable in-tub seat: 15 inches minimum and 16 inches maximum deep, designed and mounted for secure placement.
 - b. Permanent seats at the head end of the bathtub: 15 inches deep minimum and extending from the back wall to or beyond the outer edge of the bathtub.
 - 2. Shower compartment seats:
 - a. In standard roll-in shower compartment a folding type may be provided (not required). If provided, locate on the side wall adjacent to the controls, and extend from the back wall to a point within 3 inches of the compartment entry.
 - b. In an alternate roll-in type shower compartment a folding type may be provided (not required). If provided, locate on the front wall opposite the back wall, and extend from the adjacent side wall to a point within 3 inches of the compartment entry.
 - c. In transfer-type showers, the seat is required. Seat is to extend from the back wall to a point within 3 inches of the compartment entry. Mount with the top of the seat 17 inches minimum and 19 inches maximum AFF.

- B. Toilet paper dispensers: locate dispensers 7 inches minimum and 9 inches maximum in front of the water closet measured to the centerline of the dispenser with the outlet of the dispenser 15 inches minimum and 48 inches maximum AFF. Do not locate the dispenser behind grab bars or less than 1-½ inch below or less than 12 inches above the bar. Maintain clear space for use of the grab bar.
- **c.** Reach range requirements for towel dispensers, handles on diaper decks, hand dryers, and soap dispensers: the topmost and bottommost controls and operating parts of all equipment are required to be within reach range limits as follows:
 - 1. Unobstructed forward reach: minimum 15 inches and maximum 48 inches AFF.
 - 2. Obstructed forward reach:
 - a. Where the obstruction (reach depth) is 20 inches maximum: 48 inches maximum AFF.
 - b. Where the obstruction (reach depth) is between 20 inches and 25 inches: 44 inches maximum AFF.
 - c. Obstructions more than 25 inches deep not permitted.
 - d. Clear floor space can extend beneath the element for a distance not less than the required reach depth over the obstruction.
 - 3. Unobstructed side reach: minimum 15 inches and maximum 48 inches AFF.
 - 4. Obstructed side reach.
 - a. Where the obstruction (reach depth) is 10 inches maximum: 48 inches maximum AFF.
 - d. Where the reach depth is between 10 inches and 24 inches: the maximum height of the obstruction is 34 inches and the maximum side reach is 46 inches AFF.
 - e. Obstructions more than 24 inches deep not permitted.

Best Practice Recommendations:

- Hand drying accessories should be mounted adjacent to the accessible lavatory so that users can reach the towels or device without moving from position at the lavatory.
- Toilet paper dispensers and soap dispensers are sometimes omitted from the construction project in favor of products supplied by and installed by a janitorial service. These specifications and requirements must be passed along to such services as part of the contract requirements if such arrangements will be pursued.
- High efficiency power hand dryers are recommended over paper towel holders to reduce energy impact. Mount so that dryer is easily usable from a seated position.

Regional Consideration:

• If an administrative authority requires controls for flush valves to be located in a position that conflicts with the location of the rear grab bar, the rear grab bar can be split or shifted to the open side of the toilet area.

10 28 16 / BATH ACCESSORIES / 10280

Integrative Design 1.2a Universal Design (New Construction Only) [Mandatory]

Integrative Design 1.2b Universal Design (Substantial and Moderate Rehab Only) [Mandatory]

PART 1 – GENERAL

1.1 Summary

- **A.** Applicability:
 - 1. Public and common use toilet rooms.
 - 2. Type A units. Note: in some residential dwelling units, grab bars may not be required to be installed in toilet or bathrooms provided that reinforcement has been installed in walls and located so as to permit future the installation of grab bars.
- B. Related Sections:
 - 1. 06 10 53 Miscellaneous Rough Carpentry
 - 2. 10 21 13 Toilet Compartments
 - 3. 22 40 00 Plumbing Fixtures

1.2 Product Literature

A. Submit product literature for all components including medicine cabinets. Include dimensions of all elements including toilet paper holder and towel dispenser depths and mounting alternatives.

PART 2 - PRODUCTS

2.1 Grab Bars

- A. Cross section:
 - 1. Circular cross section: outside diameter of 1-1/4 inches minimum and 2 inches maximum.
 - 2. Non-circular cross sections: cross-section dimension of 2 inches maximum and a perimeter dimension of 4 inches minimum and 4.8 inches maximum.

B. Spacing:

- 1. Space between the wall and the grab bar: $1-\frac{1}{2}$ inches.
- 2. Space between the grab bar and projecting objects below and at the ends: 1-1/2 inches minimum.
- 3. Space between the grab bar and projecting objects above: 12 inches minimum.

2.2 Other Accessories

- **A.** Medicine cabinets: select product that will allow for installation within specified reach ranges.
- **B.** Seats:
 - 1. Rectangular seats:
 - a. Rear edge of a rectangular seat: $2-\frac{1}{2}$ inches maximum.
 - b. Front edge of the seat: 15 inches minimum and 16 inches maximum from the seat wall.

- c. Side edge of the seat: $1-\frac{1}{2}$ inches maximum from the adjacent wall.
- 2. L-Shaped seats:
 - a. Gap between rear (long) edge of an L-shaped seat and the wall: 2-1/2 inches maximum.
 - b. Gap between side/rear (short) edge of an L-shaped seat and the wall: 1-1/2 inches maximum.
 - c. Depth of the L portion of the seat off the rear/side wall: 14 inches minimum and 15 inches maximum.
 - d. Depth of the front of the long portion of the seat off the rear/back wall: 15 inches minimum and 16 inches maximum.
 - e. End of the L: 22 inches minimum and 23 inches maximum from the main seat wall.



NOTE: All dimensions in inches (above) and millimeters (below).

3. Strength: do not exceed allowable stresses for materials used when a vertical or horizontal force of 250 pounds is applied at any point on the seat, fastener, mounting device, or supporting structure.

PART 3 - EXECUTION

3.1 Grab Bar Mounting Requirements

- **A.** Water closet grab bars: mount on the side wall(s) closest to the water closet and on the rear wall. In ambulatory toilet stalls, provide two side-wall grab bars and no rear-wall grab bars.
 - 1. Side-wall grab bars:
 - a. Horizontal: 42 inches long minimum, located 12 inches maximum from the rear wall and extending 54 inches minimum from the rear wall.
 - b. Vertical (public and common use areas only): 18 inches long minimum located 39 inches minimum and 41 inches maximum out from the rear wall, with the bottom end 39 inches minimum and 41 inches maximum from the finished floor.
 - 2. Rear-wall grab bar: 36 inches long minimum and extend from the centerline of the water closet 12 inches minimum on one side and 24 inches minimum on the other side.
 - 3. Install horizontal side and one rear grab bars in a horizontal position, 33 inches minimum and 36 inches maximum AFF measured to the top of the gripping surface.

- **B**. Bathtub grab bars bathtubs with permanent seats:
 - Rear wall: install two grab bars on the rear wall, one 33 inches minimum and 36 inches maximum AFF and the other located 8 inches minimum and 10 inches maximum above the rim of the bathtub. Extend each grab bar 15 inches maximum from the head end wall and 12 inches maximum from the control-end wall.
 - 2. Control-end wall: install one horizontal and one vertical grab bar on the control end wall.
 - a. Horizontal: 24 inches long minimum, installed at the front edge of the bathtub, 33 inches minimum and 36 inches maximum AFF.
 - b. Vertical: 18 inches long minimum, installed 3 inches minimum and 6 inches maximum above the top surface of the horizontal bar, 4 inches maximum in from the front edge of the bathtub.
 - 3. In dwelling units, grab bars are not required to be installed provided that reinforcement has been installed in walls and located so as to permit the future installation of grab bars (see Section 06 10 53).
- c. Bathtubs without permanent seats:
 - Rear wall: install two minimum 24-inch grab bars on the back wall, one 33 inches minimum and 36 inches maximum AFF and the other located 8 inches minimum and 10 inches maximum above the rim of the bathtub. Install grab bars 24 inches maximum from the head end wall and 12 inches maximum from the control-end wall.
 - 2. Control-end wall:
 - a. Horizontal: install one 24-inch minimum grab bar on the control-end wall at the front edge of the bathtub, 33 inches minimum and 36 inches maximum AFF.
 - b. Vertical: install one 18-inch minimum grab bar 3 inches minimum and 6 inches maximum above the top surface of the horizontal bar, 4 inches maximum in from the front edge of the bathtub.
 - 3. Head-end wall: install a horizontal grab bar 12 inches long minimum on the head end wall at the front edge of the bathtub.
 - 4. In dwelling units, grab bars are not required to be installed provided that reinforcement has been installed in walls and located so as to permit the future installation of grab bars (see Section 06 10 53).
- **D.** Showers:
 - In transfer type compartments, provide horizontal grab bars across the control wall and rear wall to a
 point 18 inches from the control wall. In addition, provide one vertical grab bar 18 inches long
 minimum on the control end wall. Locate the vertical bar 6 inches maximum above the horizontal bar
 and 4 inches maximum inward from the front edge of the shower. Horizontal bar heights: 33 inches
 minimum and 36 inches maximum AFF to the top of the bar.
 - 2. Where a seat is provided in standard roll-in type shower compartments, provide grab bars on the rear wall and the side wall opposite the seat. Do not install grab bars above the seat. Where a seat is not provided in standard roll-in type shower compartments, provide grab bars on three walls. Extend grab bars 6 inches maximum from adjacent walls.
 - 3. In alternate roll-in type shower compartments, provide grab bars on the back wall and the side wall farthest from the compartment entry. Do not install grab bars above the seat. Extend grab bars 6 inches maximum from adjacent walls.

3.2 Mounting Requirements for Accessories

- A. Seats:
 - 1. Bathtub seats: mount with top of bathtub seats 17 inches minimum and 19 inches maximum above the bathroom finished floor.
 - a. Removable in-tub seat: 15 inches minimum and 16 inches maximum deep, designed and mounted for secure placement.
 - b. Permanent seats at the head end of the bathtub: 15 inches deep minimum and extending from the back wall to or beyond the outer edge of the bathtub.
 - 2. Shower compartment seats:
 - a. In standard roll-in shower compartment a folding type may be provided (not required). If provided, locate on the side wall adjacent to the controls, and extend from the back wall to a point within 3 inches of the compartment entry.
 - b. In an alternate roll-in type shower compartment a folding type may be provided (not required). If provided, locate on the front wall opposite the back wall, and extend from the adjacent side wall to a point within 3 inches of the compartment entry.
 - c. In transfer-type showers, the seat is required. Seat is to extend from the back wall to a point within 3 inches of the compartment entry. Mount with the top of the seat 17 inches minimum and 19 inches maximum AFE
- B. Toilet paper dispensers: locate dispensers 7 inches minimum and 9 inches maximum in front of the water closet measured to the centerline of the dispenser with the outlet of the dispenser 15 inches minimum and 48 inches maximum AFF. Do not locate the dispenser behind grab bars or less than 1-½ inches below or less than 12 inches above the bar. Maintain clear space for use of the grab bar.
- **C.** Reach range requirements for towel dispensers, handles on diaper decks, hand dryers, and soap dispensers: the topmost and bottommost controls and operating parts of all equipment are required to be within reach range limits as follows:
 - 1. Unobstructed forward reach: minimum 15 inches and maximum 48 inches AFF.
 - 2. Obstructed forward reach:
 - a. Where the obstruction (reach depth) is 20 inches maximum: 48 inches maximum AFF.
 - b. Where the obstruction (reach depth) is between 20 inches and 25 inches: 44 inches maximum AFF.
 - c. Obstructions more than 25 inches deep not permitted.
 - d. Clear floor space can extend beneath the element for a distance not less than the required reach depth over the obstruction.
 - 3. Unobstructed side reach: minimum 15 inches and maximum 48 inches AFF.
 - 4. Obstructed side reach:
 - a. Where the obstruction (reach depth) is 10 inches maximum: 48 inches maximum AFF.
 - f. Where the reach depth is between 10 inches and 24 inches: the maximum height of the obstruction is 34 inches and the maximum side reach is 46 inches AFF.
 - g. Obstructions more than 24 inches deep not permitted.

Best Practice Recommendation:

[•] Hand drying accessories should be mounted adjacent to the accessible lavatory so that users can reach the towels or device without moving from position at the lavatory.

- Toilet paper dispensers and soap dispensers are sometimes omitted from the construction project in favor of products supplied by and installed by a janitorial service. These specifications and requirements must be passed along to such services as part of the contract requirements if such arrangements will be pursued.
- High efficiency power hand dryers are recommended over paper towel holders to reduce energy impact. Mount so that dryer is easily usable from a seated position.

Regional Consideration:

• If an administrative authority requires controls for flush valves to be located in a position that conflicts with the location of the rear grab bar, the rear grab bar can be split or shifted to the open side of the toilet area.
10 28 19 / TUB AND SHOWER DOORS / 10281

Integrative Design 1.2a Universal Design (New Construction Only) [Mandatory] Integrative Design 1.2b Universal Design (Substantial and Moderate Rehab Only) [Mandatory]

PART 1 – GENERAL

1.1 Summary

- A. Applicability:
 - 1. Public and common use toilet rooms, shower rooms, etc.
 - 2. Type A units.
- **B.** Related sections:
 - 1. 10 28 16 Bath Accessories
 - 2. 22 40 16 Plumbing Fixtures

1.3 Product Literature

A. Submit product literature shop drawings for each configuration. Note clearances and clear spaces for fixture approach and use.

PART 2 – PRODUCTS

2.1 Tub and Shower Doors

- **A.** Enclosures for bathtubs: do not obstruct controls, faucets, shower, or spray units. Do not obstruct transfer from wheelchairs onto bathtub seats or into bathtubs. No tracks are permitted on the rim of the open face of the bathtub.
- **B.** Enclosures for shower compartments: do not obstruct controls, faucets, or shower spray units. Do not obstruct transfer from wheelchairs onto shower seats.

PART 3 - EXECUTION

3.1 Roll-in Showers

A. Glass enclosures are not recommended for roll-in showers in most situations. If installed, consider applying opaque, graphic decals across the central area of glass doors at 60 inches AFF, in order to decrease the likelihood of a user accidentally walking into the glass of the door while in a closed position.

10 55 00 / POSTAL SPECIALTIES / 10550

Integrative Design 1.2a Universal Design (New Construction Only) [Mandatory]

Integrative Design 1.2b Universal Design (Substantial and Moderate Rehab Only) [Mandatory in part]

PART 1 – GENERAL

1.1 Summary

A. Applicability: public and common use areas.

1.2 Submittals

A. Shop drawings: indicate sizes of frames and overall fabrication and assembly of mailboxes. Include information on numbering (if any) and mounting requirements.

PART 2 - PRODUCTS (No Comments)

PART 3 – EXECUTION

3.1 Installation Requirements

- **A.** Heights: the topmost and bottommost controls and operating parts of all accessible mailboxes, outgoing mail box, and similar elements are required to be within reach range limits as follows:
 - 1. Unobstructed forward reach: minimum 15 inches and maximum 48 inches AFF.
 - 2. Obstructed forward reach:
 - a. Where the obstruction (reach depth) is 20 inches maximum: 48 inches maximum AFF.
 - b. Where the obstruction (reach depth) is between 20 inches and 25 inches: 44 inches maximum AFF.
 - c. Obstructions more than 25 inches deep not permitted.
 - d. Clear floor space can extend beneath the element for a distance not less than the required reach depth over the obstruction.
 - 3. Unobstructed side reach: minimum 15 inches and maximum 48 inches AFF.
 - 4. Obstructed side reach:
 - a. Where the obstruction (reach depth) is 10 inches maximum: 48 inches maximum AFF.
 - b. Where the reach depth is between 10 inches and 24 inches: the maximum height of the obstruction is 34 inches and the maximum side reach is 46 inches AFF.
 - c. Obstructions more than 24 inches deep not permitted.

10 57 00 / WARDROBE AND CLOSET SPECIALTIES / 10570

Integrative Design 1.2a Universal Design (New Construction Only) [Mandatory] Integrative Design 1.2b Universal Design (Substantial and Moderate Rehab Only) [Mandatory]

PART 1 – GENERAL

1.1 Summary

- A. Applicability: Type A units.
- B. Related section: 06 10 53 Rough Carpentry

PART 2 – PRODUCTS (No Comments)

PART 3 - EXECUTION

- **A.** Heights: the topmost and bottommost of all accessible shelves and hanging rods are required to be within reach range limits as follows:
 - 1. Unobstructed forward reach: minimum 15 inches and maximum 48 inches AFF.
 - 2. Obstructed forward reach:
 - a. Where the obstruction (reach depth) is 20 inches maximum: 48 inches maximum AFF.
 - b. Where the obstruction (reach depth) is between 20 inches and 25 inches: 44 inches maximum AFF.
 - c. Obstructions more than 25 inches deep not permitted.
 - d. Clear floor space can extend beneath the element for a distance not less than the required reach depth over the obstruction.
 - 3. Unobstructed side reach: minimum 15 inches and maximum 48 inches AFE.
 - 4. Obstructed side reach:
 - a. Where the obstruction (reach depth) is 10 inches maximum: 48 inches maximum AFF.
 - b. Where the reach depth is between 10 inches and 24 inches: the maximum height of the obstruction is 34 inches and the maximum side reach is 46 inches AFF.
 - c. Obstructions more than 24 inches deep not permitted.

3.2 Blocking

A. Provide blocking in side and back walls for adjustable shelf and hanging hardware.

Best Practice Recommendation:

Provide adjustable shelving in all units in all closets.

Division 11: Equipment (Division 11: Equipment)

11 31 00 / RESIDENTIAL APPLIANCES / 11310

Integrative Design 1.2a Universal Design (New Construction Only) [Mandatory] Integrative Design 1.2b Universal Design (Substantial and Moderate Rehab Only) [Mandatory in part]

PART 1 – GENERAL

1.1 Summary

- A. Applicability:
 - 1. Public or common use kitchens.
 - 2. Type A units.
- **B.** Related sections:
 - 1. 01 81 14 Accessible Design Requirements
 - 2. 06 41 00 Architectural Casework
 - 3. 12 35 30 Residential Casework

1.2 Submittals

A. Include product literature in project close-out submittals to owner.

1.3 Design Requirements

- A. Locations:
 - 1. Clear path requirement: locate each appliance on an accessible route.
 - 2. Provide a clear forward or parallel approach to all appliances except refrigerator/freezer where parallel is required. Clear floor space is 30 inches wide by 48 inches deep minimum.
 - a. For the dishwasher, the clear floor space can be positioned adjacent to the dishwasher door. The door in the open position cannot obstruct the clear floor space serving the dishwasher or the sink.
 - b. Clear floor space for refrigerator/freezer: provide for parallel approach. Centerline of the clear floor space can offset a maximum of 24 inches from the centerline of the appliance.
 - 3. Side-hinged door ovens: position countertop adjacent to the latch side of the door.
 - 4. Bottom-hinged door ovens: position countertop to at least one side of the door.
 - 5. Provide clear forward or parallel approach to the countertop adjacent to the oven as well as to the appliance itself.

B. Clearances:

- 1. Verify knee and toe clearances under cooktop and sink if designed for front approach. Height of cooktop surface and lip of sink must be between 34 inches and 36 inches AFF.
 - a. Configure or insulate underside of cooktop to protect from burns, abrasions, or electrical shock.

PART 2 - PRODUCTS

- 2.1 Appliances
- A. Refrigerator:
 - 1. Freezer compartment: 50 percent of the compartment 54 inches maximum above the floor when the shelves are installed at the maximum heights possible in the compartment.
 - 2. Temperature controls: within reach ranges see 3.1 below.
- B. Range / cooktop:
 - 1. Controls: positioned to not require reaching across burners.
- C. Range Hood:
 - 1. Controls: within reach ranges see 3.1 below.
- **D.** Oven(s):
 - 1. Controls on front panels, on either side of door.

PART 3 - EXECUTION

3.1 Reach Range Requirements

- **A.** Heights: the topmost and bottommost controls and operating parts of all equipment are required to be within reach range limits as follows:
 - 1. Unobstructed forward reach: minimum 15 inches and maximum 48 inches AFF.
 - 2. Obstructed forward reach:
 - a. Where the obstruction (reach depth) is 20 inches maximum: 48 inches maximum AFF.
 - b. Where the obstruction (reach depth) is between 20 inches and 25 inches: 44 inches maximum AFF.
 - c. Obstructions more than 25 inches deep not permitted.
 - d. Clear floor space can extend beneath the element for a distance not less than the required reach depth over the obstruction.
 - 3. Unobstructed side reach: minimum 15 inches and maximum 48 inches AFF.
 - 4. Obstructed side reach:
 - a. Where the obstruction (reach depth) is 10 inches maximum: 48 inches maximum AFF.
 - b. Where the reach depth is between 10 inches and 24 inches: the maximum height of the obstruction is 34 inches and the maximum side reach is 46 inches AFE.
 - c. Obstructions more than 24 inches deep not permitted.

Best Practice Recommendations:

- French door refrigerators provide both refrigerator and freezer shelves at the greatest range of heights.
- The accessible appliance replacement requirements in the O&M manual should be alongside the ENERGY STAR rating requirements.
- · Choose knob controls with tactile calibrations over flat electronic/digital controls.
- Residential appliances will be replaced multiple times over the life span of a multifamily project. The requirements for these items should be included in the O&M manual.

Green Synergy:

Criterion 5.4 ENERGY STAR Appliances.

11 31 23 / RESIDENTIAL LAUNDRY APPLIANCES / 11310

Integrative Design 1.2a Universal Design (New Construction Only) [Mandatory] Integrative Design 1.2b Universal Design (Substantial and Moderate Rehab Only) [Mandatory]

PART 1 – GENERAL

1.1 Summary

- **A.** Applicability:
 - 1. Public and common use areas.
 - 2. Type A and B units: if laundry appliances are provided with the unit.

1.2 Submittals

A. Include product literature in project close-out submittals to owner.

PART 2 – PRODUCTS

2.1 Laundry Appliances

- A. Washers / dryers:
 - 1. Doors:
 - a. Top loading units: 36 inches maximum AFF.
 - b. Front loading units: bottom of the opening to the laundry compartment must be 15 inches minimum and 34 inches maximum AFE.
 - 2. Operable parts including doors, lint screens, detergent, and bleach compartments are required to be within reach range limits and operable using a single hand without tight pinching grasping, or twisting of the wrist.
 - **3.** Soap compartments should be within the visual field of seated person. A forward location on the washer is preferred.
- B. Assistive Devices:
 - 1. Assistive reaching devices are permitted only at common use machines in complexes where Type A units are not required by local code or other regulation.

PART 3 - EXECUTION

3.1 Locations for Laundry Equipment

- A. Placement: locate at least one of each type of equipment on an accessible route.
- B. Access: provide clear floor space for parallel approach to at least one of each type of equipment.

• In common areas, mount at least one front-loading washer and dryer set 10 inches AFF

Best Practice Recommendations:

[•] Residential Appliances will be replaced multiple times over the life span of a multifamily project. The accessibility related requirements for these items should be included in the manual provided to operating personnel and/or management firms.

• Front loading washers are recommended. These appliances are easier to use from a seated position, are more likely to be ENERGY STAR certified, and tend to use less water and energy than top loading equipment.

Green Synergy:

• Criterion 5.4 ENERGY STAR Appliances.

11 60 00 / ENTERTAINMENT EQUIPMENT / 11600

Integrative Design 1.2a Universal Design (New Construction Only) [Mandatory]

Integrative Design 1.2b Universal Design (Substantial and Moderate Rehab Only) [Mandatory in part]

PART 1 – GENERAL

1.1 Summary

A. Applicability: public and common use areas.

1.2 Submittals

A. Include product literature in project close-out submittals to owner.

PART 2 – PRODUCTS

2.1 Entertainment Equipment

- **A.** Equipment accessibility and usability:
 - 1. Text: provide units with clear contrast between text and back screen if digital readout is provided. Letters should be 3/8 inch tall minimum.
 - 2. Controls: all controls should be operable without tight pinching, grasping, or twisting of the wrist. Labels under controls should be high contrast.

PART 3 - EXECUTION

3.1 Mounting Heights & Locations for Components

- A. Locations:
 - 1. Clear path requirement: locate each appliance on an accessible route.
 - 2. Provide a clear forward or parallel approach to all appliances except refrigerator/freezer where parallel is required. Clear floor space is 30 inches wide by 48 inches deep minimum.
- **B.** Heights: the topmost and bottommost controls and operating parts of all equipment are required to be within reach range limits as follows:
 - 1. Unobstructed forward reach: minimum 15 inches and maximum 48 inches AFF.
 - 2. Obstructed forward reach:
 - a. Where the obstruction (reach depth) is 20 inches maximum: 48 inches maximum AFF.
 - b. Where the obstruction (reach depth) is between 20 inches and 25 inches: 44 inches maximum AFF.
 - c. Obstructions more than 25 inches deep not permitted.
 - d. Clear floor space can extend beneath the element for a distance not less than the required reach depth over the obstruction.
 - 3. Unobstructed side reach: minimum 15 inches and maximum 48 inches AFF.
 - 4. Obstructed side reach:
 - a. Where the obstruction (reach depth) is 10 inches maximum: 48 inches maximum AFF.
 - b. Where the reach depth is between 10 inches and 24 inches: the maximum height of the obstruction is 34 inches and the maximum side reach is 46 inches AFF.
 - c. Obstructions more than 24 inches deep not permitted.

Best Practice Recommendations:

- If controls of equipment are via remote, provide at least one remote designed for people with low-vision or who are blind and create a fixed location in the room where it can reliably be found.
- Entertainment centers should consider having an induction loop hearing systems. They offer low maintenance, easy to use, "set-it and forget-it" technology that transforms the experience of hearing aid users and people with cochlear implants. It's particularly valuable for 55+ housing.

11 66 00 / EXERCISE EQUIPMENT / 11600

Integrative Design 1.2a Universal Design (New Construction Only) [Mandatory] Integrative Design 1.2b Universal Design (Substantial and Moderate Rehab Only) [Mandatory]

PART 1 – GENERAL

1.1 Summary

A. Applicability: public and common use areas.

1.2 Submittals

A. Include product literature in project close-out submittals to owner.

PART 2 - PRODUCTS (No Comments)

PART 3 – EXECUTION

3.1 Equipment Locations and Access

- A. Locations:
 - 1. Clear path requirement: locate each appliance on an accessible route.
 - 2. Provide a clear forward or parallel approach to all equipment. Clear floor space is 30 inches wide by 48 inches deep minimum.

11 67 00 / RECREATIONAL EQUIPMENT / 11670

Integrative Design 1.2a Universal Design (New Construction Only) [Mandatory]

Integrative Design 1.2b Universal Design (Substantial and Moderate Rehab Only) [Mandatory in part]

PART 1 – GENERAL

1.1 Summary

- **A.** Applicability:
 - 1. Public and common use areas: at least one of each type of recreational equipment is required to be accessible as specified below. Include:
 - a. Clubhouse equipment such as pool table, poker table, ping pong table, dart board, fooz-ball, and similar games.
 - b. Game room equipment such as video games.

PART 2 - PRODUCTS (No Comments)

PART 3 - EXECUTION

- 3.1 Equipment Locations and Access
- **A.** Locations:
 - 1. Clear path requirement: locate each appliance on an accessible route.
 - 2. Provide a clear forward or parallel approach to all equipment. Clear floor space is 30 inches wide by 48 inches deep minimum.
- **B.** Storage: provide a clear route to all areas and spaces where equipment pieces such as pool cues, darts, or paddles are stored.

11 68 13 / PLAYFIELD EQUIPMENT AND STRUCTURES / 11680

Integrative Design 1.2a Universal Design (New Construction Only) [Mandatory if Play Areas provided]

Integrative Design 1.2b Universal Design (Substantial and Moderate Rehab Only) [Mandatory if Play Areas provided]

PART 1 – GENERAL

1.1 Summary

A. Applicability: public and common use areas. Play areas are required to be accessible. Where areas are separated geographically on a site or in a complex, they are considered separate play areas and each must be accessible.

1.2 Submittals

- A. Include the following in project close-out submittals to owner:
 - 1. List of playground equipment.
 - 2. Playground layout.
 - 3. Product data and installation recommendations for the play area surface, issued by the material manufacturer.

1.3 Design Requirements

A. Play Components:

1. Ground level play components: at least one of each type must be located on an accessible route and comply with specified requirements. When elevated play components are provided, ground level play elements are required as follows:

Number of elevated play components provided	1	N/A	N/A
Minimum number of ground level play components required to be on an accessible route	2 to 4	1	1
Minimum number of different types of ground level play components required to be on an accessible route	5 to 7	2	2

If more than 7 are provided, see ADA 2010 Standards, 240.2.1.2 for requirements concerning provisions for ground level components.

- 2. Elevated play components: at least 50 percent of elevated play components must be located on an accessible route and accessible as specified.
- 3. Ground level play components accessed by children with disabilities must be integrated into the play area. Designers should consider the optimal layout of ground level play components accessed by children with disabilities to foster interaction and socialization among all children. Grouping all ground level play components accessed by children with disabilities in one location is not considered integrated.

- 4. Where ramps connect elevated play components, the maximum rise of any ramp run is limited to 12 inches (305 mm). Ramps are preferred over transfer systems since not all children who use wheelchairs or other mobility devices may be able to use, or may choose not to use, transfer systems. Designers and operators are encouraged to provide ramps with slopes less than the 1:12 maximum.
- Platform lifts are permitted to form a part of an accessible route. Because lifts must be independently
 operable, operators should carefully consider the appropriateness of their use in unsupervised outdoor
 settings.
- **B.** Width of accessible routes connecting play components:
 - 1. Width of ground level accessible routes: 60 inches minimum, except as follows:
 - a. In play areas less than 1000 square feet, the clear minimum width of accessible routes may be 44 inches if at least one 60 inch diameter turning space is provided where the restricted accessible route exceeds 30 feet in length.
 - b. The clear width of accessible routes may be 36 inches minimum for a distance of 60 inches maximum provided that multiple reduced width segments are separated by segments that are 60 inches wide minimum and 60 inches long minimum.
 - 2. Width of accessible routes connecting elevated play components: 36 inches minimum, except as follows:
 - a. The clear width of accessible routes connecting elevated play components may be reduced to 32 inches minimum for a distance of 24 inches maximum provided that reduced width segments are separated by segments that are 48 inches long minimum and 36 inches wide minimum.
 - b. The clear width of transfer systems connecting elevated play components may be reduced to 24 inches minimum.
- **C.** Ramps within play areas:
 - 1. Ramp runs connecting ground level play components may not have a running slope steeper than 1:16.
 - 2. The rise for any ramp run connecting elevated play components may be 12 inches maximum.
 - 3. Handrails are not required on ramps located within ground level use zones. In all other locations:
 - a. Top of gripping surfaces: gripping surfaces may be located between 20 inches minimum and 28 inches maximum vertically above walking surfaces, stair nosings, and ramp surfaces.
 - b. Clearance between handrail gripping surfaces and an adjacent vertical surface: 1-1/2 inches minimum.
 - c. Handrail configuration:
 - i. Handrails must be continuous along their length, with no breaks in runs.
 - ii. Handrails must not have obstructions along the top or sides, and may have obstructions for no more than 20 percent of the total length along the bottom.
 - iii. Horizontal projections must be located 1-1/2 inches minimum below the bottom of the handrail.
 - d. Handrail gripping surfaces:
 - i. Handrail gripping surfaces with a circular cross section must have an outside diameter of .95 inches minimum and 1.55 inches maximum.
 - ii. Handrail gripping surfaces with non-circular cross section must provide a gripping surface equivalent to the required circular cross section.

- iii. Handrail gripping surfaces and adjacent surfaces must be free of sharp or abrasive elements, and all edges must be rounded.
- iv. Rotation of handrails in fittings is prohibited.

D. Transfer Systems:

- 1. Where transfer systems are provided, consideration should be given to the distance between the transfer system and the elevated play components. Moving between a transfer platform and a series of transfer steps requires extensive exertion for some children. Designers should minimize the distance between the points where a child transfers from a wheelchair or mobility device and where the elevated play components are located. Where elevated play components are used to connect to another elevated play component instead of an accessible route, careful consideration should be used in the selection of the play components used for this purpose.
- 2. Provide transfer platforms where transfer is intended from wheelchairs or other mobility aids.
 - a. Level surfaces at transfer platforms: 14 inches deep minimum and 24 inches wide minimum.
 - b. Height: 11 inches minimum and 18 inches maximum measured to the top of the surface from the ground or floor surface.
 - c. Provide a transfer space adjacent to the transfer platform. Center the 48 inch long minimum dimension of the transfer space parallel to the 24 inch long minimum side of the unobstructed transfer platform.
 - d. Provide at least one means of support for transferring.
- 3. Provide transfer steps where movement is intended from transfer platforms to levels with elevated play components required to be on accessible routes.
 - a. Transfer steps: level surfaces 14 inches deep minimum and 24 inches wide minimum.
 - b. Height: 8 inches high maximum at each step.
 - c. Provide at least one means of support for transferring.
- E. Play Components:
 - 1. Provide at least one turning space on the same level as play components. Where swings are provided, locate the turning space immediately adjacent to the swing.
 - 2. Provide clear, level 30 inch minimum by 48 inch maximum clear floor space at all accessible play components positioned to access transfer or use of each element.
- F. Play Tables:
 - Provide knee clearance that is 24 inches high minimum, 17 inches deep minimum, and 30 inches wide minimum. The maximum permitted height of the tops of rims, curbs, or other obstructions is 31 inches.
 - 2. Play tables designed and constructed primarily for children 5 years and younger are not be required to provide knee clearance where the clear floor or ground space is arranged for a parallel approach.
 - 3. Entry points and seats: 11 inches (280 mm) minimum and 24 inches (610 mm) maximum from the clear floor or ground space except at slides where transfer seat is not required.
 - 4. Provide at least one means of support for transferring.

- **G** Ground Surfaces: Ground surfaces must be inspected and maintained regularly to ensure continued compliance with the ASTM F 1951 standard. The type of surface material selected and play area use levels will determine the frequency of inspection and maintenance activities.
- H. Vertical clearance at accessible routes serving ground level components: 80 inches minimum.

PART 2 – PRODUCTS (No Comments)

PART 3 - EXECUTION (No Comments)

Best Practice Recommendations:

- All materials should be selected with maximum attention to non-toxic and non-allergic materials including wood, ground surfaces and paint.
- Offer options for play elements in which a child can find a protective respite from group play (e.g., tent, sail, shelter).
- Offer options for play in shaded areas.

Division 12: Furnishings (Division 12: Furnishings)

12 20 00 / WINDOW TREATMENTS / 12200

Integrative Design 1.2a Universal Design (New Construction Only) [Mandatory] Integrative Design 1.2b Universal Design (Substantial and Moderate Rehab Only [Mandatory]

PART 1 – GENERAL

1.1 Summary

- A. Applicability: window and sliding door treatments in Type A Units.
- **B.** Related section: 01 42 00 References and Definitions.

PART 2 – PRODUCTS (No Comments)

PART 3 – EXECUTION

3.1 Installation Requirements

- **A.** Control types and locations:
 - 1. Controls for window shades must be on an accessible route and within reach range.
 - 2. Locate the control end of shades at the side most likely to remain open to a circulation path. Do not place controls in dead ends, tight corners, or similar locations.
- **B.** Reach ranges: the topmost and bottommost controls and operating parts are required to be within reach range limits as follows:
 - 1. Unobstructed forward reach: minimum 15 inches and maximum 48 inches high AFF.
 - 2. Obstructed forward high reach:
 - a. Where the obstruction (reach depth) is 20 inches maximum: 48 inches maximum reach height.
 - b. Where the reach depth is between 20 inches and 25 inches: 44 inches maximum. Obstructions more than 25 inches deep not permitted.
 - c. Clear floor space can extend beneath the element for a distance not less than the required reach depth over the obstruction.
 - 3. Unobstructed side reach: minimum 15 inches and maximum 48 inches high AFF.
 - 4. Obstructed side high reach:
 - a. Where the obstruction (reach depth) is 10 inches maximum: 48 inches maximum.
 - b. Where the reach depth is more than 10 inches and equal to or less than 24 inches: the maximum height of the obstruction is 34 inches maximum and the maximum high side reach is 46 inches. Obstructions more than 24 inches deep not permitted.

12 35 30 / RESIDENTIAL CASEWORK / 12350

Integrative Design 1.2a Universal Design (New Construction Only) [Mandatory]

Integrative Design 1.2b Universal Design (Substantial and Moderate Rehab Only) [Mandatory in part]

PART 1 – GENERAL

1.1 Summary

- **A.** Applicability:
 - 1. Common use kitchens.
 - 2. Type A units.
- **B.** Related Sections:
 - 1. 22 40 00 Plumbing Fixtures
 - 2. 11 31 00 Residential Appliances
- **C.** Design requirements:
 - 1. Unit bathrooms:
 - a. Open knee space (Type A units): a minimum 30-inch wide knee space must be provided, centered on the lavatory bowl. Include drawings of panel protecting pipes if part of the project. See below for knee and toe clearance requirements.
 - b. Removable bases (optional at Type A & Type B units): cabinetry must be removable without removal or replacement of the lavatory and without specialized tools or carpentry skills.
 - c. If vanity counter top space is provided in non-accessible dwelling or sleeping units within the same facility, equivalent counter space in terms of size and proximity to the lavatory is to be provided in all Type A units.
 - **d.** Installation of a lavatory with a drain located towards the rear of the fixture and providing a pipe protection kit will provide greater accessibility should the cabinets be removed in the future.
 - e. If there is room available, consider providing permanent, fixed storage by installing cabinet base sections with finished end panels on either side of the knee space.
 - 2. Unit kitchen sink bases:
 - a. Open knee space at sink (Type A units): a minimum 30-inch wide knee space must be provided, centered on the sink bowl. Include drawings of panel protecting pipes if part of the project. See below for knee and toe clearance requirements.
 - b. Removable bases (not permitted in common use kitchen): cabinetry must be removable without removal or replacement of the sink and without specialized tools or carpentry skills. Provide finished end panels at surrounding cabinet base sections.
 - **c.** Installation of a sink with a drain located towards the rear of the fixture and providing a pipe protection kit will provide greater accessibility should the cabinets be removed in the future.
 - **d.** If an under-counter dishwasher is provided, consider locating it on one side of the open knee space at the sink and provide a finished end panel.

- 3. Accessible unit kitchen work area:
 - a. A minimum 30-inch wide knee space must be provided under a work surface. Note that this work space is in addition to the required knee space at the sink.
 - **b.** If the kitchen layout allows, consider providing this work area adjacent to the knee space under the sink in order to provide 60-inch minimum of contiguous knee space under the kitchen counter.
 - **c.** If a kitchen range is being provided in lieu of a cooktop and wall oven, consider locating it at the opposite end of the above-mentioned 60-inch of contiguous knee space.
- 4. Common use kitchen:
 - a. Open knee-space at sink: a minimum 30-inch wide knee space must be provided, centered on the sink. Include drawings of panel protecting pipes if part of the project. See below for knee and toe clearance requirements.
 - b. Open knee-space at work area: a minimum 30-inch wide knee space must be provided under a work surface. Note that this work space is in addition to the required knee space at the sink.
 - c. Height of the front of the sink: the sink may be installed 34 inches maximum above the floor. A sink and counter that is adjustable to variable heights between 29 inches minimum and 36 inches maximum may be provided instead of a fixed counter. The counter and fixture must be installed such that they can be relocated without cutting the counter, damaging adjacent cabinets, or requiring adjustments to plumbing.
- Public and common use restroom lavatories: a minimum 30-inch wide open knee space must be provided, centered on the lavatory bowl. Include drawings of panel protecting pipes if part of the project.
- 6. Toe clearance:
 - a. Space under an element between the finished floor or ground and 9 inches AFF is considered toe clearance.
 - b. Maximum depth: toe clearance can extend 25 inches maximum under an element.
 - c. Minimum required depth: provide a minimum 17 inches of clear depth under the fixture or surface where toe clearance is required at an element as part of a clear floor space.
 - d. Space extending greater than 6 inches beyond the available knee clearance at 9 inches AFF is not considered toe clearance.
 - e. Toe clearance width: 30 inches wide minimum.



NOTE: All dimensions in inches (above) and millimeters (below).

- 7. Knee clearance:
 - a. Space under an element between 9 inches and 27 inches AFF is considered knee clearance.
 - b. Maximum depth: knee clearance can extend 25 inches maximum under an element at 9 inches AFF.
 - c. Minimum required depth: where knee clearance is required under an element as part of a clear floor space, provide knee clearance 11 inches deep minimum at 9 inches AFF, and 8 inches deep minimum at 27 inches AFF.
 - d. Clearance reduction: between 9 inches and 27 inches AFF, the knee clearance may reduce at a rate of 1 inch in depth for each 6 inches in height.
 - e. Width: 30 inches wide minimum.





1.2 Shop Drawings

- **A.** Prior to submission, check shop drawings for compliance with all requirements detailed in Section 1.1 above, for the location and type required.
- **B.** Shop drawings should include clear dimensions and notes to confirm required dimensions and clearances. Highlight work such as blocking which is by others.

PART 2 - PRODUCTS

2.1 Casework Hardware

- **A.** Drawer and door pulls: provide U-shaped or similar style handles that are able to be operated without tight grasping, pinching, or twisting.
- **B.** Consider providing hardware for adjustable shelving in cabinets provide additional opportunities to customize cabinet interiors to individual needs.

2.2 Plywood and Composite Products

A. Use plywood and composite wood products with no added formaldehyde (NAF) CARB certification.

2.3 Casework Features

- **A.** Removable base cabinets: cabinetry must be removable without removal, damage, or replacement of fixture or counter, and without specialized tools or carpentry skills. Surrounding cabinet base sections are to have finished end panels. Removing the cabinets should not disturb surrounding finishes.
- **B.** Where providing removable cabinetry, design the removable sections without a back so that plumbing and wiring are undisturbed during the removal process.

- **C.** Casework features: the following features add to the flexibility of cabinetry and provide a more universally designed kitchen space:
 - 1. Pull-out and roll-out drawers instead of shelves.
 - 2. Under-cabinet lighting.
 - 3. Adjustable sink height.
 - 4. Separated cooktop and oven units with wall ovens provided.
 - 5. Pantry space or cabinet with extra storage available at all heights.
 - 6. Refrigerator located out of any corners so that the door can open close to 180 degrees.
 - 7. Pull out spray on kitchen faucet.

PART 3 - EXECUTION

3.1 Fabrication

- A. Required clearances: blocking and concealed supports may not overlap required clearances.
- **B.** Field-verify required overall and internal dimensions. Notify architect and owner immediately of any compromised clearances.

Best Practice Recommendation:

• Design and construct open knee spaces at sinks and lavatories to provide 31 to 32 inches or more clear space. By designing for increased clearances, minor changes and adjustments in the field will not result in noncompliant conditions. Increasing the widths of knee spaces to 36 inches will provide more comfortable working spaces.

Green Synergy:

Criterion 7.1 Composite Wood Products that Emit Low/No Formaldehyde.

12 40 00 / FURNISHINGS AND ACCESSORIES / 12710

Integrative Design 1.2a Universal Design (New Construction Only) [Mandatory] Integrative Design 1.2b Universal Design (Substantial and Moderate Rehab Only) [Mandatory]

PART 1 – GENERAL

1.1 Summary

- **A.** Applicability: public and common use areas.
- **B.** Furnishings include: trash receptacles, seating, tables, business center desks, leasing and sales office meeting room tables, lounge area seating, entertainment area seating, rugs, mats, counter appliances, and similar items.
- **C.** Related section:

1. 01 81 14 Accessible Design Requirements.

- **D.** Operating policy manual for leasing and maintenance staff should include:
 - 1. Memo requiring long term maintenance of accessible route to each of the areas and uses.
 - **2.** Memo requiring long term maintenance of accessible furnishing. Replacement furniture is to provide equal or better knee and toe clearances, heights and working surfaces.

PART 2 - PRODUCTS

2.1 Desks and Tables

A. Toe clearance:

- 1. Space under an element between the finished floor or ground and 9 inches AFF is considered toe clearance.
- 2. Maximum depth: toe clearance can extend 25 inches maximum under an element.
- 3. Minimum required depth: provide a minimum 17 inches of clear depth under the fixture or surface where toe clearance is required at an element as part of a clear floor space.
- 4. Space extending greater than 6 inches beyond the available knee clearance at 9 inches AFF is not considered toe clearance.
- 5. Toe clearance width: 30 inches wide minimum.



NOTE: All dimensions in inches (above) and millimeters (below).

- B. Knee clearance:
 - 1. Space under an element between 9 inches and 27 inches AFF is considered knee clearance.
 - 2. Maximum depth: knee clearance can extend 25 inches maximum under an element at 9 inches AFF.
 - 3. Minimum required depth: where knee clearance is required under an element as part of a clear floor space, provide knee clearance 11 inches deep minimum at 9 inches AFF, and 8 inches deep minimum at 27 inches AFF.
 - 4. Clearance reduction: between 9 inches and 27 inches AFF, the knee clearance may reduce at a rate of 1 inch in depth for each 6 inches in height.
 - 5. Width: 30 inches wide minimum.



NOTE: All dimensions in inches (above) and millimeters (below).

c. Tops of accessible dining and work surfaces: 28 inches minimum and 34 inches maximum AFF. For public areas, at least 5 percent of the seating spaces and dining surfaces are required to meet these height requirements.

2.2 Trash Receptacles & Mail/Rent Drop-off Boxes

- **A.** At least one of each type of receptacle/box in each common area of the complex is to be located on an accessible route and have a 30 inch by 48 inch level open floor space adjacent to the opening or slot. Open slot units are preferred to units requiring operation of a flap or lid.
- B. Openings and slots in receptacles and drop boxes must be within required reach range limits as follows:
 - 1. Unobstructed forward reach: minimum 15 inches and maximum 48 inches AFF.
 - 2. Obstructed forward reach:
 - a. Where the obstruction (reach depth) is 20 inches maximum: 48 inches maximum AFF.
 - b. Where the obstruction (reach depth) is between 20 inches and 25 inches: 44 inches maximum AFF.
 - c. Obstructions more than 25 inches deep not permitted.
 - d. Clear floor space can extend beneath the element for a distance not less than the required reach depth over the obstruction.
 - 3. Unobstructed side reach: minimum 15 inches and maximum 48 inches AFF.
 - 4. Obstructed side reach:
 - a. Where the obstruction (reach depth) is 10 inches maximum: 48 inches maximum AFF.
 - b. Where the reach depth is between 10 inches and 24 inches: the maximum height of the obstruction is 34 inches and the maximum side reach is 46 inches AFF.
 - c. Obstructions more than 24 inches deep not permitted.

2.3 Rugs and Mats

A. Provide products that lay flat on the floor and are stable under lateral pressure. Rubber-backed or similar products are less likely to become trip hazards or kick out under the force of tires.

2.4 Counter Appliances

- **A.** Select counter appliances such as coffee pots, dispensers and other items with controls that will be within reach range when sitting on the counter.
- **B.** Select counter appliances with button or knob controls versus electronic/digital.

PART 3 - EXECUTION

3.1 Placement of Furnishings

- A. Field-verify required overall and internal dimensions.
- **B.** Do not place furnishings in conflict with accessible routes. Maintain a minimum 36-inch wide clear pathway throughout public and common areas.

Best Practice Recommendation:

• Provide an accessible counter space adjacent to the outgoing mail slot and near the rent drop-off slot or box.

12 48 13 / ENTRANCE FLOOR MATS AND FRAMES / 12485

Integrative Design 1.2a Universal Design (New Construction Only) [Mandatory] Integrative Design 1.2b Universal Design (Substantial and Moderate Rehab Only) [Mandatory]

PART 1 – GENERAL

1.1 Summary

A. Applicability: public and common use entries.

1.2 Submittals

A. Shop Drawings: provide detailed section at frame and edge of entrance mat.

PART 2 – PRODUCTS

2.1 Entrance Floor Mat and Frame

- **A.** Types: do not install loose laid mats that can shift under use. Floor mats should be recessed into the surface of the floor and set in a permanent frame. Floor mats in frames should be changed out on a regular basis.
- **B.** Thresholds: limit to ½ inch overall height. Changes in level of ¼ inch maximum may be vertical. Bevel thresholds creating a change in level between ¼ inch and ½ inch with a slope not greater than 1:2.

PART 3 - EXECUTION

3.1 Installation

A. Field-verify required overall and internal dimensions.

12 93 00 / SITE FURNISHINGS / 02870

Integrative Design 1.2a Universal Design (New Construction Only) [Mandatory]

Integrative Design 1.2b Universal Design (Substantial and Moderate Rehab Only) [Mandatory]

PART 1 – GENERAL

1.1 Summary

- **A.** Applicability: public and common use areas.
 - 1. Common use areas: not all site furnishings are required to be accessible. At least one of each type in each area is required.
 - 2. Public use areas: at least 5 percent of dining and work surfaces must be accessible.
- **B.** Site furnishings include: trash receptacles, site seating, tables, picnic tables, grilles, pet waste stations, benches, and similar exterior amenities and furnishings.
- **C.** Related sections:
 - 1. 01 81 14 Accessible Design Requirements.
 - 2. 12 40 00 Furnishings
- **D.** Operating policy manual for leasing and maintenance staff should include:
 - 1. Memo requiring long term maintenance of accessible route to each of the areas and uses (not required but recommended).
 - 2. Memo requiring long term maintenance of accessible furnishing. Replacement furniture to provide equal or better knee and toe clearances, heights and working surfaces (not required but recommended).

PART 2 – PRODUCTS

2.1 Picnic Area Furnishings, Benches, and Furnishings

A. Tops of accessible dining and work surfaces: 28 inches minimum and 34 inches maximum AFF. For public areas, at least 5 percent of the seating spaces and dining surfaces are required to meet these height requirements.

B. Benches:

- 1. Clear floor or ground space: provide a 30 inch by 48 inch clear floor or ground space positioned at the end of the bench seat and parallel to the short axis of the bench. The clear space is to be level, firm, and connected to the accessible route to the bench area.
- 2. Size: 42 inches long minimum, 20 inches high minimum and 24 inches deep maximum seats.
- 3. Back support: provide for back support or affix to a wall.
 - a. Minimum 42 inches long minimum and shall extend from a point 2 inches maximum above the seat surface to a point 18 inches minimum above the seat surface.
 - b. 2-1/2 inches maximum from the rear edge of the seat measured horizontally.
- 4. Top of the bench seat surface: 17 inches minimum and 19 inches maximum above the finished floor or ground.

5. Structural strength: do not exceed allowable stresses for materials used when a vertical or horizontal force of 250 pounds is applied at any point on the seat, fastener, mounting device, or supporting structure.

2.2 Grilles, Trash Receptacles, Pet Care Stations, Exterior Rent Drop Boxes

- **A.** At least one of each type of receptacle/box in each common area of the complex is to be located on an accessible route and have a 30 inch by 48 inch level open floor space adjacent to the opening or slot. Open slot units are preferred to units requiring operation of a flap or lid.
- B. Openings and slots in receptacles and drop boxes must be within required reach range limits as follows:
 - 1. Unobstructed forward reach: minimum 15 inches and maximum 48 inches AFF.
 - 2. Obstructed forward reach:
 - a. Where the obstruction (reach depth) is 20 inches maximum: 48 inches maximum AFF.
 - b. Where the obstruction (reach depth) is between 20 inches and 25 inches: 44 inches maximum AFF.
 - c. Obstructions more than 25 inches deep not permitted.
 - d. Clear floor space can extend beneath the element for a distance not less than the required reach depth over the obstruction.
 - 3. Unobstructed side reach: minimum 15 inches and maximum 48 inches AFF.
 - 4. Obstructed side reach:
 - a. Where the obstruction (reach depth) is 10 inches maximum: 48 inches maximum AFF.
 - h. Where the reach depth is between 10 inches and 24 inches: the maximum height of the obstruction is 34 inches and the maximum side reach is 46 inches AFE.
 - i. Obstructions more than 24 inches deep not permitted.

PART 3 – EXECUTION

3.1 Bike Racks

- A. Location: locate clear of the accessible route with space for both the bikes and for clear passage.
- 3.2 Benches
- **B.** Clear floor space: clear floor space at the bench must be on an accessible route, but clear of the circulation space. A person using the clear floor space must not block or obstruct clear passage.

Best Practice Recommendations:

- Shade is an important component of exterior design. Locate accessible benches, dining spaces, grilles, and other exterior amenities so that people using them have a choice between shaded and sunny conditions.
- If individual chairs are chosen for public areas, include some chairs with arms and some without.
- Consider specifying furniture that meets GREENGUARD or SCS Certification requirements. This indicates a furnishing meets rigorous standards related to emission reduction.
- Consider specification of plywood and composite wood products with no added formaldehyde (NAF) CARB certification.
- Equal accessibility to trash and recycling facilities and storage spaces facilitates diversion of materials from trash stream.

Division 13: Special Construction (Division 13: Special Construction)

13 11 00 / SWIMMING POOLS / 13110

Integrative Design 1.2a Universal Design (New Construction Only) [Mandatory]

Integrative Design 1.2b Universal Design (Substantial and Moderate Rehab Only) [Mandatory]

PART 1 – GENERAL

1.1 Summary

- **A.** Applicability: public and common use areas.
 - 1. Pools with 300 or more linear feet of wall require two accessible means of entry. At least one of these is to be a lift or sloped entry. The other may be a transfer wall, transfer system, or pool stair as specified.
 - 2. Pools with less than 300 linear feet of wall require one accessible means of entry. This means of entry may be either a lift for a sloped entry as specified.
 - 3. Pools with user access limited to one area require one accessible means of entry. This means of entry may be a lift, a sloped entry, or a transfer system.

B. Related Sections: 01 42 00 References and Definitions

C. Where more than one means of entry is provided into the water, it is recommended that the means be different. Providing different means of entry will better serve the varying needs of people with disabilities in getting into and out of a swimming pool. It is also recommended that where two or more means of entry are provided, they not be provided in the same location in the pool. Different locations will provide increased options for entry and exit, especially in larger pools.

PART 2 – PRODUCTS

2.1 Lifts

- **A.** Location of lift:
 - 1. The lift must be located where the water level does not exceed 48 inches, except in cases where the entire pool depth is greater than 48 inches.
 - 2. Where multiple pool lift locations are provided, no more than one pool lift is required to be located in an area where the water level is 48 inches maximum.
- **B.** Seat location:
 - 1. In the raised position, locate the centerline of the seat over the deck and 16 inches minimum from the edge of the pool.
 - 2. Slope the deck surface between the centerline of the seat and the pool edge not steeper than 1:50 (2%).
 - 3. Provide clear deck space parallel with the seat on the side of the seat opposite the water.
 - a. Area & location: 36 inches wide minimum and extending forward 48 inches minimum from a line located 12 inches behind the rear edge of the seat.
 - b. Slope of clear deck space: not steeper than 1:50 (2%).
- **c.** Seat height: designed to allow a stop at 16 inches minimum to 19 inches maximum measured from the deck to the top of the seat surface when in the raised (load) position.

- D. Seat width: minimum 16 inches.
- **E.** Footrests and armrests: footrests are required except at spas, and they must travel with the seat. If provided, the armrest positioned opposite the water is required to be removable or fold clear of the seat when the seat is in the raised (load) position.
- **F.** Lift operation: the lift must be capable of unassisted operation from both the deck and water levels with unobstructed controls and operating mechanisms when the lift is in use. Use controls operable with one hand and without tight grasping, pinching, or twisting of the wrist. The force required to activate operable parts must be 5 pounds maximum.
- **G.** Design the lift so that the seat will submerge to a water depth of 18 inches minimum below the stationary water level.
- H. Lifting capacity: minimum weight capacity of 300 pounds and capable of sustaining a static load of at least one and a half times the rated load. Pool lifts should be provided that meet the needs of the populations using the facility. Providing a lift with a weight capacity greater than 300 pounds may be advisable.

2.2 Sloped Entries

- **A.** Extend sloped entries to a depth of 24 inches minimum and 30 inches maximum below the stationary water level.
 - 1. Running slope of ramp runs: 1:12 (8.33%) maximum.
 - 2. Cross slope of ramp runs: 1:50 (2%) maximum.
 - 3. Changes in level other than the running slope and cross slope: not permitted.
 - 4. Widths: 36 inches minimum at ramp run and, where handrails are provided, the clear width between handrails.
 - 5. Maximum rise: 30 inches.
- B. Landings: required at the top and the bottom of each ramp run.
 - 1. Where landings are required, locate one 24 inches minimum and 30 inches maximum below the stationary water level. In wading pools, extend the sloped entry and landings, if provided, to the deepest part of the wading pool.
 - 2. Floor and ground surfaces: shall be stable and firm.
 - 3. Changes in level are not permitted.
 - 4. Maximum slopes: maximum 1:50 (2%).
 - 5. Dimensions: landing clear width to be at least as wide as the widest ramp run leading to the landing. Length: minimum 60 inches.
- **C.** Edge protection: provide on each side of ramp runs and at each side of ramp landings. Edge protection can be either extended floor/ground surface or a curb or barrier.
 - 1. Extended floor or ground surface of the ramp run or landing 12 inches minimum beyond the inside face of a handrail.
 - 2. Provide a curb or barrier that prevents the passage of a 4 inch diameter sphere, where any portion of the sphere is within 4 inches of the finished floor or ground surface.

- D. Handrails: provide at least two handrails on the sloped entry.
- 1. Clear width between handrails: 33 inches minimum and 38 inches maximum. Spacing limitations do not apply where the sloped entry is provided for wave action pools, leisure rivers, sand bottom pools, and other pools where user access is limited to one area.
 - 2. Top of gripping surfaces: gripping surfaces may be located between 34 inches minimum and 38 inches maximum vertically above walking surfaces, stair nosings, and ramp surfaces.
 - 3. Clearance between handrail gripping surfaces and an adjacent vertical surface: 1-1/2 inches minimum.
 - 4. Handrail configuration:
 - a. Handrails must be continuous along their length, with no breaks in runs.
 - b. Handrails must not have obstructions along the top or sides, and may have obstructions for no more than 20 percent of the total length along the bottom.
 - c. Horizontal projections must be located $1-\frac{1}{2}$ inches minimum below the bottom of the handrail.
 - 5. Handrail gripping surfaces:
 - a. Handrail gripping surfaces with a circular cross section must have an outside diameter of 1-1/4 inches minimum and 2 inches maximum.
 - Handrail gripping surfaces with non-circular cross sections must have a perimeter dimension of 4 inches minimum and 6-1/4 inches maximum, and a cross-section dimension of 2-1/4 inches maximum
 - c. Handrail gripping surfaces and adjacent surfaces must be free of sharp or abrasive elements, and all edges must be rounded.
 - d. Rotation of handrails in fittings is prohibited.
- **E.** Handrail extensions:
 - 1. Handrail extensions are not required for continuous handrails at the inside turn of switchback or dogleg stairs and ramps.
 - 2. Top and bottom extension at ramps: handrails must extend horizontally for 12 inches minimum at the required landing at the top and bottom of ramp runs. Extensions must return to a wall, guard, or the landing surface, or continue to the handrail of an adjacent ramp run.
 - 3. Top extension at stairs: handrails must extend handrails horizontally or 12 inches minimum from a point directly above the first riser nosing. Extensions must to a wall, guard, or the landing surface, or continue to the handrail of an adjacent stair flight.
 - 4. Bottom extension at stairs: handrails must extend at the slope of the stair flight for a horizontal distance at least equal to one tread depth from a point directly above the last riser nosing. Extensions must return to a wall, guard, or the landing surface, or continue to the handrail of an adjacent stair flight.
- **F.** To accommodate the widest range of users, provide ramps with the least possible running slope and, wherever possible, accompany ramps with stairs for use by those individuals for whom distance presents a greater barrier than steps, e.g., people with heart disease or limited stamina.

2.3 Transfer Walls

- **A.** Clear deck space: provide a clear deck space of 60 inches minimum by 60 inches minimum with a slope not steeper than 1:48 at the base of the transfer wall. Where one grab bar is provided, center the clear deck space on the grab bar. Where two grab bars are provided, center the clear deck on the clearance between them.
- B. Height: 16 inches minimum and 19 inches maximum measured from the deck.
- **C**. Wall depth: 12 inches minimum and 16 inches maximum.
- D. Length: 60 inches minimum and centered on the clear deck space.
- E. Surface: surfaces of transfer walls shall not be sharp and shall have rounded edges.
- **F.** Grab bars: provide at least one grab bar on the transfer wall. Mount perpendicular to the pool wall and extend the full depth of the transfer wall. The top of the gripping surface is to be 4 inches minimum and 6 inches maximum above transfer walls. Where one grab bar is provided, provide 24 inches minimum clearance on both sides of the grab bar. Where two grab bars are provided, provide be 24 inches minimum clearance between them.

2.4 Transfer System

- **A.** Transfer platform: provide minimum 19 inches clear deep and minimum 24 inches clear wide platform at the head of each transfer system.
- **B.** Transfer space: provide 60 inches minimum by 60 inches minimum transfer space with a slope not steeper than 1:50 (2%) at the base of the transfer platform surface centered along a minimum 24 inch unobstructed side of the transfer platform.
- C. Height: 16 inches minimum and 19 inches maximum measured from the deck.
- D. Surface: rounded. Sharp edges are not permitted.
- E. Transfer steps:
 - 1. Transfer step height: 8 inches maximum. Extend the surface of the bottom tread to a water depth of 18 inches minimum below the stationary water level.
 - Transfer step surface sizes: 14 inches minimum and 17 inches maximum depth with clear width of 24 inches minimum.

2.5 Grab Bars for Transfer Walls and Systems.

- A. Grab bars: provide at least one grab bar on each transfer step and the transfer platform or a continuous grab bar serving each transfer step and the transfer platform. Where a grab bar is provided on each step, locate the top of gripping surfaces 4 inches minimum and 6 inches maximum above each step and transfer platform. Where a continuous grab bar is provided, locate the top of the gripping surface 4 inches minimum and 6 maximum above each step and transfer platform. Grab bars at the transfer platforms are not permitted to obstruct transfer.
- B. Cross section:
 - 1. Circular cross section: outside diameter of 1-1/4 inches minimum and 2 inches maximum.
 - 2. Non-circular cross sections: cross-section dimension of 2 inches maximum and a perimeter dimension of 4 inches minimum and 4.8 inches maximum.
- C. Spacing:
 - 1. Space between the wall and the grab bar: $1-\frac{1}{2}$ inches.

- 2. Space between the grab bar and projecting objects below and at the ends: $1-\frac{1}{2}$ inches minimum.
- 3. Space between the grab bar and projecting objects above: 12 inches minimum.
- **D.** Grab bars and any wall or other surfaces adjacent to grab bars are to be free of sharp or abrasive elements and have rounded edges.
- E. Grab bars are not permitted to rotate within their fittings.
- **F.** Do not exceed allowable stresses for materials used when a vertical or horizontal force of 250 pounds is applied at any point on the grab bar, fastener, mounting device, or supporting structure.

2.6 Pool Stairs

- A. Treads and risers: uniform riser heights and tread depths are required. Treads to be minimum 11 inches deep.
- B. Open risers are not permitted.
- **c.** Changes in level are not permitted. Treads shall be permitted to have a slope not steeper than 1:50.
- **D.** Nosings:
 - 1. Radius of curvature at the leading edge of the tread: 1/2 inch maximum.
 - 2. Risers may slope under the tread at an angle of 30 degrees maximum from vertical.
 - 3. Permitted projection of the nosing: $1-\frac{1}{2}$ inches (38 mm) maximum over the tread below.
- E. Handrails:
 - 1. Clearance between handrail gripping surfaces and an adjacent vertical surface: 1-1/2 inches minimum.
 - 2. Handrail configuration:
 - a. Handrails must be continuous along their length, with no breaks in runs.
 - b. Handrails must not have obstructions along the top or sides, and may have obstructions for no more than 20 percent of the total length along the bottom.
 - c. Horizontal projections must be located $1-\frac{1}{2}$ inches minimum below the bottom of the handrail.
 - 3. Handrail gripping surfaces:
 - a. Handrail gripping surfaces with a circular cross section must have an outside diameter of 1-1/4 inches minimum and 2 inches maximum.
 - Handrail gripping surfaces with non-circular cross sections must have a perimeter dimension of 4 inches minimum and 6-1/4 inches maximum, and a cross-section dimension of 2-1/4 inches maximum.
 - c. Handrail gripping surfaces and adjacent surfaces must be free of sharp or abrasive elements, and all edges must be rounded.
 - d. Rotation of handrails in fittings is prohibited.
 - 4. Width between handrails: 20 inches minimum and 24 inches maximum.
 - 5. Top extension at stairs: handrails must extend handrails horizontally or 12 inches minimum from a point directly above the first riser nosing.

PART 3 - EXECUTION (No Comments)

Best Practice Recommendation:

• Consider using contrast at edges in wet areas to indicate change of level for improved safety of people with vision limitations.

13 17 00 / TUBS AND POOLS / 13170

Integrative Design 1.2a Universal Design (New Construction Only) [Mandatory]

Integrative Design 1.2b Universal Design (Substantial and Moderate Rehab Only) [Mandatory in part]

PART 1 – GENERAL

1.1 Summary

- A. Applicability: public and common use areas.
 - 1. Tubs, Jacuzzis, and spas Pools require one accessible means of entry. This means of entry may be a lift, transfer wall, or transfer system.
- B. Related Sections:
 - 1. 01 42 00 References and Definitions
 - 2. 13 11 00 Swimming Pools

PART 2 - PRODUCTS

2.1 Lifts

- **A.** Location of lift:
 - 1. The lift must be located where the water level does not exceed 48 inches, except in cases where the entire pool depth is greater than 48 inches.
- **B.** Seat location:
 - 1. In the raised position, locate the centerline of the seat over the deck and 16 inches minimum from the edge of the pool.
 - 2. Slope the deck surface between the centerline of the seat and the pool edge not steeper than 1:50 (2%).
 - 3. Provide clear deck space parallel with the seat on the side of the seat opposite the water.
 - a. Area & location: 36 inches wide minimum and extending forward 48 inches minimum from a line located 12 inches behind the rear edge of the seat.
 - b. Slope of clear deck space: not steeper than 1:50 (2%).
- **c.** Seat height: designed to allow a stop at 16 inches minimum to 19 inches maximum measured from the deck to the top of the seat surface when in the raised (load) position.
- D. Seat width: minimum 16 inches.
- **E.** Footrests and armrests: footrests are required except at spas, and they must travel with the seat. If provided, the armrest positioned opposite the water is required to be removable or fold clear of the seat when the seat is in the raised (load) position.
- **F.** Lift operation: the lift must be capable of unassisted operation from both the deck and water levels with unobstructed controls and operating mechanisms when the lift is in use. Use controls operable with one hand and without tight grasping, pinching, or twisting of the wrist. The force required to activate operable parts must be 5 pounds maximum.
- **G.** Design the lift so that the seat will submerge to a water depth of 18 inches minimum below the stationary water level.

H. Lifting capacity: minimum weight capacity of 300 pounds and capable of sustaining a static load of at least one and a half times the rated load. Pool lifts should be provided that meet the needs of the populations using the facility. Providing a lift with a weight capacity greater than 300 pounds may be advisable.

2.3 Transfer Walls

- **A.** Clear deck space: provide a clear deck space of 60 inches minimum by 60 inches minimum with a slope not steeper than 1:48 at the base of the transfer wall. Where one grab bar is provided, center the clear deck space on the grab bar. Where two grab bars are provided, center the clear deck on the clearance between the grab bars.
- **B**. Height: 16 inches minimum and 19 inches maximum measured from the deck.
- **C**. Wall depth: 12 inches minimum and 16 inches maximum.
- **D.** Length: 60 inches minimum and centered on the clear deck space.
- E. Surface: surfaces of transfer walls shall not be sharp and shall have rounded edges
- **F.** Grab bars: provide at least one grab bar on the transfer wall. Mount perpendicular to the pool wall and extend the full depth of the transfer wall. The top of the gripping surface is to be 4 inches minimum and 6 inches maximum above transfer walls. Where one grab bar is provided, provide 24 inches minimum clearance on both sides of the grab bar. Where two grab bars are provided, provide be 24 inches minimum clearance between grab bars.

2.4 Transfer System

- **A.** Transfer platform: provide minimum 19 inches clear deep and minimum 24 inches clear wide platform at the head of each transfer system.
- **B.** Transfer space: provide 60 inches minimum by 60 inches minimum transfer space with a slope not steeper than 1:50 (2%) at the base of the transfer platform surface centered along a minimum 24 inch unobstructed side of the transfer platform.
- **C.** Height: 16 inches minimum and 19 inches maximum measured from the deck.
- D. Surface: rounded. Sharp edges are not permitted.
- E. Transfer steps:
 - 1. Transfer step height: 8 inches maximum. Extend the surface of the bottom tread to a water depth of 18 inches minimum below the stationary water level.
 - Transfer step surface sizes: 14 inches minimum and 17 inches maximum depth with clear width of 24 inches minimum.

2.5 Grab Bars for Transfer Walls and Systems.

- A. Grab bars: provide at least one grab bar on each transfer step and the transfer platform or a continuous grab bar serving each transfer step and the transfer platform. Where a grab bar is provided on each step, locate the top of gripping surfaces 4 inches minimum and 6 inches maximum above each step and transfer platform. Where a continuous grab bar is provided, locate the top of the gripping surface 4 inches minimum and 6 maximum above the step nosing and transfer platform. Grab bars at the transfer platforms are not permitted to obstruct transfer.
- B. Cross section:
 - 1. Circular cross section: outside diameter of 1-1/4 inches minimum and 2 inches maximum.

- 2. Non-circular cross sections: cross-section dimension of 2 inches maximum and a perimeter dimension of 4 inches minimum and 4.8 inches maximum.
- C. Spacing:
 - 1. Space between the wall and the grab bar: $1-\frac{1}{2}$ inches.
 - 2. Space between the grab bar and projecting objects below and at the ends: 1-1/2 inches minimum.
 - 3. Space between the grab bar and projecting objects above: 12 inches minimum.
- **D.** Grab bars and any wall or other surfaces adjacent to grab bars are to be free of sharp or abrasive elements and have rounded edges.
- E. Grab bars are not permitted to rotate within their fittings.
- **F.** Do not exceed allowable stresses for materials used when a vertical or horizontal force of 250 pounds is applied at any point on the grab bar, fastener, mounting device, or supporting structure.

PART 3 - EXECUTION (No Comments)

Division 14: Conveying Equipment (Division 14: Conveying Systems)

14 20 00 / ELEVATORS / 14200

Integrative Design 1.2a Universal Design (New Construction Only) [Mandatory]

Integrative Design 1.2b Universal Design (Substantial and Moderate Rehab Only) [Mandatory]

PART 1 – GENERAL

1.1 Summary

- A. Applicability: public and common use areas.
- **B.** Related sections:
 - 1. 01 81 14 Accessible Design Requirements
 - 2. 10 14 00 Signage

1.2 References

A. ASME A17.1, American Society of Mechanical Engineers publication.

PART 2 – PRODUCTS

2.1 Elevators

- A. Elevator controls:
 - 1. Provide raised or flush call buttons. Existing elevators are permitted to have recessed call buttons. Raised buttons are preferred.
 - 2. Locate call buttons and keypads within specified reach ranges, measured to the centerline of the highest operable part. Existing call buttons and existing keypads may be located at 54 inches maximum AFF, measured to the centerline of the highest operable part.
 - 3. Size: 3/4 inch minimum in the smallest dimension. Existing elevator buttons may be smaller. Buttons that are 1-¹/₄ inches in diameter or larger are preferred.
 - 4. Provide a level clear floor or ground space at call controls.
 - 5. Locate the call button that designates the up direction above the call button that designates the down direction.
 - 6. Provide visible signals to indicate when each call is registered and when each call is answered.

B. Hall signals:

- 1. Provide a visible and audible signal at each hoistway entrance to indicate which car is answering a call and the car's direction of travel. Where in-car signals are provided, they are to be visible from the floor area adjacent to the hall call buttons. Note: in existing elevators, a signal indicating the direction of car travel is not required.
- 2. Center visible signal fixtures at 72 inches minimum AFF. The visible signal elements shall be 2 ¹/₂ inches minimum measured along the vertical centerline of the element. Signals shall be visible from the floor area adjacent to the hall call button.
- 3. Provide audible signals. Signals are to sound once for the up direction and twice for the down direction, or have verbal annunciators that indicate the direction of elevator car travel. Verbal annunciators are preferred.
 - a. audible signals: frequency of 1500 Hz maximum.
 - b. verbal annunciators: frequency of 300 Hz minimum and 3000 Hz maximum.
 - c. the audible signal and verbal annunciator are to be 10 dB minimum above ambient, but not exceed 80 dB, measured at the hall call button.
- **C.** Hoistway signs: provide floor designations on both jambs of elevator hoistway entrances in both tactile characters and braille. Tactile characters: 2 inches high minimum. Provide a tactile star on both jambs at the main entry level. Refer to Signage specification for complete requirements related to these signs.
- **D.** Hoistway and car doors:
 - 1. Provide only horizontal sliding type elevator doors that open and close automatically.
 - 2. Provide elevator doors with a reopening device that stops and reopens a car door and hoistway door automatically if the door becomes obstructed by an object or person. The device is to activate on sensing an obstruction passing through the opening at 5 inches nominal and 29 inches nominal AFF.
 - 3. Sensors do not require physical contact to be activated, although contact is permitted to occur before the door reverses.
 - 4. Reopening action to remain effective for 20 seconds minimum.
 - 5. Door delay: remain fully open in response to a car call for 3 seconds minimum.
- E. Elevator car requirements:
 - 1. Car dimensions with centered door:
 - a. Door clear width: 42 inches minimum. A width of 48 inches is recommended and provides greater accessibility.
 - b. Inside car, side to side: 80 inches.
 - c. Inside car, back wall to front return: 51 inches.
 - d. Inside car, back wall to inside face of door: 54 inches.
 - 2. Car dimensions with door located to one side (off-centered):
 - a. Door clear width: 36 inches .
 - b. Inside car, side to side: 68 inches.
 - c. Inside car, back wall to front return: 51 inches..
 - d. Inside car, back wall to inside face of door: 54 inches
 - 3. Car dimensions with 36 inch wide door opening (any location), option 1:
 - a. Inside car, side to side: 54 inches.
 - b. Inside car, back wall to front return: 80 inches.
 - c. Inside car, back wall to inside face of door: 80 inches.

- 4. Car dimensions with 36 inch wide door opening (any location), option 2:
 - a. Inside car, side to side: 60 inches.
 - b. Inside car, back wall to front return: 60 inches.
 - c. Inside car, back wall to inside face of door: 60 inches.
- 5. Other car configurations that provide a clear 60 inch diameter turning space with the door closed are permitted. When possible, provide car with 60 inch by 80 inch interior floor space.
- 6. Clearance between the car platform sill and the edge of any hoistway landing: 1-1/4 inch maximum.
- Equip each car with a self-leveling feature that will automatically bring and maintain the car at floor landings within a tolerance of ¹/₂ inch under rated loading to zero loading conditions.
- 8. Minimum level of illumination at the car controls, platform, car threshold and car landing sill is 5 foot candles (54 lux) minimum.
- **F.** Elevator car controls:
 - 1. Locate standard controls within one of the reach ranges specified under Section 2.3.
 - 2. Provide raised or flush car control buttons with floor designations. Raised buttons are preferred.
 - 3. Buttons: ³/₄ inch minimum in their smallest dimension. Buttons that are 1-¹/₄ inches in diameter or larger are preferred.
 - 4. Arrange buttons with numbers in ascending order. When two or more columns of buttons are provided they are to read from left to right.
 - 5. Locate emergency control buttons with their centerlines 35 inches minimum AFF. Group emergency controls, including the emergency alarm, at the bottom of the panel.
- G. Designations and indicators of car controls:
 - 1. Identify control buttons with tactile characters complying with Signage specifications.
 - 2. Place raised character and braille designations immediately to the left of the control button to which the designations apply.
 - 3. Identify the control button for the emergency stop, alarm, door open, door close, main entry floor, and phone, with tactile symbols as shown below:

	Tactile Symbol	Braille Message
Control Button		
Emergency Stop	\mathbf{X}	"ST"OP Three cells
Alarm	▲	AL"AR"M four cells
Door Open		OP"EN" three cells
Door Close		CLOSE five cells
Main Entry Floor	*	MA"IN" three cells
Phone	~	PH"ONE" four cells

- 4. Provide visible indicators for buttons with floor designations to show that a call has been registered. The visible indication must extinguish when the car arrives at the designated floor.
- H. Car position indicators: provide audible and visible car position indicators in elevator cars.
 - 1. Visible indicators:
 - a. Size of characters: 1/2 inch high minimum.
 - b. Locate indicators above the car control panel or above the door preferred.
 - c. Illuminate the corresponding characters as the car passes a floor and when a car stops at a floor served by the elevator.
 - 2. Audible indicators shall comply with 407.4.8.2.
 - a. Provide an automatic verbal annunciator which announces the floor at which the car is about to stop. For elevators other than destination-oriented elevators that have a rated speed of 200 feet per minute (1 m/s) or less, a non-verbal audible signal with a frequency of 1500 Hz maximum which sounds as the car passes or is about to stop at a floor served by the elevator is permitted. Verbal annunciators are preferred.
 - b. Signal level of the verbal annunciator: 10 dB minimum above ambient, but not more than 80 dB, measured at the annunciator.
 - c. Signal frequency: 300 Hz minimum to 3000 Hz maximum.
- I. Provide emergency two-way communication systems within reach ranges specified in Section 2.3. Provide tactile symbols and characters adjacent to the device. Refer to Signage specifications for tactile requirements.

2.2 Limited-Use / Limited-Application Elevators

- A. Elevator landings:
 - 1. Provide raised or flush call buttons. Existing elevators are permitted to have recessed call buttons.
 - 2. Locate call buttons and keypads within specified reach ranges, measured to the centerline of the highest operable part. Existing call buttons and existing keypads may be located at 54 inches maximum AFF, measured to the centerline of the highest operable part.
 - 3. Size: 3/4 inch minimum in the smallest dimension. Existing elevator buttons may be smaller.
 - 4. Provide a level clear floor or ground space at call controls.
 - 5. Locate the call button that designates the up direction above the call button that designates the down direction.
 - 6. Provide visible signals to indicate when each call is registered and when each call is answered.
- B. Hall signals:
 - 1. Provide a visible and audible signal at each hoistway entrance to indicate which car is answering a call and the car's direction of travel. Where in-car signals are provided, they are to be visible from the floor area adjacent to the hall call buttons. Note: in existing elevators, a signal indicating the direction of car travel is not required.
 - 2. Center visible signal fixtures at 72 inches minimum AFF. The visible signal elements shall be 2 ¹/₂ inches minimum measured along the vertical centerline of the element. Signals shall be visible from the floor area adjacent to the hall call button.

- 3. Provide audible signals. Signals are to sound once for the up direction and twice for the down direction, or have verbal annunciators that indicate the direction of elevator car travel.
 - a. Audible signals: frequency of 1500 Hz maximum.
 - b. Verbal annunciators: frequency of 300 Hz minimum and 3000 Hz maximum.
 - c. The audible signal and verbal annunciator are to be 10 dB minimum above ambient, but not exceed 80 dB, measured at the hall call button.
- **C.** Hoistway signs: provide floor designations on both jambs of elevator hoistway entrances in both tactile characters and braille. Tactile characters: 2 inches high minimum. Provide a tactile star on both jambs at the main entry level.
- **D.** Elevator doors:
 - 1. Sliding doors: slide horizontally and operate automatically. Provide reopening devices as specified in Section 2.1.
 - 2. Swinging doors.
 - a. Power operation is required for all swinging doors. Doors must open and close automatically and comply with ANSI/BHMA A156.19 (1997 or 2002 edition).
 - b. Swinging doors must remain open for 20 seconds minimum when activated.
- **E.** Elevator cars:
 - Provide elevator cars with a clear width 42 inches minimum and a clear depth 54 inches minimum. Position car doors shall be positioned at the narrow ends of cars and provide 32 inches minimum clear width.
 - 2. Clearance between the car platform sill and the edge of any hoistway landing: 1-1/4 inch maximum.
 - 3. Equip each car with a self-leveling feature that will automatically bring and maintain the car at floor landings within a tolerance of 1/2 inch under rated loading to zero loading conditions.
 - 4. Minimum level of illumination at the car controls, platform, car threshold and car landing sill is 5 foot candles (54 lux) minimum.
- **F.** Elevator car controls:
 - 1. Locate standard controls within one of the reach ranges specified under Section 2.3.
 - 2. Provide raised or flush car control buttons with floor designations.
 - 3. Buttons: 3/4 inch minimum in their smallest dimension.
 - 4. Arrange buttons with numbers in ascending order. When two or more columns of buttons are provided they are to read from left to right.
 - 5. Locate emergency control buttons with their centerlines 35 inches minimum AFF. Group emergency controls, including the emergency alarm, at the bottom of the panel.
- G. Designations and indicators of car controls:
 - 1. Identify control buttons with tactile characters complying with Signage specifications.
 - 2. Place raised character and braille designations immediately to the left of the control button to which the designations apply.
 - 3. Identify the control button for the emergency stop, alarm, door open, door close, main entry floor, and phone, with tactile symbols as shown below:

4. Provide visible indicators for buttons with floor designations to show that a call has been registered. The visible indication must extinguish when the car arrives at the designated floor.

	0	8
	Tactile Symbol	Braille Message
Control Button		
Emergency Stop		"ST"OP Three cells
Alarm	▲	AL"AR"M four cells
Door Open		OP"EN" three cells
Door Close		CLOSE five cells
Main Entry Floor	*	MA"IN" three cells
Phone	^	PH"ONE" four cells

H. Provide emergency two-way communication systems within reach ranges specified in Section 2.3. Provide tactile symbols and characters adjacent to the device. Refer to Signage specifications for tactile requirements.

2.3 Mounting Heights for Controls and Buttons

- A. Locations:
 - 1. Clear level floor area in front of machines: minimum 30 inches by 48 inches, centered on the equipment.
 - 2. Clear accessible route path to machine is required.
- **B.** Heights: the topmost and bottommost controls and operating parts of all equipment are required to be within reach range limits as follows:
 - 1. Unobstructed forward reach: minimum 15 inches and maximum 48 inches AFF.
 - 2. Obstructed forward reach:
 - a. Where the obstruction (reach depth) is 20 inches maximum: 48 inches maximum AFF.
 - b. Where the obstruction (reach depth) is between 20 inches and 25 inches: 44 inches maximum AFF.
 - c. Obstructions more than 25 inches deep not permitted.
 - d. Clear floor space can extend beneath the element for a distance not less than the required reach depth over the obstruction.
 - 3. Unobstructed side reach: minimum 15 inches and maximum 48 inches AFF.
 - 4. Obstructed side reach:
 - a. Where the obstruction (reach depth) is 10 inches maximum: 48 inches maximum AFF.
 - b. Where the reach depth is between 10 inches and 24 inches: the maximum height of the obstruction is 34 inches and the maximum side reach is 46 inches AFE.
 - c. Obstructions more than 24 inches deep not permitted.

PART 3 - EXECUTION (No Comments)

Best Practice Recommendations:

- The requirements for accessibility of existing elevators vary from state to state. In addition, the ADA Standards have exceptions for many of the requirements for new elevators. If renovating existing units, refer to state and federal regulations for additional information.
- For ease of use, providing duplicate controls on each side of elevator cabs accommodates a greater range of users. In addition, where cabs are narrow, placing controls on the side wall within reach range of the seated user is recommended.

14 40 00 / LIFTS / 14400

Integrative Design 1.2a Universal Design (New Construction Only) [Mandatory] Integrative Design 1.2b Universal Design (Substantial and Moderate Rehab Only) [Mandatory in part]

PART 1 – GENERAL

1.1 Summary

- A. Applicability: limited.
- **B.** The use of platform lifts is not encouraged. Platform lifts present serious maintenance challenges, and they are historically less than reliable or locked and unavailable for use. If specifying a platform lift, selection of a unit with a minimum capacity of 750 pounds is recommended. The ADA and other Federal civil rights laws require that accessible features be maintained in working order so that they are accessible to and usable by those people they are intended to benefit. Building owners are reminded that the ASME A18 Safety Standard for Platform Lifts and Stairway Chairlifts requires routine maintenance and inspections. Isolated or temporary interruptions in service due to maintenance or repairs may be unavoidable; however, failure to take prompt action to effect repairs could constitute a violation of Federal laws.

PART 2 - PRODUCTS

2.1 Platform Lifts

- **A.** Comply with ASME A18.1 (1999 edition or 2003 edition). Provide units designed for unassisted entry and exit from the lift. Attendant-operated units are prohibited.
- B. Platform:
 - 1. Provide a minimum 30 inch by 48 inch clear floor space in platform lifts.
 - 2. Platform to runway clearance between the platform sill and the edge of any runway landing: 1 inch maximum.
- **C.** Controls must be operable without pinching or twisting motions.
- **D.** Doors and gates: low-energy power-operated doors or gates. Doors are to remain open for 20 seconds minimum. Platform lifts serving two landings maximum and having doors or gates on opposite sides may have self-closing manual doors or gates.
 - 1. End doors and gates: minimum clear width of 32 inches.
 - 2. Side doors and gates: minimum clear width of 42 inches.

PART 3 - EXECUTION (No Comments)

Best Practice Recommendation:

• Platform lifts are not recommended for new construction with rare exception. They should not be located in busy lobbies or heavily used pedestrian routes.

Division 22: Plumbing (Division 15: Mechanical)

22 10 00 / PLUMBING/PIPING / 15400

Integrative Design 1.2a Universal Design (New Construction Only) [Mandatory] Integrative Design 1.2b Universal Design (Substantial and Moderate Rehab Only) [Mandatory]

PART 1 – GENERAL

1.1 Summary

- **A.** Applicability:
 - 1. Public and common use restrooms and kitchens.
 - 2. Type A units.
- **B.** Notify Architect and/or MEP Engineer immediately if field conditions prevent installation of piping rough at locations specified. Accessibility of fixtures will be adversely affected and adjustments may be required prior to proceeding with work.
- **C.** Related sections:
 - 1. 01 42 00 References and Definitions
 - 2. 01 77 00 Closeout Procedures
 - 3. 06 41 00 Architectural Wood Casework
 - 4. 10 21 13 Toilet Compartments
 - 5. 10 28 13 Toilet Accessories
 - 6. 10 38 16 Bath Accessories
 - 7. 12 35 00 Residential Casework

PART 2 - PRODUCTS

PART 3 - EXECUTION

3.1 Rough-in Clearances & Tolerances

- A. Toilets:
 - 1. Wheelchair accessible:
 - a. Position rough-in with a wall or partition to the rear and to one side of toilet.
 - b. Centerline of rough-in: 16 inches minimum to 18 inches maximum from the finished side wall or partition.
 - 2. Ambulatory accessible: rough-in 17 inches minimum and 19 inches maximum from the finished side wall or partition in the ambulatory accessible toilet compartment
 - 3. Wall hung toilet seat height AFF: 17 inches minimum and 19 inches maximum measured to the top of the seat. Set carrier to accommodate this height.

- 4. Floor-mounted toilet seat height AFF: 17 inches minimum and 19 inches maximum measured to the top of the seat.
- **B.** Drinking fountains: center equipment on a clear floor space of at least 30 inches wide and 48 inches deep. Knee clearance provided by the fixture that complies with Section 3.2 below can be included in this clear floor space.
- **c.** Urinals: center fixture on a clear floor space of at least 30 inches wide and 48 inches deep. Set wall carrier for accessible urinal so that the rim will be 17 inches maximum AFF.
- **D.** Lavatories and sinks:
 - 1. Front approach: center fixture on a clear floor space of at least 30 inches wide and 48 inches deep. Clear floor space can extend under the fixture if required knee and toe clearance is provided according to Section 3.2.
 - 2. Parallel approach: 48 inches wide and 30 inches deep. Parallel approach to a kitchen sink is allowed only in a space where a cook top or conventional range is not provided and at wet bars.
 - 3. Wall hung units: set carriers so that with topmost surface of fixture will be at 34 inches maximum AFF.
- **E.** Bathtub controls: locate on an end wall between the bathtub rim and grab bar, and between the open side of the bathtub and the centerline of the width of the bathtub.
- F. Shower controls, faucets, and shower spray units:
 - 1. Transfer-type shower compartments: install on the side wall opposite the seat 38 inches minimum and 48 inches maximum above the shower floor within 15 inches maximum from the centerline of the seat toward the shower opening.
 - 2. Standard roll-in type shower compartments: install above the grab bar height, but no higher than 48 inches above the shower floor. Where a seat will be provided, install on the back wall adjacent to the seat wall, 27 inches maximum from the seat wall.
 - 3. Alternate roll-in type shower compartments: install above the grab bar height, but no higher than 48 inches above the shower floor. Where a seat is provided, install on the side wall adjacent to the seat 27 inches maximum from the side wall behind the seat or on the back wall opposite the seat 15 inches maximum, left or right, from the centerline of the seat. Where a seat is not provided, install on the side wall farthest from the compartment entry.

3.2 Knee and Toe Clearance Requirements

- 1. Toe clearance:
 - a. Space under an element between the finished floor or ground and 9 inches AFF is considered toe clearance.
 - b. Maximum depth: toe clearance can extend 25 inches maximum under an element.
 - c. Minimum required depth: provide a minimum 17 inches of clear depth under the fixture or surface where toe clearance is required at an element as part of a clear floor space.
 - d. Space extending greater than 6 inches beyond the available knee clearance at 9 inches AFF is not considered toe clearance.

e. Toe clearance width: 30 inches wide minimum.



NOTE: All dimensions in inches (above) and millimeters (below).

- 2. Knee clearance:
 - a. Space under an element between 9 inches and 27 inches AFF is considered knee clearance.
 - b. Maximum depth: knee clearance can extend 25 inches maximum under an element at 9 inches AFF.
 - c. Minimum required depth: where knee clearance is required under an element as part of a clear floor space, provide knee clearance 11 inches deep minimum at 9 inches AFF, and 8 inches deep minimum at 27 inches AFF.
 - d. Clearance reduction: between 9 inches and 27 inches AFF, the knee clearance may reduce at a rate of 1 inch in depth for each 6 inches in height.
 - e. Width: 30 inches wide minimum.



NOTE: All dimensions in inches (above) and millimeters (below).

Best Practice Recommendation:

 Rough-in dimensions should not be set at the limits of required ranges. Finish products can changed after the completion rough-in and can affect clearances. Setting rough-ins for an extra ¹/₂ inch of variation is recommended.

22 40 00 / PLUMBING FIXTURES / 15450

Integrative Design 1.2a Universal Design (New Construction Only) [Mandatory]

Integrative Design 1.2b Universal Design (Substantial and Moderate Rehab Only) [Mandatory in part]

PART 1 – GENERAL

1.1 Summary

- **A.** Applicability:
 - 1. Public and common use restrooms and kitchens.
 - 2. Type A units.
- B. Related Sections:
 - 1. 01 77 00 Closeout Procedures
 - 2. 10 28 13 Toilet Accessories (seats, grab bar and other components)
 - 3. 12 35 00 Residential Casework

1.2 Submittals

A. Include product literature for all fixtures and fittings in project close-out submittals to owner. Include manufacturer's specifications sheets indicating all fixture dimensions, heights, and clearances.

PART 2 - PRODUCTS

2.1 Plumbing Fixtures

- A. Toilets:
 - 1. Seat height: 17 inches minimum and 19 inches maximum measured to the top of the seat. Seats may not be sprung to return to a lifted position.
 - 2. Flush valve must be located on the open side of the toilet, except in ambulatory accessible toilet compartments.
 - 3. Flush controls must be hand operated or automatic. Hand operated flush controls: maximum 5 pounds of force required to operate and located within reach ranges specified below.
- **B.** Lavatories and sinks:
 - 1. Mounting type and drain location: coordinate with countertop. Fixtures with rear, offset drains provide better overall accessibility.
 - 2. No more than one bowl of a multi-bowl sink is required to provide knee and toe clearance, provided the space under the one bowl will provide the required width.
 - 3. Install lavatories and sinks with the front of the rim or counter surface 34 inches maximum AFF, whichever is higher.
 - 4. Faucets must be operable with one hand without pinching, grasping, or twisting motions. Force to operate is limited to 5 pounds or less.

C. Bathtubs:

- 1. Controls: operable with one hand without pinching, grasping, or twisting motions. Force to operate is limited to 5 pounds or less.
- 2. Provide a shower spray unit with a hose 59 inches long minimum that can be used both as a fixed-position shower head and as a hand-held shower. Include an on/off control with a non-positive shut-off. If an adjustable-height shower head on a vertical bar is used, install the bar so as not to obstruct the use of grab bars.
- 3. Water temperature: 120°F maximum.
- Bathtub enclosures: do not obstruct controls, faucets, or shower and spray units. Do not obstruct transfer from wheelchairs onto bathtub seats or into bathtubs. Tracks on the rim of the tub are prohibited.
- 5. Provide fixture with slip resistant surfaces in the bottom of the tub.
- **D.** Showers:
 - In transfer-type shower compartments, provide 36 inches by 36 inches clear inside dimensions measured at the center points of opposing sides and a 36 inch wide minimum entry on the face of the shower compartment. Provide clear floor space of 36 inches wide minimum by 48 inches long minimum measured from the control wall and placed parallel with the entry.
 - 2. In standard roll-in-type shower compartments, provide 30 inches wide minimum by 60 inches deep minimum clear inside dimensions measured at center points of opposing sides and with a 60 inches wide minimum entry on the face of the shower compartment. Designing the shower compartment with additional depth (e.g. 42 inches deep) provides for better water control and ease of movement in the compartment.
 - 3. In alternate roll-in-type shower compartments, provide 36 inches wide and 60 inches deep minimum clear inside dimensions measured at center points of opposing sides. Provide a 36 inch wide minimum entry at one end of the long side of the compartment. Designing the shower compartment with additional depth (e.g. 42 inches deep) provides for better water control and ease of movement in the compartment.
 - 4. Shower spray unit: provide a hose 59 inches long minimum that can be used both as a fixed-position shower head and as a hand-held shower. Include an on/off control with a non-positive shut-off. If an adjustable-height shower head on a vertical bar is used, install the bar so as not to obstruct the use of grab bars.
 - 5. Water temperature: 120°F maximum.
 - 6. Thresholds: limit to ½ inch overall height. Changes in level of ¼ inch maximum may be vertical. Bevel thresholds creating a change in level between ¼ inch and ½ inch with a slope not greater than 1:2.
 - 7. Thresholds in transfer-type shower compartments: limit to ½ inch overall height. Thresholds may be beveled, rounded, or vertical. A threshold 2 inches high maximum is permitted in transfer- type shower compartments in existing facilities where provision of a ½ inch high threshold would disturb the structural reinforcement of the floor slab.
 - 8. Shower enclosures: do not obstruct controls, faucets, and shower spray units or obstruct transfer from wheelchairs onto shower seats.
 - 9. Controls must be operable with one hand without tight grasping, pinching, or twisting motions. Force required to operate is limited to 5 pounds or less.

E. Drinking fountains:

- 1. Operable parts must be operable with one hand without tight grasping, pinching, or twisting motions. Force required to operate is limited to 5 pounds or less.
- 2. Spout outlets: 36 inches maximum AFF.
- 3. Spout location: 15 inches minimum from the vertical support and 5 inches maximum from the front edge of the unit, including bumpers.
- 4. Provide a flow of water 4 inches high minimum, located 5 inches maximum from the front of the unit. Measure the angle of the water stream horizontally relative to the front face of the unit.
 - a. Where spouts are located less than 3 inches of the front of the unit: angle water stream at 30 degrees maximum.
 - b. Where spouts are located between 3 inches and 5 inches maximum from the front of the unit, angle of the water stream at 15 degrees maximum.
- 5. Drinking fountains for standing users: locate with spout outlet 38 inches minimum and 43 inches maximum AFF.
- F. Urinals:
 - 1. 13-1/2 inches deep minimum measured from the outer face of the urinal rim to the back of the fixture.
 - 2. Locate flush valve on open side.
 - 3. Flush controls: hand operated or automatic. Hand operated flush controls: maximum 5 pounds of force required to operate. Mount controls within reach ranges specified below.

2.2 Knee and Toe Clearances

- A. Toe clearance:
 - 1. Space under an element between the finished floor or ground and 9 inches AFF is considered toe clearance.
 - 2. Maximum depth: toe clearance can extend 25 inches maximum under an element.
 - 3. Minimum required depth: provide a minimum 17 inches of clear depth under the fixture or surface where toe clearance is required at an element as part of a clear floor space.
 - 4. Space extending greater than 6 inches beyond the available knee clearance at 9 inches AFF is not considered toe clearance.
 - 5. Toe clearance width: 30 inches wide minimum.



NOTE: All dimensions in inches (above) and millimeters (below).

- **B.** Knee clearance:
 - 1. Space under an element between 9 inches and 27 inches AFF is considered knee clearance.
 - 2. Maximum depth: knee clearance can extend 25 inches maximum under an element at 9 inches AFF.
 - 3. Minimum required depth: where knee clearance is required under an element as part of a clear floor space, provide knee clearance 11 inches deep minimum at 9 inches AFF, and 8 inches deep minimum at 27 inches AFF.
 - 4. Clearance reduction: between 9 inches and 27 inches AFF, the knee clearance may reduce at a rate of 1 inch in depth for each 6 inches in height.
 - 5. Width: 30 inches wide minimum.



NOTE: All dimensions in inches (above) and millimeters (below).

PART 3 - EXECUTION

3.1 Plumbing Fixture Installation Requirements

- A. Toilets:
 - 1. Seat height: check installed height.

2. Flush valve on open side. Hand operated flush controls: maximum 5 pounds of force required to operate. Mount controls within reach ranges specified below.

- **B.** Lavatories and sinks, mounting type and drain location: coordinate with countertop. Top edge of rim or counter, whichever is higher, is to be a maximum of 34 inches AFF.
- C. Accessible urinals: rim at 17 inches maximum AFF.

3.2 Reach Range Requirements

- **A.** Heights: the topmost and bottommost controls and operating parts of all accessible mailboxes, outgoing mail box and similar elements are required to be within reach range limits as follows:
 - 1. Unobstructed forward reach: minimum 15 inches and maximum 48 inches high AFF.
 - 2. Obstructed forward high reach:
 - a. Where the obstruction (reach depth) is 20 inches maximum: 48 inches maximum reach height.
 - b. Where the reach depth is between 20 inches and 25 inches: 44 inches maximum. Obstructions more than 25 inches deep not permitted.
 - c. Clear floor space can extend beneath the element for a distance not less than the required reach depth over the obstruction.

- 3. Unobstructed side reach: minimum 15 inches and maximum 48 inches high AFF.
- 4. Obstructed side high reach:
 - a. Where the obstruction (reach depth) is 10 inches maximum: 48 inches maximum.
 - b. Where the reach depth is more than 10 inches and equal to or less than 24 inches: the maximum height of the obstruction is 34 inches maximum and the maximum high side reach is 46 inches. Obstructions more than 24 inches deep not permitted.

Best Practice Recommendations:

- Ensure that hand-held shower spray units are capable of delivering water pressure substantially equivalent to fixed shower heads
- Management policies and procedures should include information concerning the on-going maintenance of fixtures, grab bars and related accessible elements and spaces.
- Installation of toilets with washlets (built-in bidets) is recommended for increased accessibility. This recommendation applies particularly to "family assist" restrooms and accessible stalls in multi-user settings.
- Select a single style of lavatory for a restroom and use it throughout the room(s). The accessible lavatory can be the same as the others in appearance and be fully integrated into the design.
- In all cases, the fixtures and fittings that are accessible should be of the same quality and general appearance as the rest of the fixtures and fittings in a space. The function and style should be as integrated as possible.
- Setting domestic water heaters to 120 degrees maximum mitigates scalding and is optimal for energy conservation.
- Waterless urinals promote water conservation and reduce operational issues associated with flush mechanisms. Confirm that fixtures with adequate protections against proliferation of bacteria are specified.

Green Synergy:

- Criterion 4.1 Water Conserving Fixtures.
- Criterion 4.2 Advanced Water-Conserving Appliances and Fixtures.

Division 23: HVAC (Division 15: Mechanical)

23 30 00 / HVAC AIR DISTRIBUTION / 15100

Integrative Design 1.2a Universal Design (New Construction Only) [Mandatory]

Integrative Design 1.2b Universal Design (Substantial and Moderate Rehab Only) [Mandatory in part]

PART 1 – GENERAL

1.1 Summary

- **A.** Applicability:
 - 1. Public and common use areas.
 - 2. Type A and Type B units.
- B. Related Section: 01 42 00 References and Definitions

PART 2 – PRODUCTS

- **A.** Thermostat type: the ease of use and relative accessibility of the environmental control system depends largely on the thermostat. Select a product with the following characteristics:
 - 1. Provide high contrast between text/numbers and background. Illuminated dials or screens with large text improve ease of use.
 - 2. User-friendly controls.
 - 3. Programmable thermostats are particularly important when specific resident have higher or lower temperature range needs in daily living. A programmable or remotely controlled thermostat will allow the system to be reset to the needed temperature just before the resident returns home rather than holding that temperature throughout hours the dwelling unit is vacant.

PART 3 - EXECUTION

- 3.1 Thermostats
- A. Mounting height: maximum 48 inches AFF.

3.2 Other Environmental Controls

- A. Location:
 - 1. Controls must be on an accessible route and within reach range.
 - 2. Locate controls in areas within the unit that are most likely to remain open to a circulation path. Do not place controls in dead ends, tight corners, or similar locations.
- **B.** Reach ranges: the topmost and bottommost controls and operating parts are required to be within reach range limits as follows:
 - 1. Unobstructed forward reach: minimum 15 inches and maximum 48 inches high AFF.

- 2. Obstructed forward high reach:
- a. Where the obstruction (reach depth) is 20 inches maximum: 48 inches maximum reach height.
- b. Where the reach depth is between 20 inches and 25 inches: 44 inches maximum. Obstructions more than 25 inches deep not permitted.
- c. Clear floor space can extend beneath the element for a distance not less than the required reach depth over the obstruction.
- 3. Unobstructed side reach: minimum 15 inches and maximum 48 inches high AFF.
- 4. Obstructed side high reach.
 - a. Where the obstruction (reach depth) is 10 inches maximum: 48 inches maximum.
 - j. Where the reach depth is more than 10 inches and equal to or less than 24 inches: the maximum height of the obstruction is 34 inches maximum and the maximum high side reach is 46 inches. Obstructions more than 24 inches deep not permitted.

Best Practice Recommendations:

- Access to air filtration systems is recommended. Provide return air filter at a location on the unit or at the grille that facilitates maintenance by the dwelling occupant.
- Air filtration media helps promote healthy indoor air quality for all residents, but is especially important for those with respiratory or other ailments that make them acutely vulnerable to particulate contamination.
- Programmable thermostats provide ease of operation and directly impact energy consumption, if properly used.

23 34 00 / VENTILATION FANS / 15140

Integrative Design 1.2a Universal Design (New Construction Only) [Mandatory]

Integrative Design 1.2b Universal Design (Substantial and Moderate Rehab Only) [Mandatory]

PART 1 – GENERAL

1.1 Summary

- **A.** Applicability:
 - 1. Public and common use areas.
 - 2. Type A and Type B units.
- B. Related section: 01 42 00 References and Definitions

PART 2 - PRODUCTS

- **B.** Control types: the ease of use and relative accessibility of the environmental control system depends largely on the controls. Select products with the following characteristics:
 - 4. Provide high contrast between text/numbers and background. Illuminated dials or screens with large text improve ease of use.
 - 5. User friendly controls.

PART 3 - EXECUTION

3.1 Controls

A. Location:

- 1. Controls must be on an accessible route and within reach range.
- 2. Locate controls in areas within the unit that are most likely to remain open to a circulation path. Do not place controls in dead ends, tight corners, or similar locations.
- **B.** Reach ranges: the topmost and bottommost controls and operating parts are required to be within reach range limits as follows:
 - 1. Unobstructed forward reach: minimum 15 inches and maximum 48 inches high AFF.
 - 2. Obstructed forward high reach:
 - a. Where the obstruction (reach depth) is 20 inches maximum: 48 inches maximum reach height.
 - b. Where the reach depth is between 20 inches and 25 inches: 44 inches maximum. Obstructions more than 25 inches deep not permitted.
 - c. Clear floor space can extend beneath the element for a distance not less than the required reach depth over the obstruction.
 - 3. Unobstructed side reach: minimum 15 inches and maximum 48 inches high AFF.
 - 4. Obstructed side high reach:
 - a. Where the obstruction (reach depth) is 10 inches maximum: 48 inches maximum.
 - k. Where the reach depth is more than 10 inches and equal to or less than 24 inches: the maximum height of the obstruction is 34 inches maximum and the maximum high side reach is 46 inches. Obstructions more than 24 inches deep not permitted.

Best Practice Recommendations:

- In multifamily projects, a low level of continuous bathroom exhaust ventilation paired with a HRV or ERV provides necessary air exchange, mitigates the energy impact associated with ventilation, and reduces operational issues associated with switch mechanisms. In situations where energy recovery is not possible, careful thought should be put into mechanisms that will ensure that ASHRAI required levels of exhaust ventilation will be ensured.
- Fresh, direct supply air into units promotes healthy indoor air quality and increases the ability to compartmentalize units within multifamily projects, which has a direct impact on the energy performance of mid to high rise buildings.

Green Synergies:

- Criterion 5 Energy Efficiency.
- Criterion 7.4 Exhaust Fans.
- Criterion 7.6 Ventilation.

Division 26: Electrical (Division 16: Electrical)

26 05 00 / BASIC ELECTRICAL MATERIALS AND METHODS / 16050

Integrative Design 1.2a Universal Design (New Construction Only) [Mandatory] Integrative Design 1.2b Universal Design (Substantial and Moderate Rehab Only) [Mandatory]

PART 1 – GENERAL

1.1 Summary

- A. Applicability:
 - 1. Public and common use areas.
 - 2. Type A and Type B units.
- **B.** Related Sections:
 - 10 26 16 Bath Accessories

26 27 00 Low Voltage Distribution and Equipment

PART 2 - PRODUCTS

2.1 Devices

- **A.** Switches: flat paddle switches are easier to operate with a closed fist.
- B. Other controls: provide units with high contrast on letter/number to background.

PART 3 - EXECUTION

3.1 Mounting Heights

- **A.** Maintain the following mounting heights:
 - 1. Convenience outlets (unless over a counter): 18 inches minimum AFF.
 - 2. Outlets over counters: 44 inches minimum AFF. Note height restrictions below.
 - 3. Switches & timers: 48 inches maximum AFF except over counters. At counters, mount at 44 inches AFF. Note height restrictions below.

3.2 Controls

- A. Location:
 - 1. Controls and equipment must be on an accessible route and within reach range.
 - 2. Locate controls in areas within the unit that are most likely to remain open to a circulation path. Do not place controls in dead ends, tight corners, or similar locations.
- **B.** Reach ranges: the topmost and bottommost controls and operating parts of all equipment are required to be within reach range limits as follows:
 - 1. Unobstructed forward reach: minimum 15 inches and maximum 48 inches high AFF.
 - 2. Obstructed forward high reach:

- a. Where the obstruction (reach depth) is 20 inches maximum: 48 inches maximum reach height.
- b. Where the reach depth is between 20 inches and 25 inches: 44 inches maximum. Obstructions more than 25 inches deep not permitted.
- c. Clear floor space can extend beneath the element for a distance not less than the required reach depth over the obstruction.
- 3. Unobstructed side reach: minimum 15 inches and maximum 48 inches high AFF.
- 4. Obstructed side high reach:
 - a. Where the obstruction (reach depth) is 10 inches maximum: 48 inches maximum.
 - b. Where the reach depth is more than 10 inches and equal to or less than 24 inches: the maximum height of the obstruction is 34 inches maximum and the maximum high side reach is 46 inches. Obstructions more than 24 inches deep not permitted.

26 27 00 / LOW VOLTAGE DISTRIBUTION AND EQUIPMENT / 16700

Integrative Design 1.2a Universal Design (New Construction Only) [Mandatory] Integrative Design 1.2b Universal Design (Substantial and Moderate Rehab Only) [Mandatory in part]

PART 1 – GENERAL

1.1 Summary

- **A.** Applicability:
 - 1. Public and common use areas.
 - 2. Type A and Type B units.
- B. Related section: 26 05 00 Basic Electrical Materials and Methods

PART 2 – PRODUCTS

2.1 Devices

- A. Doorbell: prewire for connection to interior visual signal system.
- **B** Doorbell buttons: internally lighted.

PART 3 - EXECUTION

3.1 Mounting Heights

- **A.** Maintain the following mounting heights:
 - 1. Data jacks, telephone jacks (unless over a counter): 18 inches minimum AFF.
 - 2. Jacks over counters: 44 inches minimum AFF. Note height restrictions below.
 - 3. Doorbell buttons: 48 inches maximum AFF. 36 inches is recommended.
 - 4. Security panels: 48 inches maximum AFF to the topmost operating button.

3.1 Controls

A. Location:

- 1. Controls and equipment must be on an accessible route and within reach range.
- Locate controls in areas within the unit that are most likely to remain open to a circulation path. Do not
 place controls in dead ends, tight corners, or similar locations.
- **B.** Reach ranges: the topmost and bottommost controls and operating parts of all equipment are required to be within reach range limits as follows:
 - 1. Unobstructed forward reach: minimum 15 inches and maximum 48 inches high AFF.
 - 2. Obstructed forward high reach:
 - a. Where the obstruction (reach depth) is 20 inches maximum: 48 inches maximum reach height.
 - b. Where the reach depth is between 20 inches and 25 inches: 44 inches maximum. Obstructions more than 25 inches deep not permitted.
 - c. Clear floor space can extend beneath the element for a distance not less than the required reach depth over the obstruction.

- 3. Unobstructed side reach: minimum 15 inches and maximum 48 inches high AFE.
- 4. Obstructed side high reach:
 - a. Where the obstruction (reach depth) is 10 inches maximum: 48 inches maximum.
 - b. Where the reach depth is more than 10 inches and equal to or less than 24 inches: the maximum height of the obstruction is 34 inches maximum and the maximum high side reach is 46 inches. Obstructions more than 24 inches deep not permitted.

26 51 00 / INTERIOR LIGHTING / 16500

Integrative Design 1.2a Universal Design (New Construction Only) [Mandatory] Integrative Design 1.2b Universal Design (Substantial and Moderate Rehab Only) [Mandatory]

PART 1 – GENERAL

1.1 Summary

- **A.** Applicability:
 - 1. Public and common use areas.
 - 2. Type A and Type B units.
- B. Related section: 26 05 00 Basic Electrical Materials and Methods

PART 2 – PRODUCTS

2.1 Products

- A. Wall mounted light fixtures: maximum 4 inches deep in all circulation areas.
- **B** Objects with leading edges more than 27 inches and equal to or less than 80 inches AFF can protrude a maximum of 4 inches horizontally into the circulation path.
- **c.** Vertical clearance: 80 inches high minimum. Provide guardrails or other barriers where the vertical clearance is less than 80 inches high. Locate the leading edge of such guardrails or barriers at 27 inches maximum AFF.
- **D.** Fixtures that are touch activated: mount within reach ranges specified below.

PART 3 - EXECUTION

3.1 Controls

- A. Location:
 - 1. Controls and equipment must be on an accessible route and within reach range.
 - 2. Locate controls in areas within the unit that are most likely to remain open to a circulation path. Do not place controls in dead ends, tight corners, or similar locations.
- **B.** Reach ranges: the topmost and bottommost controls and operating parts of all equipment are required to be within reach range limits as follows:
 - 1. Unobstructed forward reach: minimum 15 inches and maximum 48 inches high AFF.
 - 2. Obstructed forward high reach:
 - a. Where the obstruction (reach depth) is 20 inches maximum: 48 inches maximum reach height.
 - b. Where the reach depth is between 20 inches and 25 inches: 44 inches maximum. Obstructions more than 25 inches deep not permitted.
 - c. Clear floor space can extend beneath the element for a distance not less than the required reach depth over the obstruction.
 - 3. Unobstructed side reach: minimum 15 inches and maximum 48 inches high AFF.

- 4. Obstructed side high reach:
 - a. Where the obstruction (reach depth) is 10 inches maximum: 48 inches maximum.
 - b. Where the reach depth is more than 10 inches and equal to or less than 24 inches: the maximum height of the obstruction is 34 inches maximum and the maximum high side reach is 46 inches. Obstructions more than 24 inches deep not permitted.

Best Practice Recommendations:

- Light fixtures should be selected for a combination of factors including reduction in glare off surfaces, protection of light source to prevent glare & hot spots, and provision of minimum recommended light levels for tasks.
- Design lighting at entrances to mitigate the intensity of light transitions both at night and day.

Green Synergy:

Criterion 5.5 Efficient Lighting.

Division 32: Exterior Improvements (Division 02: Site Work)

32 13 00 / RIGID PAVING / 02780

Integrative Design 1.2a Universal Design (New Construction Only) [Mandatory] Integrative Design 1.2b Universal Design (Substantial and Moderate Rehab Only) [Mandatory in part]

PART 1 – GENERAL

1.1 Summary & Applicability

- A. Applicability:
 - 1. Public and common use areas: interior ramps, breezeways, covered building patios and walkways, garage interiors, and similar locations.
 - 2. Dwelling units: interior accessible routes, patios, and balconies.
- **B.** Related sections:
 - 1. 01 89 10 Construction Performance Requirement
 - 2. 03 33 00 Cast-in-Place Concrete

1.2 Submittals at Closeout

A. Floor, landing and ramp surface flatness and levelness measurements indicating compliance with specific tolerances (recommended, not required).

PART 2 - PRODUCTS (No Comments)

PART 3 - EXECUTION

3.1 Formwork & Preparation of Substrates

- A. Set formwork for as required to comply with slope specifications below.
- **B.** Hold back concrete floor slab at entrance mat locations for separate pour to accommodate level conditions.
- **c.** Set forms to 0.5 percent less overall slope than required maximums. Use a digital level while forming concrete to verify compliance with accessible route and level space requirements.

3.2 Cast-in-place Concrete

A. Changes in level:

- 1. Changes in level of $\frac{1}{4}$ inch high maximum may be vertical.
- 2. Changes in level between ¹/₄ inch high minimum and ¹/₂ inch high maximum: bevel with a slope not steeper than 1:2.
- 3. Changes in level greater than 1/2 inch high and less than 6 inches: ramp at 1:12 (8.33%) maximum.
- 4. Changes in level greater than 6 inches: ramp at 1:12 (8.33%) maximum: edge protection, landings, and handrails are required.
- **B.** Landings and turning spaces: bottom and top of ramp surfaces are to be flush with adjacent landing.
 - 1. If there is a door in a landing there needs to be at least 2 feet of landing on the latch side.

C. Slopes:

- 1. Landings and level areas may not exceed 1:50 (2%) slope in either direction.
- 2. Sloped walking surfaces (which are not ramps) may not exceed 1:20 (5%) in running slope and 1:50 (2%) in cross slope. Landings are not required.
- 3. Ramp surfaces may not exceed 1:12 (8.33%) in running slope and 1:50 (2%) in cross slope. Ramps are required to have landings at the top, bottom, and intermediate resting or turning spaces.

D. Finishes:

- 1. Provide broom finish or similar non-slip surface treatment in exterior environments.
- 2. Exposed aggregate finishes can be very slippery when wet and can be challenging to maintain. If working with an exposed aggregate product, test the surface for performance under wet conditions before proceeding with work.
- E. Decks, patios, and porches at type A units (not common area spaces):
 - 1. Where an exterior patio, balcony, or similar area is impervious and exposed to the elements, the surface may be held 4 inches maximum below the adjacent floor level.

Best Practice Recommendations:

- Design concrete slopes to at least 0.5 percent less than the maximum permitted for the use. For example, a ramp surface would be designed to 7.5 percent running slope and 0 percent cross slope, and the landing at the ramp would be designed to 1.5 percent cross slope each way.
- Note on design drawings that there are no tolerances for slopes exceeding maximums (e.g. 2.2 percent exceeds permitted cross slope maximum of 2 percent and is non-compliant).
- Exterior accessible routes must drain water away from walking and parking surfaces without exceeding running and cross slope limits.
- It is important that project teams cross reference appropriate slopes for accessible pathways with sloping requirements related to site water control and building durability. Pathways and surfaces that meet both of these requirements should be developed.
- Semi-permeable paving materials vary widely in quality control, smoothness, durability under use and other issues. Use of these materials is not recommended on accessible route unless testing has been performed and the product and installation method is proven to result in a smooth, non-wavy, durable finish that does not add unnecessary drag or catch cane and walker tips.

32 14 00 / UNIT PAVING / 02780

Integrative Design 1.2a Universal Design (New Construction Only) [Mandatory]

Integrative Design 1.2b Universal Design (Substantial and Moderate Rehab Only) [Mandatory in part]

PART 1 – GENERAL

1.1 Summary & Applicability

- **A.** Applicability:
 - 1. Public and common use areas: interior ramps, breezeways, covered building patios and walkways, garage interiors, and similar locations.
 - 2. Dwelling units: patios and balconies.
- B. Related sections:
 - 1. 01 89 10 Construction Performance Requirements
 - 2. 03 33 00 Cast-in-Place Concrete

1.2 Submittals at Closeout

A. Surface flatness and levelness measurements indicating compliance with specific tolerances (recommended, not required).

PART 2 – PRODUCTS

2.1 Pavers

A. Pavers: use products designed for the exposure and climate that have square edges and flat surfaces. Avoid tumbled, beveled, or chamfered pavers. Wire cut pavers are preferred.

PART 3 - EXECUTION

3.1 Formwork & Preparation of Substrates

- A. Set formwork for as required to comply with slope specifications below.
- **B.** Set forms to 0.5 percent less overall slope than required maximums. Use a digital level while forming concrete to verify compliance with accessible route and level space requirements.
- 3.2 Surface Characteristics
- **A.** Changes in level:
 - 1. Changes in level of $\frac{1}{4}$ inch high maximum may be vertical.
 - 2. Changes in level between ¹/₄ inch high minimum and ¹/₂ inch high maximum: bevel with a slope not steeper than 1:2.
 - 3. Changes in level greater than $\frac{1}{2}$ inch high and less than 6 inches: ramp at 1:12 (8.33%) maximum.
 - Changes in level greater than 6 inches: ramp at 1:12 (8.33%) maximum: edge protection, landings, and handrails are required.
- B. Landings and turning spaces: bottom and top of ramp surfaces are to be flush with adjacent landing.
 - 1. If there is a door in a landing there needs to be at least 2 feet of landing on the latch side.

C. Slopes:

- 1. Landings and level areas may not exceed 1:50 (2%) slope in either direction.
- 2. Sloped walking surfaces (which are not ramps) may not exceed 1:20 (5%) in running slope and 1:50 (2%) in cross slope. Landings are not required.
- 3. Ramp surfaces may not exceed 1:12 (8.33%) in running slope and 1:50 (2%) in cross slope. Ramps are required to have landings at the top, bottom, and intermediate resting or turning spaces.
- **D**. Decks, patios, and porches at Type A units (not common area spaces):
 - 1. Where an exterior patio, balcony, or similar area is impervious and exposed to the elements, the surface may be held 4 inches maximum below the adjacent floor level.
- E. Butt joints without mortaring.

Best Practice Recommendations:

- Design exterior paved surface slopes to at least 0.5 percent less than the maximum permitted for the use. For example, a ramp surface would be designed to 7.5 percent running slope and 0 percent cross slope, and the landing at the ramp would be designed to 1.5 percent cross slope each way.
- Ramps should always be designed to the gentlest possible slope, never to maximums. Ramps should not be finished with unit pavers.
- If the project team intends to specify open grid pavers for storm water infiltration or heat island impact purposed, careful attention should be paid to ensure that these materials are not part of an accessible route or exterior pathway. Alternatively, the team could specify the use of porous or light colored pavers that meet the accessible guidelines outlined in this specification section.

Regional Consideration:

Adjust detailing and installation of substrates to respond to climatic challenges and differences.

32 16 00 / CURBS, GUTTERS, SIDEWALKS AND DRIVEWAYS / 02550

Integrative Design 1.2a Universal Design (New Construction Only) [Mandatory]

Integrative Design 1.2b Universal Design (Substantial and Moderate Rehab Only) [Mandatory]

PART 1 – GENERAL

1.1 Summary

- A. Applicability: accessible pedestrian routes and accessible parking spaces and aisles.
- B. Related Work:
 - 1. 01 89 10 Construction Performance Requirements
 - 2. 32 13 00 Rigid Paving
- **C.** During winter months, snow removal and snow management should address maintenance of curb ramps and exterior accessible paths. Snow and ice can form an impassable barrier very quickly. Pile snow removed from streets and walks away from curb ramps.

1.2 References

- **A.** PROWAG: Public Rights-of-Way Accessibility Guidelines, current edition available from the Access Board. This set of guidelines represents current best practices for construction in the public right-of-way and can be used to evaluate common elements such as curb ramps.
- B. PROTAM: Technical Assistance Manual available from the Access Board.

1.3 Submittals at Closeout

- **A.** Floor, landing and ramp surface flatness and levelness measurements indicating compliance with specific tolerances.
- PART 2 PRODUCTS (No Comments)

PART 3 - EXECUTION

3.1 Formwork & Preparation of Substrates

- A. Set formwork for as required to comply with slope specifications below.
- **B.** Set forms to 0.5 percent less overall slope than required maximums. Use a digital level while forming concrete to verify compliance with accessible route and level space requirements.

3.2 Cast-in-place Concrete

- **A.** Changes in level:
 - 1. Changes in level of $\frac{1}{4}$ inch high maximum may be vertical.
 - 2. Changes in level between ¹/₄ inch high minimum and ¹/₂ inch high maximum: bevel with a slope not steeper than 1:2.
 - 3. Changes in level greater than ¹/₂ inch high and less than 6 inches: ramp at 1:12 (8.33%) maximum.
 - 4. Changes in level greater than 6 inches: ramp at 1:12 (8.33%) maximum: edge protection, landings, and handrails are required.

- B. Landings and turning spaces: bottom and top of ramp surfaces are to be flush with adjacent landing.
 - 1. If there is a door in a landing there needs to be at least 2 feet of landing on the latch side.
- **c.** Slopes:
 - 1. Landings and level areas may not exceed 1:50 (2%) slope in either direction.
 - 2. Sloped walking surfaces (which are not ramps) may not exceed 1:20 (5%) in running slope and 1:50 (2%) in cross slope. Landings are not required.
 - 3. Ramp surfaces may not exceed 1:12 (8.33%) in running slope and 1:50 (2%) in cross slope. Ramps are required to have landings at the top, bottom, and intermediate resting or turning spaces.
- D. Driveways with crossing sidewalks:
 - 1. Cross slopes may not exceed 1:50 (2%) at the sidewalk portion of the driveway section.
- **E.** Counter slopes of adjoining gutters and road surfaces immediately adjacent to the curb ramp may not be steeper than 1:20. The adjacent surfaces at transitions at curb ramps to walks, gutters, and streets are to be at the same level.

3.3 Curb Ramps

- A. Sides of curb ramps may not exceed 1:10.
- **B.** Provide landings at the tops of curb ramps with a minimum clear length of 48 inches. Make the landing clear width at least as wide as the curb ramp, excluding flared sides, leading to the landing.
- **C.** Locate curb ramps and the flared sides of curb ramps so that they do not project into vehicular traffic lanes, parking spaces, or parking access aisles. Curb ramps at marked crossings must be wholly contained within the markings, excluding any flared sides.
- **D.** Whenever possible, the ramp of the curb ramp and the edges and/or returns should align with the path of travel that leads to the opposite side of the vehicular way being crossed. Diagonal ramps that point into the middle of an intersection are not preferred.

3.4 Sidewalks

- **A.** Cross slopes may not exceed 1:50 (2%).
- B. Running slopes may not exceed 1:20 (5%) unless following the grade of an adjacent roadway.
- **c.** Minimum width: 48 inches with passing spaces 60 inches wide at 200 foot maximum intervals. A sidewalk width of 60 inches minimum is preferred.

Best Practice Recommendation:

Consider working with a specialist in accessible rights-of-way design.

32 17 00 / PAVING SPECIALTIES / 02760

Integrative Design 1.2a Universal Design (New Construction Only) [Mandatory]

Integrative Design 1.2b Universal Design (Substantial and Moderate Rehab Only) [Mandatory in part]

PART 1 – GENERAL

1.1 Summary

- A. Applicability: accessible pedestrian routes and accessible parking spaces and aisles.
- B. Related Sections:

01 89 00 Construction Performance Requirements

- 10 14 00 Signage
- **c.** Parking lot maintenance and restriping requirements should be included in the operating and maintenance manuals provided to the managers of the property.

PART 2 - PRODUCTS

A. Marking paint: 70 percent contrast with pavement, light on dark or dark on light. Provide slip resistant paint or appliques.

PART 3 – EXECUTION

- **A.** Measure widths of parking spaces and access aisles from the centerline of the markings. Where parking spaces or access aisles are not adjacent to another parking space or access aisle, measurements can include the full width of the line defining the parking space or access aisle.
- B. Vehicle Spaces.
 - 1. Car parking spaces must be 96 inches wide minimum plus access aisle.
 - 2. Van parking spaces must be 132 inches wide minimum, plus access aisle. Van parking spaces may be 96 inches wide minimum where the access aisle is 96 inches wide minimum.
 - 3. Access aisles serving parking spaces are required to be on an accessible route. Two parking spaces can share a common access aisle (see Regional Consideration below). Accessible routes must connect parking spaces to accessible entrances. In parking facilities where the accessible route must cross vehicular traffic lanes, marked crossings enhance pedestrian safety, particularly for people using wheelchairs and other mobility aids. Where possible, it is preferable that the accessible route not pass behind parked vehicles.
 - a. Width of aisles: Access aisles serving car and van parking spaces shall be 60 inches wide minimum.
 - b. Length: extend the full length of the parking spaces they serve.
 - c. Access aisles shall be marked so as to discourage parking in them.
 - d. Access aisles location: do not overlap the vehicular way. Access aisles may be placed on either side of the parking space except for angled van parking spaces where access aisles located on the passenger side of the parking spaces are required.
 - e. Wheelchair lifts typically are installed on the passenger side of vans. Many drivers, especially those who operate vans, find it more difficult to back into parking spaces than to back out into

comparatively unrestricted vehicular lanes. For this reason, where a van and car share an access aisle, consider locating the van space so that the access aisle is on the passenger side of the van space.

- 4. Floor or ground surfaces: construct access aisles at the same level as the parking spaces they serve. Changes in level are not permitted. Slope surfaces not steeper than 1:50 (2%) to drain.
- 5. Vertical clearance: provide a vertical clearance of 98 inches minimum at parking spaces for vans and at access aisles and vehicular routes serving them.
- 6. Relationship to accessible routes: design parking spaces and access aisles so that cars and vans, when parked, do not obstruct the required clear width of adjacent accessible routes. Wheel stops are an effective way to prevent vehicle overhangs from reducing the clear width of accessible route.

2.5 International Symbol of Accessibility

A. Parking space identification signs shall include the International Symbol of Accessibility complying with 703.7.2.1. Signs identifying van parking spaces shall contain the designation "van accessible." Signs shall be 60 inches minimum above the finished floor or ground measured to the bottom of the sign. Markings on the pavement are NOT an alternative to vertical signage.

B. Image:



Regional Consideration:

• In some jurisdictions, access aisles may not be permitted to be shared between parking spaces and may be dedicated on a space by space basis. In addition, there are jurisdictions that required additional spaces labeled for specific users. Always check local building and zoning requirements before doing parking layout.

32 31 00 / FENCES AND GATES / 02810

Integrative Design 1.2a Universal Design (New Construction Only) [Mandatory] Integrative Design 1.2b Universal Design (Substantial and Moderate Rehab Only) [Mandatory]

PART 1 – GENERAL

1.1 Summary

- **A.** Applicability: Public and common use areas
- B. Locations:
 - 1. Accessible pedestrian routes
 - 2. Swimming pool and playground enclosures
- **C.** Related sections:
 - 1. 01 81 14 Accessible Design Requirements (Doors and Doorways)
 - 2. 08 10 00 Doors and Frames

PART 2 - PRODUCTS

2.1 Gates

- **A.** Gate hardware: Access gates in barrier walls and fences protecting pools, spas, and hot tubs are permitted to have operable parts of the release of latch on self-latching devices at 54 inches maximum above the finished floor or ground provided the self-latching devices are not also self-locking devices and operated by means of a key, electronic opener, or integral combination lock.
- **B.** Gate surfaces: Solid at bottom 10 inches on the push side, recommended 24 inches for maintenance equipment.
- C. Must meet maneuvering requirements for gate width and location: see Section 01 81 14 Accessible Design Requirements (Doors and Doorways).

2.2 Locks and Latches

- **A.** Lever handles, locks, latches and operating parts: operable with one hand. Hardware that requires tight grasping, pinching, or twisting of the wrist is prohibited.
- B. Force required to operate parts: 5 pounds maximum.
- **C.** Punch locks: single button operation only. The sequence and functions must permit operation using a wand, knuckle or other element. Do not set up to require simultaneous operation of two buttons or elements to open the door.

2.3 Closing Hardware

- **A.** Closers: adjust door closers and gate closers so that from an open position of 90 degrees, the time required to move the door to a position of 12 degrees from the latch is 5 seconds minimum.
- **B.** Spring hinges: adjust door and gate spring hinges so that from the open position of 70 degrees, the door or gate shall move to the closed position in 1.5 seconds minimum.
- C. Gate width and location: see Section 01 81 14 Accessible Design Requirements (Doors and Doorways).

PART 3 - EXECUTION (No Comments)

Best Practice Recommendation:

• Create extra space on latch side to allow for people pushing bicycles and baby carriages.