July 2001

Florida Department of Education
CURRICULUM FRAMEWORK

Program Title: Telecommunications Technology
Occupational Area: Industrial Education

	Secondary	**PSAV**
Program Numbers	**8730200**	**I470301**
CIP Number	0647010301	0647010301
Grade Level	9-12 30, 31	30, 31
Length	3 Credits	450 hours
Certification	ELECTRONIC @7G COMP SVC @7G ELECTRICAL @7G	ELECTRONIC @7G COMP SVC @7G ELECTRICAL @7G

I. **PURPOSE:** The purpose of this program is to prepare students for employment or advanced training in a variety of occupations in the Telecommunications industry.

This program focuses on broad, transferable skills and stresses understanding and demonstration of the following elements of the Telecommunications industry; technical and product skills, underlying principles of technology, labor issues, community issues and health, safety, and environmental issues.

II. **PROGRAM STRUCTURE:** This program is a planned sequence of instruction consisting of three occupational completion points: (A) Telecommunications Installer, (B) Telecommunications Installation and Repair Specialist, (C) Telecommunications Technician. When the recommended sequence is followed, the structure will allow students to complete specified portions of the program for employment or to remain for advanced training. A student who completes the applicable competencies at any occupational completion point may either continue with the training or become an occupational completer.

The courses content includes, but is not limited to, installation, maintenance and servicing of telecommunication systems; and diagnosis and correction of operational problems in telecommunications arising from mechanical, electrical, electronics and hardware malfunctions.

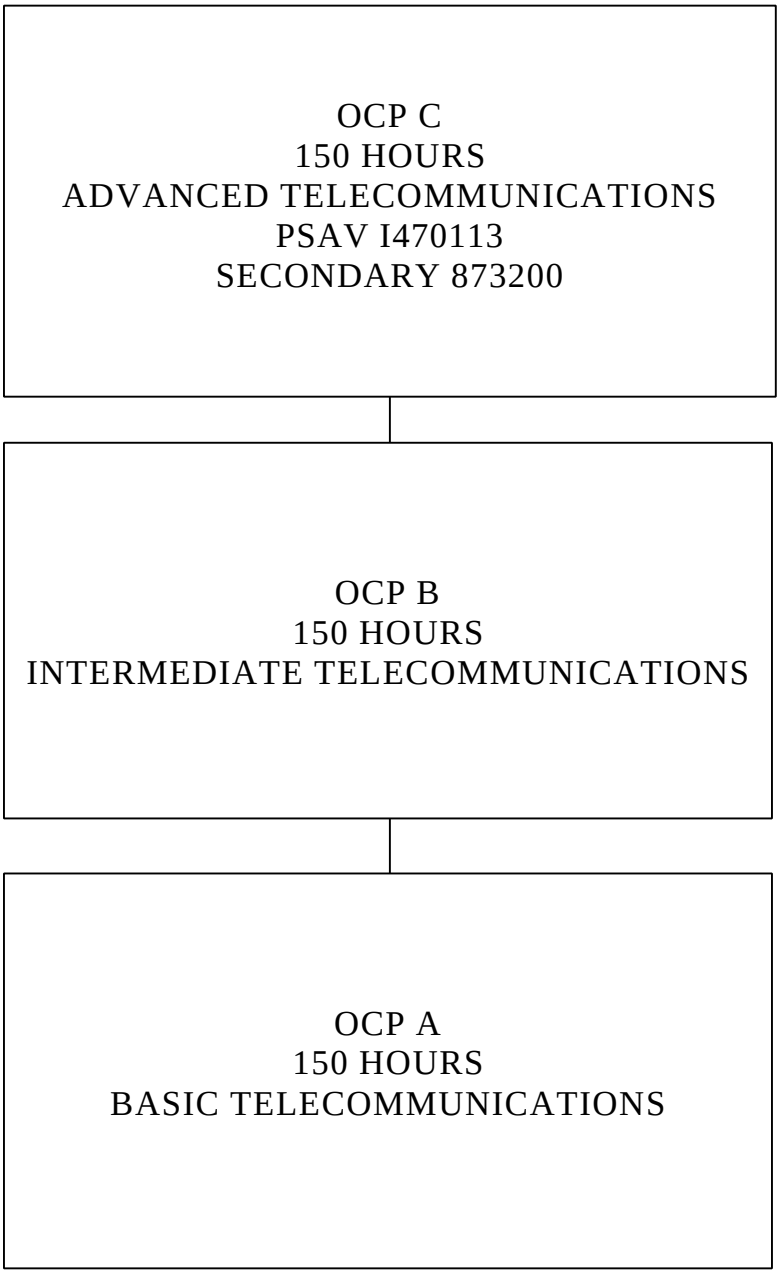
The course content includes, but is not limited to, communication, leadership skills, human relations and employability skills; and safe, efficient work practices.

III. **LABORATORY ACTIVITIES:** Shop or laboratory activities are an integral part of this program. These activities provide instruction in the use of tools, equipment, materials and processes found in the industry. Students will use various types of precision test equipment for analyzing, troubleshooting and repairing telecommunications circuitry.

Listed below are the courses that comprise this course when offered at the secondary level.

8730210 - Telecommunications Technology 1(150)-(OCP A)
8730220 – Telecommunications Technology 2(150)-(OCP B)
8730230 - Telecommunications Technology 3(150)-(OCP C)

THE FOLLOWING DISGRAM SHOWS THE RECOMMENDED PROGRAM SEQUENCE



III. LABORATORY ACTIVITIES: Classroom, shop, and laboratory activities are an integral part of this program. These activities include instruction in the use of the safety procedures, tools, equipment, materials, and processes found in the industry.

IV. **SPECIAL NOTE: SkillsUSA**-VICA, Inc. is the appropriate Career and Technical Student Organization (CTSO) for providing leadership training and for reinforcing specific career and technical skills. Career and Technical Student Organizations, when provided, shall be an integral part of the career and technical instructional program, and the activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, FAC.

ELECTRICAL @7G Certification has been added to the Telecommunication Technology program framework. This recognizes the crossover skills in the electrical and telecommunication industries. While many electricians have trained and acquired telecommunication skills this is not universal throughout the electrical trades. The districts are responsible to assure the required skills to teach the telecommunication technology program have been acquired by the instructor.

The program may be offered in Postsecondary adult vocational (PSAV) courses. Vocational credit shall be awarded to the student on a transcript in accordance with Section 230.643, F.S.

Cooperative training - OJT is appropriate for this program. Whenever cooperative training - OJT is offered, the following are required for each student: A training plan, signed by the student, teacher, and employer, which includes instructional objectives and a list of on-the-job and in-school learning experiences; a workstation that reflects equipment, skills and tasks that are relevant to the occupation which the student has chosen as a career goal. The student must receive compensation for work performed.

In accordance with Rule 6A-10.040, FAC, the minimum basic-skills grade levels required for adult vocational students to exit this program are: Mathematics 9.0, Language 9.0, Reading 9.0 These grade-level numbers correspond to grade-equivalent scores obtained on one of the state-designated basic-skills examinations. If a student does not meet the basic-skills level required for completion of the program, remediation should be provided concurrently through Vocational Preparatory Instruction (VPI). Please refer to the Rule for exemptions.

To be transferable statewide between institutions, this program/course must have been reviewed, and a "transfer value" assigned the curriculum content by the appropriate Statewide Course Numbering System discipline committee. This does not preclude institutions from developing specific program or course articulation agreements with each other.

When a secondary student with a disability is enrolled in a vocational class with modifications to the curriculum framework, the particular outcomes and student performance standards which the student must master to earn credit must be specified on an individual basis. The job or jobs for which the student is being trained should be reflected in the student's desired postschool outcome statement on the Transition Individual Educational Plan (Transition IEP).

SCANS Competencies: To accomplish the Secretary's Commission on Achieving Necessary Skills (SCANS) competencies, instructional strategies for this program must include methods that require students to identify, organize, and use resources appropriately; to work with each other cooperatively and productively; to acquire and use information; to understand social, organizational, and technological systems; and to work with a variety of tools and equipment. Instructional strategies must also incorporate methods to improve students' personal qualities and higher-order thinking skills.

The standard length of the Telecommunications Technology program is 450 hours.

V. **INTENDED OUTCOMES:** After successfully completing this program, the student will be able to:

OCCUPATIONAL COMPLETION POINT - DATA CODE A - (150 Hours)
TELECOMMUNICATION INSTALLER -
INDUSTRY TITLE

TELECOMMUNICATION TECHNOLOGY 1

01.0 Explain and practice workplace safety.
02.0 Demonstrate basic work practices.
03.0 Demonstrate employability skills
04.0 Demonstrate the use of safety equipment.
05.0 Inspect tools and equipment.
06.0 Inspect test equipment.
07.0 Explain industry code of conduct.
08.0 Demonstrate traffic control.
09.0 Demonstrate pole climbing.
10.0 Explain roadside safety.
11.0 Explain electrical hazards.
12.0 Perform data line safety checks
13.0 Demonstrate proficiency in making electrical connections, splices and basic field repair skills.
14.0 Troubleshoot and repair telecommunication system wiring.
15.0 Demonstrate proficiency in customer relations.
16.0 Demonstrate appropriate communication skills.
17.0 Demonstrate an understanding of entrepreneurship.
18.0 Demonstrate proficiency in basic D. C. circuits.
19.0 Demonstrate appropriate understanding of basic math.
20.0 Demonstrate proficiency in the use of tools, equipment and materials used in the telecommunications industry

OCCUPATIONAL COMPLETION POINT - DATA CODE B - (150 Hours)

TELECOMMUNICATION INSTALLATION AND REPAIR SPECIALIST - INDUSTRY TITLE

TELECOMMUNICATION TECHNOLOGY 2

21.0 Demonstrate appropriate understanding of basic science.
22.0 Demonstrate proficiency in basic A. C. circuits.
23.0 Analyze technical data associated with cable validation and fault location.
24.0 Install, repair, terminate and test network cabling.
25.0 Demonstrate advanced skills in test equipment usage to locate faults.

OCCUPATIONAL COMPLETION POINT - DATA CODE C - (150 Hours)

TELECOMMUNICATION TECHNICIAN -
INDUSTRY TITLE

TELECOMMUNICATION TECHNOLOGY 3

26.0 Demonstrate advanced cable repair techniques.
27.0 Demonstrate usage of test equipment to validate network and telecommunication cabling systems.
28.0 Demonstrate a basic understanding of computer system architecture
29.0 Demonstrate proficiency in peripheral equipment.
30.0 Demonstrate proficiency in electronic information exchange.
31.0 Demonstrate proficiency in site requirements and
32.0 Use tables and charts
33.0 Prepare work-site plans.
34.0 Demonstrate proficiency in twisted pair design.

July 2001

Florida Department of Education
STUDENT PERFORMANCE STANDARDS

Program Title: Telecommunications Technology
Secondary Program Number: 8730200
Postsecondary Number: I470113

OCCUPATIONAL COMPLETION POINT - DATA CODE A - (150 Hours)
TELECOMMUNICATION INSTALLER -
INDUSTRY TITLE

TELECOMMUNICATION TECHNOLOGY 1-(8730210 secondary course number)

01.0 EXPLAIN AND DEMONSTRATE WORKPLACE SAFETY--The student will be able to:

01.01 Demonstrate office safety
01.02 Demonstrate safety outside of the office.
01.03 Explain fiber optics safety.
01.04 Demonstrate safety for splicing.
01.05 Demonstrate or explain bucket truck safety.

02.0 DEMONSTRATE BASIC WORK PRACTICES--The student will be able to:

02.01 Demonstrate good work attitudes.
02.02 Explain work and business ethics.
02.03 Explain general code of conduct.

03.0 DEMONSTRATE EMPLOYABILITY SKILLS--The student will be able to:

03.01 Prepare a resume.
03.02 Conduct a job search.
03.03 Secure information about a job.
03.04 Identify and provide documents, which may be required when interviewed for a job.
03.05 Complete a job application form correctly and completely.
03.06 Practice job interview techniques.
03.07 Identify and demonstrate appropriate response to criticism from employer, supervisor or other employees.
03.08 Identify and demonstrate acceptable work habits.
03.09 Demonstrate knowledge of how to make job changes appropriately.
03.10 Demonstrate knowledge of employee health issues.
03.11 Demonstrate efficient organizational skills.
03.12 Demonstrate knowledge of the “Florida Right-To-Know Law” as recorded in Florida Statutes Chapter 442.

04.0 DEMONSTRATE THE USE OF SAFETY EQUIPMENT--The student will be able to:

04.01 Correctly use personal safety equipment used in the telecommunications industry.
04.02 Explain the hazards associated with telecommunications industry.

05.0 INSPECT TOOLS AND EQUIPMENT-–The student will be able to:

05.01 Safety, inspect support equipment.
05.02 Safety, inspect tools.

06.0 INSPECT TEST EQUIPMENT--The student will be able to:

06.01 Evaluate and inspect test equipment.

07.0 EXPLAIN INDUSTRY CODE OF CONDUCT--The student will be able to:

07.01 Explain the purpose of a code of conduct.
07.02 List the basic parts of his/her Industry code of conduct.
07.03 Explain how the code of conduct protects both customers and workers.
07.04 Explain the relationship between code of conduct and the laws governing privacy of telephone conversations.

08.0 DEMONSTRATE TRAFFIC CONTROL--The student will be able to:

08.01 Use roadside signals.
08.02 Use signage, barricades and cones.
08.03 Perform flagging, and hand signals
08.04 Explain general outside safety procedures.

09.0 DEMONSTRATE POLE CLIMBING--The student will be able to:

09.01 Conduct pole-climbing safety inspection.
09.02 Use pole-climbing equipment in a safe and correct manner.
09.03 Explain the hazards of pole climbing.
09.04 Demonstrate safe and correct ladder usage.
09.05 Select correct ladder for telecommunication work.
09.06 Demonstrate ladder rigging for aerial installation.
09.07 Demonstrate pole climbing to install drops and perform splicing.

10.0 EXPLAIN ROADSIDE SAFETY--The student will be able to:

10.01 Explain the hazards encountered around roadways.
10.02 Work in a safe manner around roadways.

11.0 EXPLAIN ELECTRICAL HAZARDS--The student will be able to:

11.01 Identify the hazards associated with work on telecommunication lines and equipment.
11.02 Test and analyze various telecommunications equipment and lines for safety hazards.

12.0 PERFORM DATA LINE SAFETY CHECKS--The student will be able to:

12.01 Check and identify hazardous line currents and voltages.

13.0 DEMONSTRATE PROFICIENCY IN MAKING ELECTRICAL CONNECTIONS, SPLICES AND BASIC FIELD REPAIR-–The student will be able to:

13.01 Apply proper Occupational Safety Health Administration (OSHA) Safety Standards.
13.02 Make electrical connections.
13.03 Identify and use hand tools properly.
13.04 Identify and use power tools properly.
13.05 Demonstrate acceptable soldering techniques.
13.06 Demonstrate acceptable desoldering techniques.
13.07 Demonstrate electrostatic discharge (ESD) safety procedures.
13.08 Describe the construction of printed circuit boards (PCB's).
13.09 Explain the theoretical concepts of soldering.
13.10 Demonstrate rework and repair techniques.

14.0 TROUBLESHOOT AND REPAIR TELECOMMUNICATION SYSTEM WIRING--The student will be able to:

14.01 Test telecommunication systems and evaluate based on established criteria.
14.02 Identify range of fault conditions for telecommunication systems.
14.03 Demonstrate Telecommunication fault identification skills.
14.04 Use field documentation techniques for repair of systems.
14.05 Use test equipment and logic to locate faults.
14.06 Demonstrate proficiency in repair techniques using splices, closure assembly and punch-down terminations.
14.07 Validate repaired system to industry criteria.

15.0 DEMONSTRATE PROFICIENCY IN CUSTOMER RELATIONS--The student will be able to:

15.01 Describe and demonstrate appropriate personal hygiene and professional attire.
15.02 Describe and demonstrate effective listening techniques.
15.03 Describe and apply techniques for installing customer confidence and satisfaction.
15.04 Describe and apply techniques for keeping the customer informed
15.05 Describe and apply effective follow-up techniques.
15.06 Demonstrate discretion in interacting with customers in field and retail environments.
15.07 Demonstrate an understanding of basic conflict resolution.

16.0 DEMONSTRATE APPROPRIATE COMMUNICATION SKILLS--The student will be able to:

16.01 Write logical and understandable statement, or phrases, to accurately fill out forms and invoices commonly used in business and industry.

16.02 Read and use graphs, charts, diagrams, tables, parts manuals, and information sources commonly used in this industry/occupational area.
16.03 Read and follow written and oral instructions.
16.04 Answer and ask questions coherently and concisely.
16.05 Read critically by recognizing assumptions and implications and by evaluating ideas.
16.06 Demonstrate appropriate telephone/communication skills.

17.0 DEMONSTRATE AN UNDERSTANDING OF ENTREPRENEURSHIP--The student will be able to:

17.01 Identify characteristics of the American Enterprise System.
17.02 Define inflation and deflation.
17.03 Explain the basic economic questions facing any society.
17.04 Explain the results and change in demand or a change in supply.
17.05 List factors, which contribute to economic growth.
17.06 Identify characteristics of different types of business ownership.
17.07 Choose the appropriate action in a situation requiring application of business ethics.

18.0 DEMONSTRATE PROFICIENCY IN BASIC D.C. CIRCUITS—-The student will be able to:

18.01 Solve problems in electronics units utilizing metric prefixes.
18.02 Identify sources of electricity.
18.03 Define voltage, current, resistance, power and energy.
18.04 Apply ohm’s law and power formulas.
18.05 Identify and interpret industry appropriate, color codes and symbols to identify electrical components and values.
18.06 Measure properties of a circuit using volt-ohm meter (VOM) and digital volt-com meter (DVM) and oscilloscopes.
18.07 Compute conductance and compute and measure resistance of conductors and insulators.
18.08 Apply ohm’s law to series circuits.
18.09 Construct and verify operation of series circuits.
18.10 Analyze and troubleshoot series circuits.
18.11 Apply ohm’s law to parallel circuits.
18.12 Construct and verify the operation of parallel circuits.
18.13 Analyze and troubleshoot parallel circuits.

19.0 DEMONSTRATE APPROPRIATE UNDERSTANDING OF BASIC MATH—-The student will be able to:

19.01 Solve problems for volume, weight, area and circumference and perimeter measurements for rectangles, square and cylinders.
19.02 Measure tolerance(s) on horizontal and vertical surfaces using millimeters, centimeters, and feet and inches.
19.03 Add, subtract, multiply and divide using fractions, decimals and whole numbers.
19.04 Determine the correct purchase price, to include sales tax for a materials list containing a minimum of six items.

19.05 Demonstrate an understanding of federal, state and local taxes and their computation.
19.06 Use basic algebra to solve job related problems.

20.0 DEMONSTRATE PROFICIENCY IN THE USE OF TOOLS AND TEST EQUIPMENT USED IN THE TELECOMMUNICATIONS INDUSTRY - - The student will be able to:

20.01 Install Twisted pair cabling systems.
20.02 Terminate twisted pair cords, plugs, and outlets.
20.03 Test installed cables.
20.04 Troubleshoot cables.
20.05 Demonstrate proficiency in the current techniques and equipment used in the telecommunications industry.
20.06 Demonstrate proficiency in usage of the NEC codes.
20.07 Demonstrate proficiency in usage of the color codes and configuration.
20.08 Interpret cable substitution hierarchy.

OCCUPATIONAL COMPLETION POINT - DATA CODE B - (150 Hours)
TELECOMMUNICATION INSTALLATION AND REPAIR SPECIALIST
INDUSTRY TITLE

TELECOMMUNICATION TECHNOLOGY 2-(8730220 secondary course number)

21.0 DEMONSTRATE APPROPRIATE UNDERSTANDING OF BASIC SCIENCE—-The student will be able to:

21.01 Demonstrate an understanding of the effects of temperature extremes and moisture content in regards to electronic equipment.
21.02 Demonstrate an understanding of the impact and effects of electrostatic discharge (ESD), power surges, grounding, and lighting strikes.
21.03 Apply the scientific method to draw conclusions or make inferences from data.
21.04 Demonstrate deductive reasoning techniques when troubleshooting
21.05 Demonstrate an understanding of the effects of heat load and ventilation in regards to electronic equipment.
21.06 Identify safety and health related issues including exposure to work related chemicals and hazardous materials, and demonstrate the appropriate precautionary measures.
21.07 Demonstrate an understanding of environmental impact and regulations in regards to the appropriate disposal of electronic equipment.

22.0 DEMONSTRATE PROFICIENCY IN BASIC A. C. CIRCUITS--The student will be able to:

22.01 Identify properties of an AC signal.
22.02 Identify AC sources.
22.03 Analyze and measure AC signals utilizing VOM, DVM.
22.04 Perform AC safety checks.
22.05 Perform AC safety checks.
22.06 Explain high voltage power systems and hazards.

23.0 ANALYZE TECHNICAL DATA ASSOCIATED WITH CABLE VALIDATION AND FAULT LOCATION--The student will be able to:

23.01 Read and understand telecommunications technical data.
23.02 Interpret diagrams, schematics.
23.03 Document work.

24.0 INSTALL REPAIR TERMINATE AND TEST NETWORK CABLING – The student will be able to:

24.01 Terminate cable using industry standard configuration termination RJ11, RJ12, RJ45, BNC, and AUI.
24.02 Install cabling using industry standard tools, telepole, and fishtape.
24.03 Punchdown cables on standard wiring blocks. (66 Block, 110 Block)
24.04 Route cable over aerial and buried drops.

25.0 DEMONSTRATE ADVANCED SKILLS IN TEST USAGE TO LOCATE FAULTS--The student will be able to:

25.01 Operate butt-in test sets.
25.02 Operate toners.
25.03 Operate subscriber line test set.
25.04 Operate cable locator test sets.

OCCUPATIONAL COMPLETION POINT - DATA CODE C - (150 Hours)
TELECOMMUNICATION TECHNICIAN -
INDUSTRY TITLE

TELECOMMUNICATION TECHNOLOGY 3-(8730230 secondary course number)

26.0 DEMONSTRATE ADVANCED CABLE REPAIR TECHNIQUES--The student will be able to:

26.01 Prepare buried cable for splicing.
26.02 Splice buried cable.
26.03 Make various closure devices for spliced buried cable.
26.04 Prepare aerial cable for splicing.
26.05 Splice aerial cable.
26.06 Make various closure devices for spliced aerial cable.

27.0 DEMONSTRATE USAGE OF TEST EQUIPMENT VALIDATE NETWORK AND TELECOMMUNICATION CABLING SYSTEMS--The student will be able to:

27.01 Validate telephone lines using standard industry procedures.
27.02 Validate high-speed digital lines using industry standard procedures.
27.03 Validate advanced signal lines. (Fiber optics).

28.0 DEMONSTRATE A BASIC UNDERSTANDING OF COMPUTER SYSTEMS ARCHITECTURE--The student will be able to:

28.01 Identify network configurations.
28.02 Distinguish between faults caused by wiring verses architecture configuration.

28.03 Install cable connectors to match architecture.
28.04 Explain cable limitations due to architecture.

29.0 DEMONSTRATE PROFICIENCY IN PERIPHERAL EQUIPMENT--The student will be to:

29.01 Demonstrate an understanding of input/output devices.
29.02 Identify and define serial and parallel interface standards.
29.03 Troubleshoot, install and upgrade telecommunications devices and adapter cards. i.e. NIC, Modem
29.04 Demonstrate professional connector assembly procedures.

30.0 DEMONSTRATE PROFICIENCY IN ELECTRONIC INFORMATION EXCHANGE--The student will be able to:

30.01 Install, connect and maintain network clients to various network operating systems.
30.02 Connect and configure computers for network connectivity.
30.03 Describe use and system maintenance of a WAN and telecommunications system.
30.04 Demonstrate knowledge of network protocols.
30.05 Demonstrate knowledge of fundamentals of an Internet system.
30.06 Demonstrate knowledge of telecommunications services and standards.

31.0 DEMONSTRATE PROFICIENCY IN SITE REQUIREMENTS AND CONSIDERATIONS--The student will be able to:

31.01 Demonstrate knowledge of data communication test equipment.
31.02 Demonstrate knowledge of telecommunication wiring systems.
31.03 Demonstrate knowledge of cable and LAN topology.
31.04 Demonstrate knowledge of hubs, switches and routers.
31.05 Calculate and determine power requirements.
31.06 Calculate and determine requirements of the working environment.
31.07Install, configure and troubleshoot LAN cable systems (twisted pair, coax, or fiber).
31.08 Configure and troubleshoot patch bay, hubs and transceivers

32.0 USE TABLES AND CHARTS- - The student will be able to:

32.01 Determine expected levels of resistance for wiring Configuration.
32.02 Determine changes in resistance due to temperature changes.
32.03 Determine capacitance of a given cable configuration.
32.04 Demonstrate quick test methods using Quick Test Charts.

33.0 PREPARE WORKSITE PLANS--The student will be able to:

33.01 Draw site plans.
33.02 Review and evaluate and plan for site electrical considerations.
33.03 Draw cable runs (cutsheet).
33.04 Evaluate and select wiring room.

34.0 DEMONSTRATE PROFICIENCY IN TWISTED PAIR DESIGN—The student will be able to:

34.01 Select correct cable for CAT5 installations.
34.02 Ensure cable rating at patch panels conforms to industry s standards.
34.03 Test installed design to meet standards using test equipment.
34.04 Maintain punchdown twist length specifications.
34.05 Use industry standards for securing cables to building structures.