# NCIDQ Examination

## NCIDQ Section 3 - Practice Design Problem
### PDP 2012-2
*Based on the Fall 2012 Practicum exam--Published December 2012*

**Introduction to Your PDP**
The Section 3 Practice Design Problem (PDP) version 2012-2 was developed to provide candidates with a practice exam that simulates Section 3 of the NCIDQ Examination. The exam consists of seven unique exercises that focus on the following areas: space planning, lighting design, egress, life safety, restroom (washroom) design, systems integration and millwork. The NCIDQ Building Code requirements provided in this PDP are for the purpose of this practice examination only. Current Building Codes for upcoming NCIDQ Examinations can be found at www.ncidq.org.

**This practice design problem includes the following:**
1. **Part A** (Space Planning; Lighting Design) – Design problem booklet and blank drawing sheets
2. **Part B** (Egress; Life Safety; Restroom [Washroom]) - Design problem booklet and blank drawing sheets
3. **Part C** (Systems Integration; Millwork) - Design problem booklet and blank drawing sheets

The enclosed materials simulate the actual exam. During the real exam you will have four hours to finish Part A, and fours hours to finish Parts B and C (two hours each). We recommend that you follow these same time limits as you practice taking this exam to simulate the testing experience.

**Using the Solutions**
Once you have completed all three parts, you can compare your work to three sample solutions, representing *Pass*, *Borderline Pass* and *Borderline Fail* examples. The solved exams include the completed drawing sheets with comments indicating the strengths and weaknesses of the solutions. You can use these to evaluate how well you did on your practice exam and where you might need additional study or experience.

Solutions to PDP 2012-2 are available in the printed book titled **PDP 2012-2 Sample Solutions.** If you purchased this PDP as a bundle, the solutions book is included. If you purchased this exam separately, you can purchase the solutions book on our web site. To get the most out your practice session, we recommend that you not review the solutions in that book until you have attempted the practice exam.

Be sure to read the information on our web site about the content of the exam and how the exam is scored as well as all the information in the current Registration Guide for information on start times, supplies and more.

**www.ncidqexam.org**

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# NCIDQ Examination
# Practice Design Problem

## Section 3

## Design Practicum - Part C
(Two Hours)

NCIDQ
Examination

**PDP 2012-01**
**Published June, 2012**

This booklet is to be used for the afternoon portion of the test. Please use this booklet in conjunction with the set of drawings labeled Design Practicum – Part C. There are four sheets in Part C.

The Section 3, Practicum examination is administered in three parts, Part A, Part B and Part C. At the end of the morning portion of the test, you will turn in Part A. You will not have access to Part A in the afternoon. You will have a maximum of four hours to finish the afternoon portions of the test, Part B and Part C (two hours for each). You may work at your own pace within the maximum time allowed.

We recommend you take this PDP under the same conditions as the exam. During the exam, work must be completed directly on the drawing sheets to be scored. Work done on tracing paper is not scored. You should use standard drafting equipment to complete the examination. The practicum section is not designed to require the use of a drafting table, but you will be permitted to use a portable drafting board or flat illustration board, within specified size requirements, during the examination. For more information on permitted supplies for the practicum section, visit our Web site at www.ncidq.org.

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# THE PROBLEM BOOKLET FOR PART C CONTAINS

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# THE SET OF DRAWINGS CONTAINS

COVER SHEET ..... C-3
SYSTEMS INTEGRATION EXERCISE ..... ID-7
SYSTEMS INTEGRATION EXERCISE ..... ID-8
MILLWORK EXERCISE ..... ID-9

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# NCIDQ SECTION 3 BUILDING CODE REQUIREMENTS

**Code requirements listed below are for the purpose of the NCIDQ Examination only.**
Your exam exercises will be graded for compliance with these code requirements. Use the following codes to develop your design solution for the **TOTAL** space as necessary to protect the health, safety, and welfare of the public.

1.0 DEFINITIONS

1.1 Common Path of Egress Travel – The portion of the exit access [access to an exit] that must be traversed **BEFORE** two separate and distinct paths of travel to two exits are available. Common path of egress travel shall be included within the permitted travel distance.

1.2 Travel Distance – The distance measured from the most remote point within a story to the entrance to an exit along the natural and unobstructed path of egress travel.

2.0 FIRE-RESISTANT RATED CONSTRUCTION

2.1 Demising partitions between tenant spaces **MUST** be 1-hour fire rated.

2.2 Partitions along a public corridor **MUST** be 1-hour fire rated.

2.3 Partitions that demise an Assembly Occupancy of 750 sq. ft. [70 $m^2$] or greater **MUST** be 1-hour fire rated.

2.4 Door assemblies in a 1-hour fire rated partition **MUST** have a minimum fire protection rating of 20 minutes and be self-closing.

2.5 Storage rooms exceeding 100 sq. ft. [9.3 $m^2$] **MUST** be 1-hour rated.

2.6 Glazing in fire rated partitions, doors or sidelights may not exceed 240 sq. in. [1548 $cm^2$].

3.0 FIRE PROTECTION SYSTEM

3.1 There **MUST** be an audio/visual fire signal device located in each restroom, hallway, lobby, and general assembly area.

3.2 An audio/visual fire signal device **MUST** be visible from any location in the room or space and **MUST** be mounted between 6'-8" to 7'-6" [2 m to 2.3 m] AFF.

3.3 The minimum number of fire extinguishers **MUST** be calculated based on one (1) fire extinguisher per 3000 sq. ft. [280 $m^2$].

3.4 Fire extinguishers **MUST** be located no more than 75' [23 m] from the furthest occupant.

3.5 Smoke and Heat Detector coverage **MUST** include all rooms, corridors and storage areas.

4.0 MEANS OF EGRESS

4.1 General Means of Egress

4.1.1 The means of egress **MUST** have a ceiling height of not less than 7'-6" [2.3 m].

4.1.2 Protruding objects are permitted to extend below the minimum ceiling height provided a minimum headroom of 6'-8" [2 m] shall be provided along the path of egress, including any corridor, aisle or passageway.

4.1.3 Protruding objects **MUST NOT** reduce the minimum clear width of accessible routes.

4.1.4 **ALL** objects located on a wall between 27" [685 mm] and 80" [2115 mm] AFF **MUST NOT** protrude more than 4" [100 mm] into an egress path of travel.

4.2 Exit Signs

4.2.1 Exit signs with a directional indicator (illuminated) showing the direction of travel shall be placed in every location where the direction of travel to reach the nearest exit is not apparent.

4.3 Illumination

4.3.1 Emergency illumination shall be provided for a minimum of 1½ hours in the event of failure of normal lighting. Emergency lighting facilities shall be arranged to provide initial illumination along the path of egress.

4.4 Travel Distance

4.4.1 **ALL** paths of travel **MUST** be accessible (barrier-free) and provide at minimum a 60" [1500 mm] turning radius at changes of travel direction.

4.4.2 The path of egress travel **MUST NOT** pass through a secondary space that is subject to closure by doors or that contains storage materials or has items that project into the path of travel.

4.4.3 The common path of egress travel distance **MUST NOT** exceed 100'-0" [30.5 m].

4.4.4 The travel distance to an exit **MUST** be measured on the floor along the centerline of the natural path of travel, starting from the most remote point to the centerline of the exit.

4.4.5 The travel distance **MUST NOT** exceed 250'-0" [76.2 m] measured along the path of travel.

4.5 Exit Access Doors, Doorways, Door Hardware and Windows

4.5.1 The height of doors **MUST NOT** be less than 7'-0" [2.1 m].

4.5.2 **ALL** door openings shall be a **MINIMUM** of 36" [900 mm] wide with an 18" [450 mm] clear space on the pull side of the door and a 12" [300 mm] clear space on the push side of the door.

4.5.3 Where a pair of doors is provided, one of the doors **MUST** be not less than 36" [900 mm] wide.

4.5.4 Locks, if provided, **MUST NOT** require the use of a key, special knowledge, or effort for operation from the egress side.

4.5.5 Doors opening from occupied spaces into the path of egress travel shall not project more than 7" [180 mm] into the required width.

4.5.6 Exit access doorways **MUST** open in the direction of exit travel.

4.5.7 Exit access doorways **MUST** be placed at a distance that is equal to or greater than:

4.5.7.1 When the building is **NOT** sprinklered, one-half the length of the maximum overall diagonal dimension of the area being served, measured in a straight line between exit doors or exit access doorways.

4.5.7.2 When the building is sprinklered, one-third the length of the maximum overall diagonal dimension of the area being served, measured in a straight line between exit doors or exit access doorways.

4.5.8 Two (2) exit access doorways **MUST** be provided from any space where the Occupancy Load exceeds 49 in Occupancy Groups A (Assembly), B (Business) and M (Mercantile) or exceeds 29 in Occupancy Group S (Storage).

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4.6 Corridors

4.6.1 The **MINIMUM** interior corridor width **MUST** be 44" [1100 mm].

4.6.2 Dead end corridors **MUST NOT** exceed 20'-0" [6 m] in length.

5.0 ACCESSIBILITY

5.1 Service (reception/transaction) counters over 8'-0" [2.4 m] in length **MUST** have an accessible height service counter, a minimum of 36" [900mm] in length.

5.2 **ALL** accessible (barrier-free) countertops, sinks, reception/transaction surfaces, and other horizontal work surfaces **MUST NOT** exceed 34" [865 mm] AFF with a 27"H [685 mm] clear knee space below.

5.3 **ALL** accessible (barrier-free) counters **MUST** have clear knee space of at least 30"W x 17"D [760 mm x 430 mm].

5.4 **ALL** exposed hot water pipes and drains **MUST** be insulated or otherwise protect wheelchair users from burns on the legs.

5.5 **ALL** accessible (barrier-free) wall-mounted controls **MUST** be located between 15" [380 mm] and 44" [1100 mm] AFF for a Forward Reach and between 9" [230 mm] and 48" [1200 mm] AFF for a Side Reach.

5.6 **ALL** accessible (barrier-free) lower cabinets **MUST** have a 6" D maximum x 9" H minimum [150mm x 230 mm] toe-kick.

5.7 **ALL** accessible (barrier-free) upper cabinets or shelves located above a work surface **MUST NOT** exceed 44" [1100 mm] AFF.

5.8 Restrooms [Washrooms]

5.8.1 **ALL** accessible toilets **MUST** have an unobstructed 60" [1500 mm] turning circle.

5.8.2 Centerline of accessible toilets **MUST** be 16"-18" [400 mm - 450 mm] from side wall or partition.

5.8.3 Clearance around accessible toilets **MUST** be 60" [1500 mm] along the rear wall and 56" [1420 mm] along the side wall.

5.8.4 Accessible toilets **MUST** be mounted at 17"-19" [430 mm – 480 mm] AFF to the top of the toilet seat.

5.8.5 **ALL** grab bars at toilets **MUST** be 36" [900 mm] long at the rear and 42" [1060 mm] long at the side, mounted between 33" [840 mm] and 36" [900 mm] AFF.

5.8.6 **ALL** accessible showers **MUST** have horizontal grab bars on three (3) sides mounted at a height between 33" [840 mm] and 36" [900 mm] AFF.

5.8.7 Accessible showers **MUST** be a minimum of 30" [760 mm] x 60" [1500 mm].

5.8.8 Accessible urinals **MUST** have an elongated rim at a maximum height of 17" [430 mm] AFF.

5.8.9 A clear floor space of 30" [760 mm] x 48" [1200 mm] **MUST** be provided in front of accessible lavatories, urinals, showers, and bathtubs.

5.8.10 Accessible mirrors **MUST** be mounted with the edge of the reflective surface no higher than 40" [1000 mm] AFF.

6.0 STRUCTURAL

6.1 Core drills **MUST NOT** be within 18" [450 mm] of any structural element.

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## 7.0 ELECTRICAL

7.1 **ALL** electrical receptacles **MUST** be 18" [450 mm] AFF unless otherwise noted.

7.2 **ALL** electrical receptacles located within 36" [900 mm] of a water source **MUST** be GFI.

7.3 Clearance of 36" [900 mm] deep **MUST** be provided in front of power panels.

## 8.0 OCCUPANCY LOAD TABLE

| FUNCTION OF SPACE | FLOOR AREA IN SQ. FT. [$m^2$] PER OCCUPANT |
|---|---|
| Accessory storage areas, mechanical equipment room | 300 [28 $m^2$] gross |
| Assembly without fixed seats<br>Concentrated (chairs only—not fixed)<br>Standing space<br>Unconcentrated (tables and chairs) | <br>7 [.7 $m^2$] net<br>5 [.5 $m^2$] net<br>15 [1.4 $m^2$] net |
| Business areas | 100 [9.3 $m^2$] gross |
| Education<br>Classroom area<br>Shops and other vocational room areas | <br>20 [1.9 $m^2$] net<br>50 [4.6 $m^2$] net |
| Exercise rooms | 50 [4.6 $m^2$ ] gross |
| Kitchens, commercial | 200 [18.6 $m^2$] gross |
| Mercantile<br>Areas on other floors<br>Basement and grade floor areas<br>Storage, stock, shipping areas | <br>60 [5.6 $m^2$] gross<br>30 [2.8 $m^2$] gross<br>300 [28 $m^2$] gross |
| Residential | 200 [18.6 $m^2$] gross |

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# SYSTEMS INTEGRATION Exercise

**Time:** One (1) of two (2) parts in a two (2) hour problem. One (1) hour is recommended for this exercise.
**Scale:** 1/8" = 1'-0" [1:100]

## I. PROJECT DESCRIPTION:

The demised area is a second (2nd) floor tenant suite of a ten (10) story building. The ceiling is a combination of 2'-0" x 2'-0" [600 mm x 600 mm] acoustical tile on 1-15/16" [50 mm] grid and suspended gypsum board. The tenant space has a plenum air return.

Recognizing that Mechanical, Electrical and Plumbing (MEP) Engineers are required for the design of these systems, this problem is designed to demonstrate that interior designers must effectively communicate design intent with respect to the interface between the various areas of professional practice.

## II. PROJECT REQUIREMENTS:

**Evaluate the plans provided with eight (8) distinctly different conflicts** between mechanical, plumbing, electrical, and structural systems. Referencing the NCIDQ Building Code Requirements attached, complete the required design solution.

**None of the elements shown (light fixtures, diffusers, etc.) may be reduced in quantity or size.**

The following items **may be relocated** as needed:
- Light fixtures
- HVAC supply and return diffusers
- HVAC trunk and branch lines less than 20" [500 mm] wide
- Sprinkler heads
- Sprinkler branch lines (lateral relocation only, not height)
- Gypsum board soffits and gypsum board clouds (height only)

The following items **may not be changed or relocated**:
- Sprinkler trunk lines
- HVAC air handling units (AHU)
- HVAC trunk lines greater than 20" [500 mm] wide
- Structural elements

## III. REQUIRED DESIGN SOLUTION:

**For this exercise, use information given on Sheets ID-7, ID-8.**

**Instructions to candidate:**

A. **On the Reflected Ceiling Plan, Sheet ID-7, draw and label:**
   - A minimum 2'-0" x 2'-0" [600 mm x 600 mm] access panel for AHU-2. (This panel may be located immediately adjacent to the unit, or underneath the unit, where there is no ductwork connected to the unit.)

(CONTINUED ON NEXT PAGE)

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B. **On the Lighting Schedule, Sheet ID-7, indicate:**
   - An appropriate mounting height AFF to the bottom of pendant mounted linear fluorescent fixtures in the Open Area.
   - An appropriate mounting height AFF to the bottom of pendant fixtures in the Reception Area.
   - An appropriate depth for wall sconces in the Reception Area.

C. **On the Notes Schedule, Sheet ID-7, write a description** of the conflict to be coordinated with Mechanical, Plumbing, and Electrical engineers for each of the eight (8) items tagged as coordination conflicts on the Reflected Ceiling Plan.

D. Referencing ID-7 and ID-8, **indicate solutions** to the eight (8) items tagged as coordination conflicts on the Reflected Ceiling Plan using both methods listed below:
   - **On the Notes Schedule, Sheet ID-7, write a proposed solution** of each conflict to be coordinated with Mechanical, Plumbing, and Electrical engineers.
   - **On the Reflected Ceiling Plan, Sheet ID-7, draw and/or note** any objects in the eight (8) coordination conflicts you have recommended relocating in their new recommended location. The new location should resolve the conflict and not create another one. The drawing should express the design intent for the engineering consultants.

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# MILLWORK Exercise

**Time:** One (1) of two (2) parts in a two (2) hour problem. One (1) hour recommended for this exercise.
**Scale:** 1/4" = 1'-0" [1:50] plan
3/4" = 1'-0" [1:20] elevation(s) and section

## I. PROJECT DESCRIPTION:

An existing mailroom in an office building is adding a courier drop-off/pick-up counter, open to a public corridor. There is a mailroom staff of two (2), one of whom uses a wheelchair. The existing copier, base cabinets and work counters are to remain in place as shown on the plan. The mailroom has an existing tile floor and an acoustical ceiling at 9'-0" AFF [2.7 m] which are to remain.

Accessibility to the counter and to all equipment is required.

## II. PROJECT REQUIREMENTS:

The **requirements for the new counter** are:

- A counter surface that accommodates work done while one (1) staff member is seated in a wheelchair and the other staff member is either standing or seated at a counter stool,
- A minimum of one (1) 15"W [380 mm] base cabinet with a door,
- A minimum of two (2) 15"W [380 mm] box/file drawer pedestals,
- One (1) 48"W x 12"D [1200 mm x 300 mm] transaction counter,
- One (1) electric mail machine 18"W x 14"D x 9"H [450 mm x 350 mm x 230 mm], and
- One (1) above counter duplex receptacle at each work area.

## III. REQUIRED DESIGN SOLUTION:

**For this exercise, use Sheet ID-9.**

**Instructions to candidate:**

A. **Draw a plan view** of the millwork solution in the Floor Plan:
   - Indicate the clearances for accessibility.
   - Indicate elevation tag(s).
   - Indicate placement of accessible worksurface to exhibit understanding of coordination needed between accessibility and general circulation.
   - Indicate electrical receptacles.

B. **Draw elevation(s)** of the millwork solution:
   - Indicate dimensions for constructability.
   - Indicate section cut.
   - Indicate a minimum of two (2) appropriate finish materials, including one (1) countertop material.
   - Indicate and dimension accessible worksurface.
   - Indicate electrical receptacles.

C. **Draw one (1) section** which conveys the construction details of a file pedestal in the accessible portion of millwork.
   - Indicate dimensions for constructability and accessibility.
   - Indicate substrates.
   - Indicate joinery/limits of materials, if appropriate.