Video Security Systems Designer

Level II Certification

Content Outline

National
Institute for
Certification in
Engineering
Technologies

Introduction

The purpose of this certification program is to recognize the professionalism of qualified designers and provide a way for others to distinguish those designers who have demonstrated job knowledge and work experience. NICET will do this by defining and testing relevant knowledge and evaluating experience.

This document presents the content that is covered in the examination and other criteria for certification as a Video Security Systems Designer at Level II. This program is based on an analysis of the tasks that are performed by a competent designer. The content outline is a listing of tasks that should be performed well by a Level II certified Designer. Also included are knowledge and skills needed to succeed at each task. These tasks are the focus of the test questions that make up the Level II exam.

The tasks are grouped into larger areas of responsibilities, or "domains". The domains are:

Identify Customer Needs and Project Objective (No Tasks at Level II)

Conduct Site Assessment

Lay out System

Prepare Proposals, Contracts, and Documentation

Plan and Conduct User Training (No Tasks at Level II)

Project Management

A general description or profile of a Level II Designer includes the following characteristics:

Education: Minimum suggested for Level I, with coursework or other experiences that develop a broad knowledge of technological applications, system layout and control, and security business procedures. (Formal education not required for certification.)

Work Experience: Minimum experience required for Level I plus a minimum of two additional years of related work (each of the years involving significant hours in VSSD Primary Activities and most other hours in VSSD Related Activities). One year of the work experience in this subfield must have been acquired within the three-year period prior to the date the certification at this level is awarded. (An Electronics Associates Degree from an ABET accredited program may be substituted for 18 months of work experience.)

Responsibility: Without supervision, develop plans for type C video systems. May review plans developed by lower level designers. Interact with installer to assure proper completion of job.

Acquired Competencies: Interface with customers and perform needs assessment and site survey for type C video systems. Calculate parameters, prepare plans, plan configuration of interfaces and controls, and select and order components and materials. Interact with installer to assure proper completion of job. Insure that the customer is adequately trained in the proper use of the system.

Tasks Performed by the Level II Designer

(Designs Type C Systems, in Addition to A and B)

2.1 *"Identify Customer Needs and Project Objective" Tasks*

No tasks at this level

2.2 *"Conduct Site Assessment" Tasks*

2.2.1 Identify existing and potential equipment locations and communications/transmission paths.

Knowledge:

Types of wiring required for integrated systems communication, how each may be bundled, and when each should be shielded or grounded

Typical bandwidth requirements for video and control equipment signals and their potential impacts on network systems

Conventional telecommunication system wiring schemes

Functions and cabling and signal requirements of matrix switching systems

Skills:

Use client's IT and telecommunications personnel and resources to collect information on interface and communications locations, protocols, and capabilities.

Use manufacturers' and site information to determine bandwidth requirements for video and control equipment signals.

Identify possible alternatives to the communications path.

Document and communicate the bandwidth requirements of proposed equipment.

2.2.2 Survey existing systems for integration requirements.

Knowledge:

Technical requirements for hard-wired contact and/or data interfaces to integrate with fire alarms, building automation, HVAC, access control, burglar alarm, intercom, and existing CCTV systems

Skills:

Research, communicate, and resolve subsystem interface issues.

2.3 “Lay Out System” Tasks

2.3.1 **Determine which features of the facility are critical for this Type C project.**

Knowledge:

Proper application of type C system components

Building systems as related to interfacing requirements

NEC

Skills:

Evaluate how building structures, spaces, and usage together with lighting and other relevant aspects of the facility are likely to affect the development of a Type C system to meet the client’s purpose or purposes.

Determine space requirements and availability for Type C operator consoles and/or control equipment.

Determine whether system objectives can be achieved with given facility limitations and identify specific shortcomings.

Develop elements of design that will overcome technical limitations in selected components.

2.3.2 Determine technical limitations.

Knowledge:

Operating principles, functions, and limitations of type C system components

Skills:

Determine whether system objectives can be achieved with given facility limitations and identify specific shortcomings.

Develop elements of design that will overcome technical limitations in selected components.

2.3.3 Create a preliminary design for a proposed type C system.

Knowledge:

Functions and operation of type C equipment

Components required for programmable control and operation, digital communication, remote operation and monitoring, and integration with other systems

Skills:

Read and interpret floor plans, wire diagrams, and related documents of sites/facilities where a type C system is to be installed.

Draw block diagrams, place components on floor plans, create camera schedules, and develop elevations and mounting requirements for type C systems.

2.3.4 Prepare block diagrams and related information for type C systems.

Knowledge:

Functions of type C system components

Power and signal pathways to, from, and between system components that are required for various Type C system functions

Skills:

Determine the quantity and types of Type C system components necessary for the application and the critical characteristics of each.

Graphically represent these components and the power and signal connections to be made to, from, and between them.

Identify the influence of environmental factors upon Type C equipment selection choices.

Collect Type C product data sheets from various manufacturers for use in design process.

2.3.5 Select head-end devices including monitors, recording devices, and controllers for use in Type C systems.

Knowledge:

Terminology associated with head-end devices for Type C systems, including controls, software, power and signal connections, and purposes/functions

Head-end device characteristics best suited to various Type C system applications

Hardware, software, and protocol compatibilities that must be established in order to establish communication between Type C system components

Skills:

Plan for future equipment and software upgrades, and network expansions.

Recognize factors in the client's requirements, the network, the building, or the natural environment that place limitations or specific requirements on devices.

Use manufacturers' specifications and system control capabilities to select the optimal equipment for the application, facility, environment, system compatibility and integration requirements, and cost limitations.

2.3.6 Select cameras and field equipment, including RF receivers, IR illuminators, receiver drivers, and relay monitor point modules, for use in Type C systems.

Knowledge:

Terminology associated with cameras and field devices for Type C systems, including controls, software, power and signal connections, and purposes/functions

Operational parameters of field devices as they apply to Type C systems

Communications and power requirements of field devices in a Type C system

Camera and field device characteristics best suited to various Type C system applications

Hardware, software, and protocol compatibilities that must be established in order to establish communication between Type C system components

Skills:

Recognize factors in the client's requirements, the network, the building, or the natural environment that place limitations or specific requirements on devices.

Use manufacturers' specifications and system control capabilities to select the optimal equipment for the application, facility, environment, system compatibility and integration requirements, and cost limitations.

2.3.7 Develop a LAN/WAN communications path.

Knowledge:

Terminology and components associated with the LAN/WAN communications path, such as:

- RS-232, 422, 485
- Bandwidth
- TCP/IP
- Protocol
- Serial Communication
- ASCII
- Hex
- Binary
- Server and client
- CAT 5
- EIA 568A/B Wiring protocol
- Hub, Router, Switcher, Gateway
- IP Address
- Network Administrator
- S/N ratio
- Ethernet,10 BaseT, 100BaseT, Gigabit Ethernet, ATM networks

TCP/IP terminology associated with the communications path

Skills:

Read and interpret manufacturers' specification materials related to communications issues.

Determine whether system objectives can be achieved with given facility limitations and identify specific shortcomings.

Layout LAN/WAN connectivity from cameras and controls to head-end.

Match LAN/WAN components with their functions.

Identify valid TCP/IP addresses.

2.3.8 Develop a telecommunications path.

Knowledge:

Telecommunications terminology and components associated with the telecommunications path

Basic performance characteristics of the following telephone and telecommunications technologies:

- POTS
- ISDN
- DSL, ADSL
- T1 Partial T1, and Frame Relay

Telecommunications system interface and transmission issues

Skills:

Match telecommunications components to their functions.

Determine whether system objectives can be achieved with given facility limitations and identify specific shortcomings.

Layout connectivity from cameras, controls, and other devices to head-end using telecommunications infrastructure.

Read and interpret manufacturers' specification materials related to telecommunications issues.

2.3.9 Develop a broadband communications path.

Knowledge:

Digital video and data transmission requirements

Capabilities of various transmission media

Path survey and FCC licensing requirements for microwave systems

Meanings and applications of the following broadband terms:

- modems
- RF modulators, agile modulators
- demodulators
- channel elimination filters
- band pass filters
- splitters, taps
- directional couplers
- field strength meters
- combiners
- adjacent channel
- dBmv
- MATV, and SMATV
- Diplex filters
- Cross modulation
- Hum modulation
- Ingress
- Signal-to-noise ratio
- Radiation leakage index
- tilt

Skills:

Read and interpret manufacturers' specification materials related to communications issues.

Determine whether system objectives can be achieved with given facility limitations and identify specific shortcomings.

Layout broadband connectivity from cameras, controls, and other devices to head-end.

Design an adjacent channel MATV head-end with local RF modulators.

2.3.10 Integrate/interface with other building services.

Knowledge:

Basic functions and interface/interface requirements for fire alarms, building automation, HVAC, access control, burglar alarm, and existing CCTV systems

How integration/interfaces with intercom, building automation, access control, burglar alarm, and fire alarm systems are constructed and tested, what information or commands are exchanged or shared, and the expected functional outcomes of these exchanges

Skills:

Research, communicate, and resolve interface requirements between subsystems.

Determine whether system objectives can be achieved with given facility limitations and identify specific shortcomings.

Operate the integrated system to confirm proper operation.

2.3.11 Prepare final plans for Type C systems.

Knowledge:

Elements of a complete set of constructions documents, including the description of the system's operational requirements, the equipment specifications, and detailed drawings containing floor plans, device schedule with mounting requirements, block diagrams, and detailed wiring diagrams showing all communications, control, and power connections

CSI Masterformat

Skills:

Prepare a narrative description of the operational requirements of the system.

Prepare a list of equipment stating minimal operational specifications.

Prepare floor plans, device schedules with mounting heights, block diagrams, and detailed point-to-point wiring diagrams.

Based on integration/interface requirements, show the interconnectivity of all systems on block diagrams.

2.4 *"Prepare Proposals, Contracts, and Documentation" Tasks*

2.4.1 Obtain necessary software and FCC licenses.

Knowledge:

When software licenses are required for various applications

What FCC licenses are available and which are required for various types of equipment and applications

Basic copyright and software licensing issues related to use and modification of products

FCC licensing procedures

How to obtain a right-of-way path search

Skills:

Collect the information required for FCC licenses or typically required for software licenses.

Obtain the necessary licenses at the right time in the project.

Obtain right-of-way permits.

2.4.2 Develop interface documentation that adequately describes the information and/or functional commands that are shared or exchanged across the interface.

Knowledge:

Functions of source equipment and the commands they generate

Input requirements of equipment to receive interface output

Skill:

Identify inputs and outputs and the actions associated with each, and layout the user interface.

Develop spreadsheets to record and present the information and relationships.

2.5 *"Plan and Conduct User Training" Tasks*

No tasks at this level.

2.6 *"Project Management" Tasks*

2.6.1 Coordinate telecommunications requirements with telecommunications providers, end users, facility personnel, and project personnel.

Knowledge:

Telecommunications systems transmission capabilities

Skills:

Determine bandwidth required and bandwidth available.

Use the knowledge and capabilities of involved personnel and resources to resolve telecommunications interface and transmission/distribution issues.

2.6.2 Coordinate equipment integration requirements with manufacturers, end users, facility personnel, and project personnel.

Knowledge:

Typical equipment integration issues

Skills:

Determine equipment integration purposes and requirements.

Use the knowledge and capabilities of involved personnel and resources to resolve equipment integration issues.

2.6.3 Develop progress charts and record status of the project.

Knowledge:

Gantt charts and their applications

Sequences of various operations required for a typical Type C project

Skills:

Select and recognize the variations in the tasks required for a particular Type C project.

Determine the critical paths for the project.

Organize Gantt charts, make entries for time, personnel, and resources, and provide printouts of the project to management, subcontractors, and other trades.

Estimate the time required for various operations.

2.6.4 Maintain log of project progress.

Knowledge:

Appropriate contents of the log and the sources of required information

Skills:

Collect information from field reports and site visits.

Communicate and record proceedings clearly in writing.

Appendix A: System Classification

The following are some of the types of equipment and system characteristics that delineate "Type A," "Type B," and "Type C" systems, as they are used in this content outline.

Type A Systems

These are basic systems with standard components, low bandwidth transmission, and menu-driven set-up, such as:

Multiplexer/VCR

Quad/VCR

Digital video recorders with time/date, play/record, and anti-tamper functions

Sequential switch

Single keyboard

Indoor/outdoor

Standard cable runs not requiring repeaters or amplifiers (less than 750 ft. for coaxial; less than 1500 ft. for twisted pair)

Type B Systems

These systems can include specialized components, programmable controls, and high-bandwidth transmission, such as:

PTZ

Multiple keyboards

Matrix interfaced with alarms, A/C, or intercom (GPI or dry contact)

Digital video recorders with programmable, alarm-based resolution and frame rate

Fiber transmission systems

Low light

Long cable runs

Covert or portable systems

RF modulators

Type C Systems

These systems can include PCs, serial communication, and wireless transmission, such as:

Integrated systems/serial communications/GUIs

LANs/WANs

Remote systems

Microwave and IR transmission

Digital video recorders with remote interface

Appendix B: Acronyms and Abbreviations

Codes, Standards, and Authorities

CSI	Construction Specifications Institute
EIA	Electronic Industries Alliance
FCC	Federal Communications Commission
NEC	National Electrical Code
SIA	Security Industry Association
UL	Underwriters Laboratories

General

DHCP	Dynamic Host Configuration Protocol
DSL	Digital Subscriber Line
DVR	Digital Video Recorder
EMI	Electro Magnetic Interference
HVAC	Heating, Ventilation, and Air Conditioning
GUI	Graphical User Interface
IR	Infrared
ISDN	Integrated Services Digital Network
LAN	Local Area Network
MATV	Master Antenna Television
NVR	Network Video Recorder
POTS	Plain Old Telephone Service
PTZ	Pan-Tilt-Zoom
RF	Radio Frequency
SONET	Synchronous Optical Network
TCP/IP	Transmission Control Protocol/Internet Protocol
UTP	Unshielded Twisted Pair
VCR	Video Cassette Recorder
VoIP	Voice Over IP
WAN	Wide Area Network