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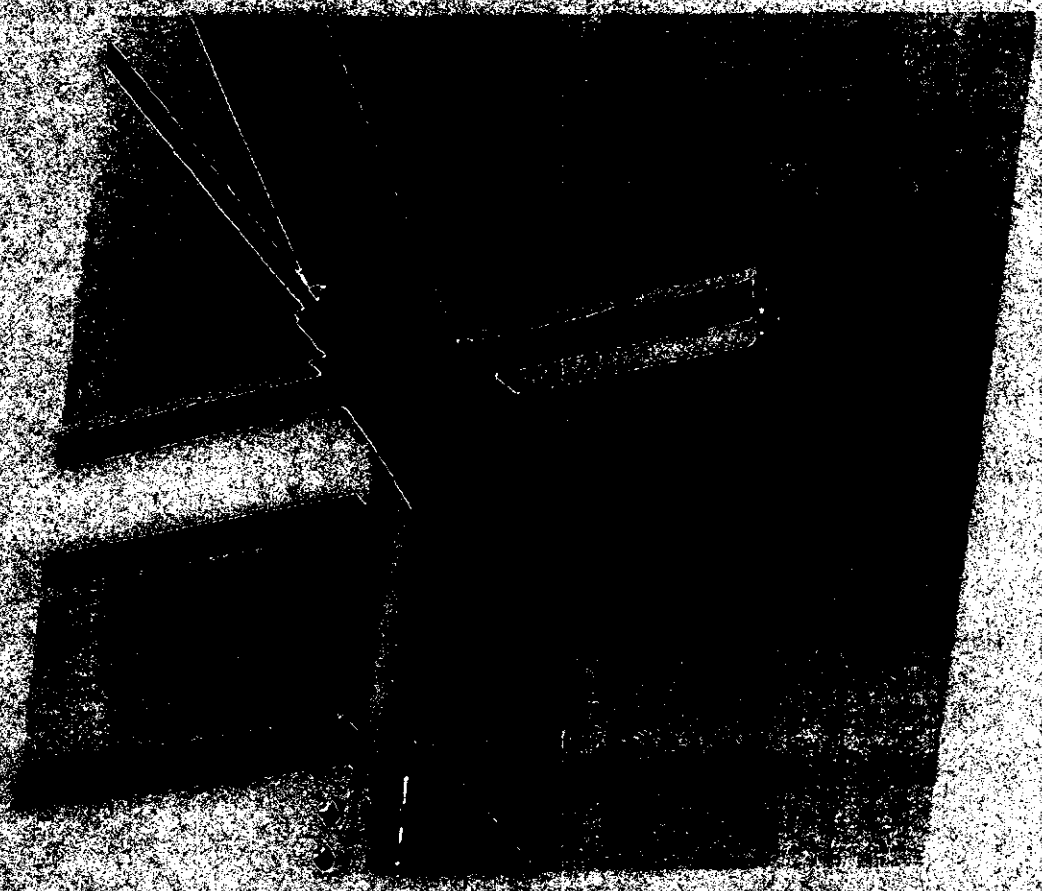
Recommended Changes to the Existing Vocational Continuing Education Programs for the Building Trades



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School of Building Construction
University of Florida
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Construction craft training has been a contentious issue between contractors and the craft work force for more than a century. In 1888, the National Association of Builders advocated replacing formal apprenticeship training programs with school-based vocational training since, the association believed, apprenticeship training was not able to meet the "modern conditions" the industry was facing at the time. Even though contractor organizations were successful in establishing school-based vocational craft training programs, individual contractors showed little interest and were either unwilling or unable to train new workers.

All the blame for providing inadequate levels of construction craft training cannot be shouldered solely by the contractors alone. It is difficult to convince a newly hired employee to spend 6 to 10 hours per week in school, typically during evening hours, while also completing a 40-hour work week. Contractors are, however, in the preeminent position to provide both the incentive and the motivation for craft work force participation in training programs by promoting the benefits of formal craft training.

Currently no objective method exist to determine the appropriate levels of construction craft training. Construction craft unions base the annual number of individuals admitted into apprenticeship training programs on member unemployment levels, while contractors base training decisions on perceived costs; neither method addresses the labor needs of the industry. Therefore, the primary objectives of this study were to

1. document the current level of craft training in registered apprenticeship programs;
2. determine the current level of construction craft training in postsecondary vocational and technical education job preparation programs;
3. determine the current statewide construction craft employment projections, both expected separations and projected growth;
4. develop cost analyses of the construction industry training process; and
5. make recommendations to improve Florida's construction craft training process.

The purpose of this study was ***not*** to make comparisons about quality variations between the joint (union) apprenticeship, nonjoint (nonunion) apprenticeship, and vocational and technical education (vo-tech) job preparation programs.

The summary of the findings indicates there will be a significant decline in the number of craft workers who receive formal craft training, with a resulting skill loss in the craft work force, unless the industry makes a substantial effort to increase craft training levels. The State of Florida currently allocates approximately $35 million annually to support postsecondary construction craft training programs. These programs currently "turn out" approximately 900 journeyman-level craft workers from apprenticeship programs and graduate approximately 1,100 semiskilled craft workers from vo-tech job prep programs annually. The construction industry's projected annual demand is estimated at 5,750 skilled, journeyman-level, craft workers and 2,850 unskilled craft workers. A computer simulation of the operations research model indicates that in the 1990 to 2005 time period, approximately 70% of the demand for skilled craft workers will be filled by individuals who have received no formal craft training.

The development of a school-to-work transition program in the form of a youth-apprenticeship program is the principal recommendation to both improve training program retention rates and reinforce construction industry employment opportunities for those youths who are not college bound. A copy of a model youth-apprenticeship program is included in Appendix A.

A copy of this report may be obtained by contacting: Executive Secretary, BCIAC, M.E. Rinker, Sr., School of Building Construction, P.O. Box 115703, University of Florida, Gainesville, Florida 32611, 904/392-5965.

TABLE OF CONTENTS

1.0 Introduction

This task outlines the historical framework of construction craft vocational, technical and apprenticeship training, first in the United States as a whole and then in Florida.

There is a growing belief in the industry that the quantity of construction craft training does not meet the needs of the industry (Fox, 1988; Gasperow, 1990). Industry observers have long realized that craft training is vitally important to the construction industry since training levels directly influence cost, productivity, quality and safety (Weinberg, 1969; Liska, 1994). Three basic methods of providing construction industry training: (1) formal and informal on-the-job training; (2) training off the job in schools and/or training centers; and (3) formal apprenticeship with academic vocational instruction and structured, supervised, on-the-job training. An investigation into current nationwide levels of construction craft training suggests that approximately 19% of craft workers report receiving formal company training, 38% report receiving informal on-the-job training (of these individuals, approximately 10% also report receiving postsecondary, school-based training), 4% report receiving "other" training and 39% report receiving no craft training at all (Bureau of Labor Statistics, 1992).

Contractors in the industry increasingly recognize that technological change demands continuing education and training for journeyman-level craft workers; however, only 25% of all craft workers report receiving skill improvement training (Bureau of Labor Statistics, 1992). Improving access to, and availability of, craft training is vital in the effort to provide the

construction industry with a craft work force that has a wide range of job skills and is able to adapt to the constantly changing conditions encountered on a construction job site.

1.1 Construction Craft Training Programs in the United States

Formal craft training, specifically formal craft apprenticeship and to a lesser degree vocational and technical education job preparation programs, in the construction industry is designed to produce a skilled, journeyman-level craft worker who can perform a broad range of tasks, including the fundamentals of the craft and all specialized tasks, largely without direct supervision (Mills, 1972). An examination of the relative merits of academic vocational training coupled with a structured on-the-job training program versus a strictly academic vocational training program indicates that a mixture of on-the-job training and academic classroom training is the most effective method of training semiskilled and skilled craft workers (Franklin, 1973). Experience on previous construction sites combined with task evaluation and layout skills are essential for qualified, journeyman-level craft workers (Mills, 1972). Every viable construction industry craft training program must include a combination of formal, structured, on-the-job training coupled with appropriate vocational schooling (Rubens and Harrisson, 1980).

Perhaps the primary function of legitimate vocational, technical and apprenticeship training programs is to develop the craft work force for the construction industry (Foster, 1973). These formal training programs are expected to expose the apprentice to a variety of work and training, both on the job and in the classroom. In the ideal setting, on-the-job training refers to a systematic process that includes incremental exposure to the diverse elements of the trade; repeated performance of tasks under the direction of a qualified, journeyman-level craft worker;

and periodic appraisal of skill development (Franklin, 1973). The training functions of formal programs are not designed to produce semiskilled laborers, but rather a core of broadly skilled craft workers whose skill mastery gives them the distinguished "journeyman-level craft worker" status (Mills, 1972).

1.2 Labor Relations in the Building Trades

The American Federation of Labor (AF of L) issued the formal charter of the Building and Construction Trades Department on March 20, 1908, to the seven founding member unions: Carpenters, Iron Workers, Lathers, Painters, Plumbers, Steam Engineers and Tile Layers (AFL-CIO, 1983). By 1917, membership in construction trades unions constituted more than one-fifth of the entire membership of the AF of L (AFL-CIO, 1983). These early years were marked with interunion jurisdictional disputes in the unions' struggle for control of the work. During the early 1920s, approximately 95% of all strikes were disputes among trade unions protecting their "trade jurisdiction" from infringement by other unions rather than protecting working conditions and standards from attack by employers (Haber, 1930). Employers often attempted to substitute workers of a lower wage union for workers of a higher wage union, which exacerbated this problem (Haber, 1930).

As these early trade unions became more powerful, they began to introduce work rules and establish restrictions on output. These work rules were created either by the unions or the employers, or arrived at jointly, depending upon the nature of the activity controlled by the work rules and the relative bargaining strength of the parties (Haber, 1930). Employers tended to view many of the restrictive union regulations as faulty economic policy; however, the regulations were

appropriate policy from the point of view of perpetuating the union and protecting the living standards of the membership (Haber, 1930). Many construction employers were less opposed to recognizing collective bargaining agreements than they were to acquiescing to the regulations the unions enacted in their efforts to protect wages, hours and working conditions (Haber, 1930).

The employer-employee relationship in the construction industry began to change during World War II. The war effort created an urgent need for rapidly designed and built defense projects. Many of these large projects were constructed by nationally oriented design-build contractors who had large in-house engineering staffs (Edmister, 1991). When these large, typically unionized contractors entered a local labor market, local union leaders tended to keep a close watch on work assignments and job conditions and, at times, took positions on jurisdictional issues that most observers regarded as extreme or unwise (Mills, 1972). At times of full employment and favorable market conditions, the unions tended to steadfastly enforce work rules, especially on large construction projects (Haber, 1930).

After World War II, many business leaders thought the trade unions were becoming too powerful (Edmister, 1991). Congress passed the Labor Management Relations Act of 1947 (Taft-Hartley Act), partially in response to these perceptions (Zieger, 1986). Although President Harry Truman initially vetoed the Taft-Hartley Act, Congress overrode the veto in 1947 (AFL-CIO, 1983).

The Taft-Hartley Act outlined union unfair labor practices and also permitted the states to outlaw the closed-union-shop. The following 21 states currently have "right-to-work" laws that legislatively prohibit the closed-union shop (Gall, 1988):

State	Year Legislation Passed
Alabama	1953
Arizona	1947
Arkansas	1947
Florida	1943
Georgia	1947
Iowa	1947
Kansas	1957
Louisiana	1954 & 1976
Mississippi	1954
Nebraska	1947
Nevada	1951
New Mexico	1947
North Carolina	1947
North Dakota	1947
South Carolina	1954
South Dakota	1947
Tennessee	1947
Texas	1947
Utah	1955
Virginia	1947
Wyoming	1963

The right-to-work laws in these states encouraged the growth of nonunion construction firms within the state borders. With very few exceptions, these nonunion contractors were initially small firms, competing in local construction markets, with each firm having less than $1 million in annual billings (AFL-CIO, 1983).

Congress passed the Labor-Management Reporting and Disclosure Act of 1959 (Landrum-Griffin Act), which allowed union hiring halls to refer members based on seniority, residence,

and experience--an exclusive referral system (Perloff, 1981). The Landrum-Griffin Act also authorized collection of training funds and joint administration of union-management training programs (Mills, 1972). This last provision became the cornerstone of the union apprenticeship training programs by providing the mechanism to collect apprenticeship training funds, treated as trust funds, from unionized employers. Training funds, which are primarily collected through a levy attached to the journeyman wage rate, are jointly administered by the apprenticeship training committee (Mills, 1972).

Between 1957 and 1962, unemployment in the unionized construction industry was never less than 12% (Perloff, 1981). By 1965, however, union construction unemployment fell to approximately 4% (Perloff, 1981). This low unemployment level was partially responsible for dynamic changes in the construction industry. In certain geographical areas, without fear of outside competition from nonunion firms, construction labor unions were able to gain control over the labor supply and introduce inflexible and restrictive work practices, demand and receive higher wages, and enact greater restraints on contractor management (Haber, 1930; Edmister, 1991). Many union business agents began to advocate unreasonable positions on local labor issues while threatening to withhold the services of the union craft worker--a powerful weapon (Borcherding, 1976; Edmister, 1991). Fragmented contractor management associations, which collectively bargained with the trade unions, agreed to union demands rather than face disruptive strikes (Haber, 1930; Edmister, 1991). The driving force behind the escalating wage increases can be attributed to the contour wage theory that postulates local unions were engaged in wage rate leapfrogging during this period (Schulenburger, 1978). In heavily organized areas of the country, local unionized contractors had no incentive to contest unions' demands for higher wages

(Maloney, 1978; Edmister, 1991). Each contractor would have the same base labor cost, effectively taking labor out of market competition, and these increased labor costs would be passed on to the owner.

Between 1967 and 1974 the construction unions were able to collectively bargain for an average 64.2% wage increase (Perloff, 1981). As construction labor costs began to adversely affect the cost of new facilities, the users of construction services began to organize. The Construction Users Anti-Inflation Roundtable was founded in 1969 and later renamed and combined with other alliances in 1972 to form the Business Roundtable (1983). This organization of chief executives of the nation's largest industrial corporations began to focus on labor costs as a method to reduce construction costs of new facilities. As these owners became aware of the actual costs of restrictive union labor practices and craft jurisdictional disputes, the owners, particularly in the South, began to experiment with nonunion construction companies during the early 1970s (Allen, 1988). During the late 1970s and early 1980s, the Business Roundtable's Construction Industry Cost Effectiveness Project produced 23 individual reports on specific construction industry problem areas (Business Roundtable, 1983). The summary report identified 57 inefficient work restrictions not required by collective bargaining agreements that inflated union labor costs by an estimated 15% (Business Roundtable, 1983).

The construction industry historically has been one of the largest industries in the United States, contributing anywhere from 4% to 5% of the nation's Gross National Product for any given year (United States Bureau of the Census, 1993). Construction industry spending increased from $91.3 billion in 1970 to approximately $400 billion by 1987 (United States Bureau of the

Census, 1993). By the late 1970s the average nonunion general contractor, paying two-thirds the union wage rate for labor, had a 6%-7% cost advantage over the unionized general contractor (Diekmann and Peppler, 1984). By 1984, nonunion contractors accounted for more than 70% of the construction dollar volume (Northrup, 1985). The nonunion share of the construction industry market has continued to increase slowly and was approximately 80% of the labor pool by 1993 (Tomsho, 1993). The decline in unionized construction is further evidenced by employment information compiled by the United States Department of Labor, Bureau of Labor Statistics. In 1973, the Building and Construction Trades Department (BCTD) of the American Federation of Labor-Congress of Industrial Organizations (AFL-CIO) represented 40% (1,722,000) of the 4.3 million construction workers; by 1987, the BCTD represented only 22% (1,123,000) of the more than 5 million construction workers.

1.3 Construction Craft Apprenticeship Training

The origins of construction industry craft training in the United States date to the British system of trade union structure with its tradition of private sponsorship and funding (Motley, 1907). Throughout the 19th century and continuing until World War I, the construction industry relied on European immigrants for skilled craft labor. In 1888, the National Association of Builders advocated replacing formal apprenticeship training programs with school-based vocational training since, the association believed, apprenticeship training did not meet the "modern conditions" the industry was facing at the time (Haber, 1930). Although contractor organizations at the time were successful in establishing school-based vocational craft training programs, individual contractors showed little interest and were unwilling and/or unable to train new workers (Haber, 1930).

By 1928, construction craft apprenticeship training efforts were still haphazard, employer-sponsored, on-the-job training programs without uniform national standards (Haber and Levinson, 1956). These 1920s-era apprenticeship programs were used by both employers and early labor unions as one, and perhaps the primary, method of regulating the number of new workers entering the industry (Franklin, 1973). During the 1930s, when thousands of skilled craft workers were unemployed, union resistance to apprenticeship training programs was intense, and employers were unwilling to assume the costs and obligations of craft training at a time when skilled workers were readily available (Haber and Levinson, 1956). For these reasons, construction craft training became and has continued to be a contentious issue between employers and the construction craft work force.

The only apprenticeship legislation that has been promulgated at the federal level was the passage of the National Apprenticeship Act (Fitzgerald Act) in 1937. In 1911, Wisconsin became the first state to adopt an apprenticeship statute (Glover, 1986). The Smith-Hughes Act of 1917, which established the legislative origins of vocational education in the United States, was initially intended as a replacement for formal craft apprenticeship (Haber, 1930; Hamilton, 1990). The Fitzgerald Act, which established a uniform federal apprenticeship policy for the United States (29 U.S.C. 50 §1), required the Secretary of Labor to establish standards for apprenticeship training and provided neither encouragement nor incentive for states to get involved in apprenticeship training (Haber and Levinson, 1956).

Pursuant to the Fitzgerald Act, the United States Department of Labor (US-DOL) established guidelines for apprenticeship training that forced the formalization of training policies

in each of the construction crafts. The original national apprenticeship standards were established by national joint apprenticeship committees for each of the building trades, with each committee composed of an equal number of members from the individual BCTD unions and respective national employer associations (United States Department of Labor, 1938). Consequently, the BCTD was the first construction organization to establish formalized apprenticeship training programs for the building trades that followed the US-DOL guidelines (Levitt, 1979). The requirements were promulgated by the US-DOL, but administration and control of the programs were kept at the local level (Haber and Levinson, 1956).

"Labor Standards for the Regulation of Apprenticeship Programs," published in the Code of Federal Regulations, established the minimum standards for sponsors of apprenticeship programs (29, CFR 29.5). Following is a summary of the minimum apprenticeship standards:

1. Initiation of a written apprenticeship agreement
2. Minimum starting age of 16 years
3. Written schedule of work processes the apprentice will learn on the job
4. Minimum of 144 hours per year of organized technical instruction
5. Progressively increasing wage schedule
6. Supervision of on-the-job training and adequate training facilities
7. Periodic review and evaluation of the apprentice's progress, both on the job and in the classroom
8. Cooperation by both employers and employee organizations
9. Recognition of successful completion of the apprenticeship program
10. Training without regard to race, creed or national origin

In the United States high school graduates historically have displayed little interest in apprenticeship or skilled blue-collar jobs (Rubens and Harrisson, 1980). The educational system and faulty school-to-work transition programs play an important role in this negative attitude (Hamilton, 1990). The United States and Canada are the only two industrialized nations in the

world where apprenticeship is not a teenage youth training program (Rubens and Harrisson, 1980). In most countries (Germany, Great Britain, Australia and Japan, for example) apprenticeship is a teenage youth employment program. This is not true in the United States, where the construction trades apprentice is older, has more years of general education, is enrolled for a longer apprenticeship training period, receives less on-the-job supervision, has fewer hours of off-the-job training and has a higher dropout rate (Rubens and Harrisson, 1980; Glover, 1986).

The United States is the only country investigated that has not established training councils or industry training boards for apprenticeship training. Thirty-two states do not a have State Apprenticeship Council (SAC), thus making the United States the only industrialized country that relies on an incomplete federal-state system of apprenticeship administration (Glover, 1986). The 28 states and 3 territories that do have an SAC are Arizona, California, Connecticut, Washington, D.C., Delaware, Florida, Hawaii, Kansas, Kentucky, Louisiana, Guam, Maine, Maryland, Massachusetts, Minnesota, Montana, Nevada, New Hampshire, New Mexico, New York, North Carolina, Ohio, Oregon, Pennsylvania, Puerto Rico, Rhode Island, Vermont, Virgin Islands, Virginia, Washington and Wisconsin (Bureau of Apprenticeship and Training, 1991). Many of these states, facing budgetary shortfalls, are reducing or eliminating SAC funding levels. The Florida legislature has steadily eliminated funding for the Florida Bureau of Apprenticeship and Training.

There also is a serious problem associated with the secondary educational system that until recently has been focused entirely on presenting college preparation course work at the expense of those students who do not attend college. Middle schools and high schools have actively

moved away from "industrial arts" class offerings, and career counselors have not effectively promoted the construction industry to students who are not college bound (Federle, Rowings, and DeVany, 1993). The construction industry's characteristic of undertraining the work force devalues the work done by all workers, especially the most highly skilled craft workers, and leaves most of the work force with few options for upward social mobility, which also prejudices high school career counselors (Hamilton, 1990).

1.4 Current Construction Craft Apprenticeship Training Practices

Vocational, technical and apprenticeship training and continuing education programs are expensive to establish and administer (Rubens and Harrisson, 1980). Many employers perceive these training programs as costly propositions that do not pay off, especially when workers are likely to go to work for competitors before employers' training costs can be recovered (Rubens and Harrisson, 1980). Nontraining employers view the employees and/or other employers as ultimately receiving the training benefits (Rubens and Harrisson, 1980).

A conflict of interest exists between the construction employers and the work force regarding scope of training. Because building trades craft training is universal in nature, and not firm specific, it is generally cheaper for a contractor to hire craft workers trained by other firms than it is to actually train craft workers (Rubens and Harrisson, 1980). The BCTD unions have tried to keep apprenticeship training as extensive as possible to ensure job mobility since extent of training and competence of skilled craft workers are strongly related to craftsmen's ability to secure work (Mills, 1972; Franklin, 1973).

The nonunion sector of the construction industry has tried but has not had complete success in enhancing the skills of nonunion construction helpers or "apprentices" (Levitt, 1979). US-BAT has approved national standards for nonunion apprenticeship training programs; however, nonunion construction firms generally have not been effective in establishing a wide range of vocational and apprenticeship programs (Foster, 1973; United States Department of Labor, 1975). Most nonunion training programs tend to include extensive informal on-the-job training, which typically translates to random observation of others' work (Foster, 1973). At most smaller contractors, the apprentice's time is devoted largely to production work; any training that occurs is largely a by-product (Mills, 1972; Foster, 1973). Essentially, most contractors, both union and nonunion, are not individually equipped to support broad, systematic craft instruction to the untrained or marginally trained work force (Foster, 1973).

The largest nonunion firms have established task or modular training programs to train unskilled workers within very narrow task structures (Northrup, 1985). Upon completing a specific task training module, the worker typically receives a certificate of completion (Northrup, 1985). These modular training programs tend to be job specific so the employer can recoup training costs as soon as possible (Business Roundtable, September, 1982; Northrup, 1985). It is unclear whether these narrowly defined training programs provide employees any advantage in securing future employment.

There is also a movement within the nonunion sector of the construction industry to promote "competency-based" training for the construction crafts (Northrup, 1992). Competency-based apprenticeship training, as proposed for the construction trades, refers to the practical and

theoretical instruction integrated into individual learning packages that enables apprentices to proceed at their own pace (Northrup, 1992). Competency-based training programs are required to meet US-DOL standards, under the guidelines set forth in the 1937 Fitzgerald Act, if the program is to be registered with US-BAT. The length of apprenticeships, as established by US-BAT, tends to reflect differences among the various construction trades. These differences require adjustments in the number of hours required for training in each of the various building crafts. It is difficult to reduce the time element of vocational and apprenticeship training without impairing training content (Rubens and Harrisson, 1980). Competency-based apprenticeship and vocational training must not be misused or diminish scope of training.

Since the United States tends to train inadequate numbers of construction industry apprentices, journeymen who have graduated from formal apprenticeship programs work more hours annually than do workers who have not completed a formal apprenticeship program (Franklin, 1973; Glover, 1986). Those individuals who complete apprenticeship training are more likely to maintain employment related to their training and usually suffer fewer and briefer periods of unemployment than narrowly skilled craft workers (Franklin, 1973).

Graduates of formal apprenticeship programs are broadly trained, adaptable to change, likely to undertake continuing education and more likely to stay with the trade (Franklin, 1973). Apprenticeship training program graduates also are more likely to become craft supervisors (Franklin, 1973). In one study, 39% of construction supervisors had completed a formal apprenticeship training program, whereas only 33% of all journeyman-level craft workers had completed a formal training program, indicating that more craft supervisors tended to be

apprenticeship graduates (Franklin, 1973). Studies also have shown that workers with formal apprenticeship instruction are more productive than workers with other types of training (Glover, 1986).

Supporters of apprenticeship training claim that underutilization of apprenticeship results in shortages of skilled journeymen that ultimately diminish the quality of the constructed product (Franklin, 1973). Others argue that the primary purpose of formal apprenticeship in the construction industry is to produce a pool of supervisors and key skilled craft workers for any given trade (Northrup, 1985).

1.5 Construction Craft Related Vocational and Technical Education

In the United States, apprenticeship is only one way to acquire construction skills. The primary methods of skill acquisition in the construction industry, both formal and informal, are within the construction industry (Foster, 1970). Nonapprenticeship sources of skill acquisition in the construction industry include training in other industries, vocational and technical schools, military training and informal instruction by friends and relatives (Foster, 1970). Informal training in the construction industry also is gained through unstructured skill acquisition such as observation of others' workmanship.

The national shift away from unionized construction and toward nonunion construction has contributed to a restructuring of construction craft training processes. This restructuring has sharply limited traditional apprenticeship and favored vocational education mixed with practical experience (Engineering News-Record, 1992). Assorted local nonunion contractor organizations

have developed training programs in the various trades and attempted to implement these programs in local vocational schools. The community and technical college system has provided facilities and teachers for related instruction for many of these programs.

The public role in construction vocational and apprenticeship training is to provide related instruction in the local public school system (Mills, 1972). The problems with nonunion vocational and apprenticeship programs sponsored in community colleges frequently stem from the schools' inability to conduct courses that suit the precise needs and schedules of apprentices, who come from many firms and multiple trades (Rubens and Harrisson, 1980). Uneconomical small classes and individualized instruction typically are required. These problems have limited the success of the vocational and technical education training process in meeting the needs of the construction industry.

An appraisal of the various trades in the construction industry suggests that crafts requiring fundamental intellectual ability (electrical, mechanical and sheet metal trades) rely on a more comprehensive school-based training program than the manipulative skilled trades (bricklayer, cement mason and equipment operator), where training is more logically provided on the job site. The differing skill level requirements in each of the various crafts in the building trades suggest there are internal cost efficiencies related to types of course offerings and duration of training programs (Metcalf, 1985).

The quality of vocational education and training is highly variable in the building trades and depends on sponsoring organization, location, program orientation and instructor competence

(Metcalf, 1985). The highly competitive nature of the construction industry (there are approximately 12,450 active, licensed general contractors in Florida), where contracts are awarded based on lowest estimated cost, also precludes inclusion of training costs in contractors' bids (Coble, 1992). Inconsistent quality of these craft training programs can be directly tied to inadequate funding and may stem from employer perceptions about the cost effectiveness of vocational and apprenticeship training (Glover, 1986). Therefore, the case can be developed and presented that supports expansion of either the entire or selected parts of the vocational education and training system.

Apprenticeable trades in the construction industry cannot normally be learned exclusively in vocational schools. Vocational and technical education is only the first step in skill development for a journeyman-level craft worker. On-the-job experience is deemed the most important part of the apprenticeship training process (Foster, 1970; Franklin, 1973). Improved vocational schooling, prior to apprenticeship, is viewed as a supplement to the apprenticeship process (Kenny, 1988). There is little likelihood that vocational education, without structured on-the-job training, is capable of producing a fully trained journeyman. The appropriate vocational education roles in apprenticeships are to provide a source of well-prepared applicants for apprenticeship and serve as a resource in providing the related instruction portion of apprenticeship (Kenny, 1988). The role of vocational education is <u>not</u> to be a substitute for apprenticeship (Kenny, 1988).

Extensive use of a narrowly skilled or semiskilled work force requires division of work assignments into simple and repetitive tasks commensurate with the employees' skill levels

(Northrup, 1985). These substitute craft workers require close and careful supervision by highly skilled journeymen (Levitt, 1979). The role of the supervisor becomes critical to the overall progress and quality of the construction project (Diekmann and Peppler, 1984). The supervisor must assume complete control of both planning and sequencing the job and also must handle all tasks outside the normal routine (Levitt, 1979). Technological change and increased mechanization are likely to allow substitution of materials, equipment and semiskilled labor for journeyman skills in the basic trades; however, changing technology demands higher craft worker skill levels in the mechanical and electrical trades. The industry-wide move away from analog control systems to digital instrumentation systems in industrial construction is an example of technological change requiring a more highly skilled craft worker than in the past.

These training issues are not new problems to the construction industry. Prior to World War I, the construction industry depended heavily on overseas immigration as the source of skilled labor (Haber, 1930). The restrictions imposed on immigration after World War I eliminated this source of skilled labor. Since the early 1920s contractors have been responsible for providing training for the craft work force (Haber and Levinson, 1956). The industry increasingly recognizes that strengthening contractor commitment to formalized vocational, technical and apprenticeship training programs and expanding contractor cooperation, especially in the nonunion sector of the industry, is necessary if the construction industry is to provide the training necessary to meet the needs of both contractors and employees (Rosenbaum, 1991; Associated General Contractors, 1991; Liska, 1994).

1.6 Sources of Construction Craft Labor Market Information in Florida

In 1943, Florida was the first state in the United States to pass a right-to-work law (Gall, 1988). Its tradition of nonunion construction has led to a wide variety of vocational and apprenticeship training programs. Formal apprenticeship programs are sponsored by individual construction firms, associations of nonunion employers and associations of union employers. Vocational and technical education programs, taught at both secondary and postsecondary institutions, also are available for some crafts.

1.6.1 Florida Department of Labor and Employment Security, Bureau of Apprenticeship and Training

The Florida Department of Labor and Employment Security, Division of Labor, Employment and Training, Bureau of Apprenticeship and Training (F-BAT), compiles the apprenticeship records of registered apprenticeship programs in Florida. These records are kept in hard-copy form in Tallahassee. Each registered apprenticeship program is required to establish an apprenticeship committee whose duties must include the following (Florida Department of Labor and Employment Security, 1990):

1) Screen and select applicants for apprenticeship
2) Maintain all records for at least 5 years
3) Determine credit to be granted (if any) to applicants for previous experience or education, according to policy
4) Enter into apprenticeship agreements between the apprentice and the committee as program sponsor and submit these agreements to the Registration Agency [F-BAT] for registration
5) Maintain a record of each apprentice's training progress on the job and in related classroom instruction
6) Review regular progress reports for apprentices and recommend actions as appropriate
7) Arrange tests for determining the apprentice's progress in manipulative skills and technical knowledge

8) Notify the Registration Agency [F-BAT] of all other apprentice actions including registrations, reinstatements, cancellations and repeat periods
9) Notify the Registration Agency [F-BAT] when apprentices have satisfactorily completed their apprenticeship and request issuance of a Certificate of Completion to such apprentices
10) Provide for continuous employment of apprentices insofar as possible
11) Secure, if possible, Participating Employer agreements for designated employers and notify the Registration Agency [F-BAT] by copy
12) Hear and adjust complaints of violations and make rulings as deemed necessary
13) Recommend such changes in the program as deemed necessary to improve effectiveness and efficiency
14) Notify the Registration Agency's [F-BAT] representative of all apprenticeship committee meetings and make available, upon request, official meeting minutes
15) Provide apprenticeship records for review, upon official request of the Bureau's servicing representative
16) In general, be responsible for the successful operation of the program and the welfare of the apprentices by performing the duties listed herein

These apprenticeship committee regulations were promulgated under the guidelines established by US-BAT (Florida Statutes, Chapter 38c-16 §1-§10).

1.6.2 Florida Department of Labor and Employment Security, Bureau of Labor Market Information

The Florida Department of Labor and Employment Security, Division of Labor, Employment and Training, Bureau of Labor Market Information (BLMI), annually compiles and forecasts industry and occupational employment projections. The BLMI uses 14 different statistical analysis techniques, 7 shift and share models and 7 regression models to simulate individual occupational projections, with each model using both historical and current employer-provided data. The statistical model with the best fitting R^2, Durbin-Watson statistic, or t-statistic for each of the individual employment codes is chosen for inclusion in the general employment model.

The BLMI projects construction industry employment rising from 323,278 workers in 1990 to 390,154 workers by the year 2005 (Florida Department of Labor and Employment Security, 1992)--an increase in employment of 66,876 workers or 20.69%. These employment figures are broken down into "General Building Contractors," "General Contractors except Building" and "Special Trade Contractors" as well as by craft. The BLMI also predicts the number of yearly openings for each craft. If each of Florida's registered apprenticeship programs and vocational education programs were to train for all the projected openings (growth plus separations)--approximately 11,934 individuals per year--vocational and apprenticeship training for the building trades in Florida would be a significant undertaking.

1.6.3 Florida Department of Education, Division of Vocational, Adult, and Community Education

The Florida Department of Education, Division of Vocational, Adult and Community Education (F-DOE), compiles the number of students enrolled in vocational and technical education job preparation training programs (vo-tech job prep). The Florida Department of Education, Division of Public Schools, provides funding to local school districts based upon the 1973 Florida Education Finance Program law. Funding calculation is based on number of full-time equivalent students (FTE) (Florida Department of Education, 1993).

2.0 Introduction

The survey of training providers was initiated during the second quarter of 1993. Samples of the questionnaires and cover letters are attached under Appendix B. The overall response rate to the questionnaire was 38%.

2.1 Questionnaire Development

The survey instrument was developed utilizing "The Total Design Method" (Dillman, 1978). Open-ended questions were developed to allow respondents to describe their biggest problems and suggest improvements for the training process. Closed-ended questions with ordered choices were developed to distinguish opinion differences among the three groups of training providers. Partially closed-ended questions were developed to identify numerical cost and enrollment differences among the three groups of training providers. A separate questionnaire was developed for construction apprenticeship providers and for postsecondary community colleges and vocational and technical education centers.

The preliminary survey instrument was developed and reviewed by the BCIAC project coordinator. Once changes were made to the survey instrument, a list of candidates was developed who would test the preliminary survey instrument. The draft survey instrument was tested on a nonunion contractor in South Florida, a union contractor in Southern California, a United Association of Journeymen and Apprentices of the Plumbing and Pipe Fitting Industry local union in a Middle Atlantic state and a vo-tech training provider in north-central Florida.

Extensive review of the survey instrument also was conducted with F-DOE and F-BAT representatives. Final review of the survey instrument and printing was completed in May 1993, with initial distribution on June 1, 1993.

2.2 Training Provider Database

2.2.1 Florida Bureau of Apprenticeship Data

Florida is one of 31 states or territories that have a State Apprenticeship Council/Agency (SAC). Apprenticeship records for the state are kept at the F-BAT office in Tallahassee; however, copies also are kept in the US-BAT state office, also located in Tallahassee. Florida operates under a Sunshine in Government Law that opens most state agency records to the public for review. To gain access to the US-BAT records, the researcher would have to sue under the Freedom of Information Act, a convoluted and lengthy process. Upon a request from the researcher, F-BAT supplied a dated list of all registered apprenticeship training providers in Florida. F-BAT does not, however, summarize apprenticeship records or keep running totals of the number of apprentices enrolled in each of the registered training programs. Apprenticeship records are kept in hard-copy form at the F-BAT office and are not computerized. Therefore, the researcher made a formal, written request access to the F-BAT paper records. Formal approval for access to the Florida Department of Labor and Employment Security, Division of Labor, Employment and Training, Bureau of Job Training, apprenticeship records was granted in June 1993. The researcher manually searched the paper records to determine

1. The number of registered apprentices in each program,
2. The number of registered programs currently inactive and
3. Any programs that were not identified in the original listing.

As of December 1992, there were 58 joint apprenticeship training providers offering 83 craft training programs with an enrollment of 1,795 apprentices, and 39 nonjoint apprenticeship training providers offering 92 craft training programs with an enrollment of 1,671 apprentices. The updated list of training providers was used as part of the database for the survey instrument; the number of joint and nonjoint registered apprentices was used in the simulation model.

2.2.2 Florida Department of Education Data

The F-DOE provided, upon request, a listing of all construction-related course work taught in publicly funded secondary and postsecondary educational institutions. The F-DOE data identified 64 postsecondary vo-tech job prep training providers offering 185 construction-related programs with 5,095 enrolled students. Identification of the postsecondary vo-tech job prep training providers completed the final portion of the database for the survey instrument, and enrollment data were used in the simulation model. The F-DOE data also identified 81 apprenticeship training programs with 3,179 enrolled students, and 114 supplemental (typically continuing education) training programs with 4,526 enrolled students, who were taught and funded through vo-tech programs.

2.3 Training Provider Contact

The researcher attempted to contact each of the identified training providers by telephone five calendar days prior to the June 1, 1993 initial survey instrument distribution. Ten calendar days after the initial mailing the researcher again attempted to contact telephonically each of the identified training providers who had not already responded. Twenty-eight days after the initial

mailing, the researcher mailed an additional complete survey instrument to each of the 131 nonrespondents. The survey cutoff date was August 10, 1993, ten weeks after the initial mailing.

3.0 Introduction

There is no readily accessible data available in the United States on the type of construction industry vocational, technical and apprenticeship training practices that are available to craft workers in Germany, Great Britain, Japan or Australia (Glover, 1986; Pellegrini, 1988). However, this section does summarize the foreign vocational and apprenticeship training information that was available in the University of Florida libraries, the Library of Congress and the United States Departments of Labor and Education libraries. Personal contacts were also made with Ambrose "Red" Bittner, Chief, National Program Coordination and Training Group, Bureau of Apprenticeship and Training, United States Department of Labor and Ron Castaldi, Acting Director, Division of Vocational and Adult Education, United States Department of Education.

3.1 Comparisons

Before initiating the discussion of the individual countries it is useful to look at the size of the construction work force in each country and the estimated annual construction expenditure for each country (OECD, 1992). The graphs on the following two pages compared the annual size of the construction work forces in each country and the annual construction dollar volume, converted to 1985 U.S. dollars, Figures 3-1 and 3-2 respectively. Figure 3-2 is also adjusted for each country's specific inflation rate using 1985 as the base year.

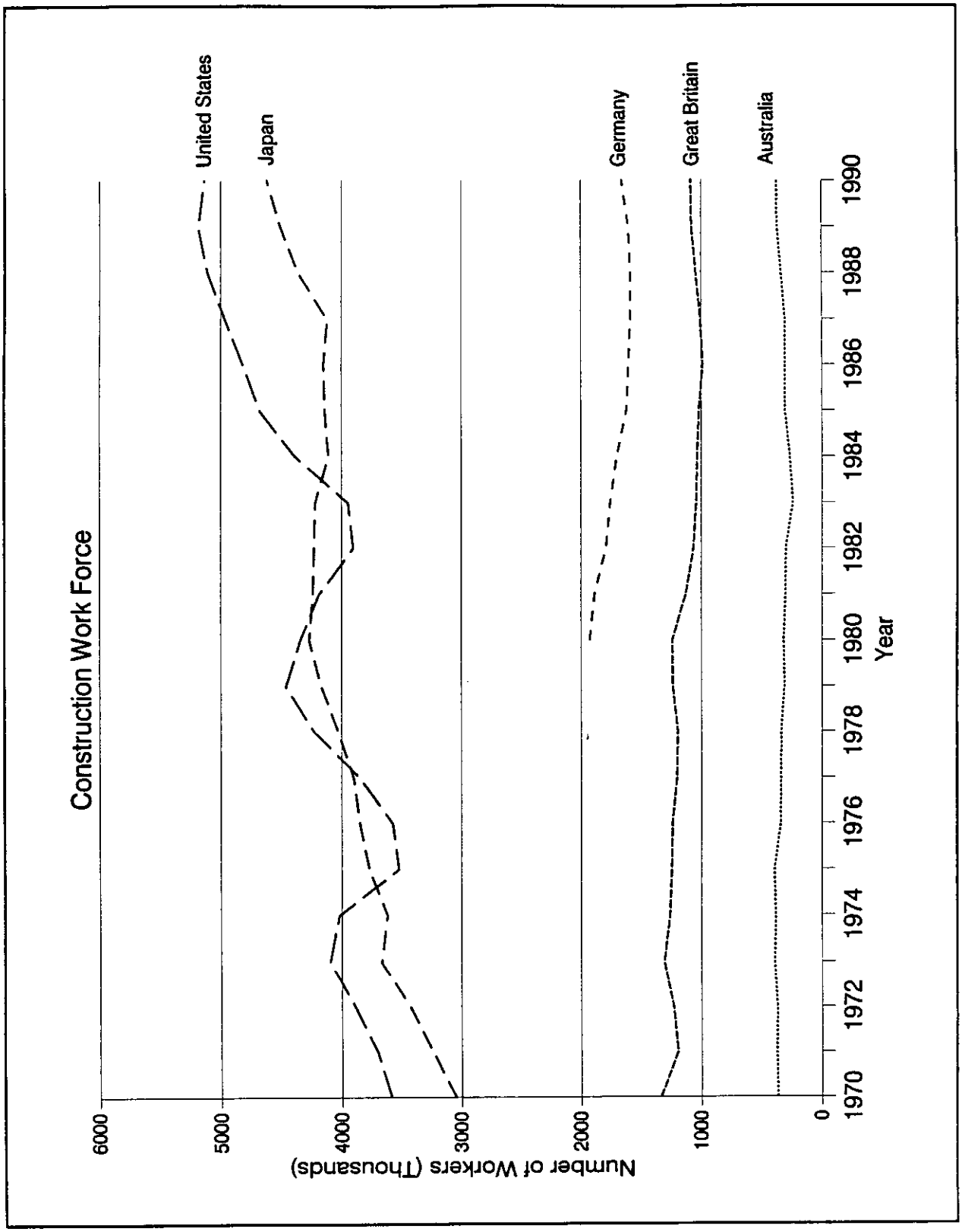

Figure 3-1 Construction Work Force

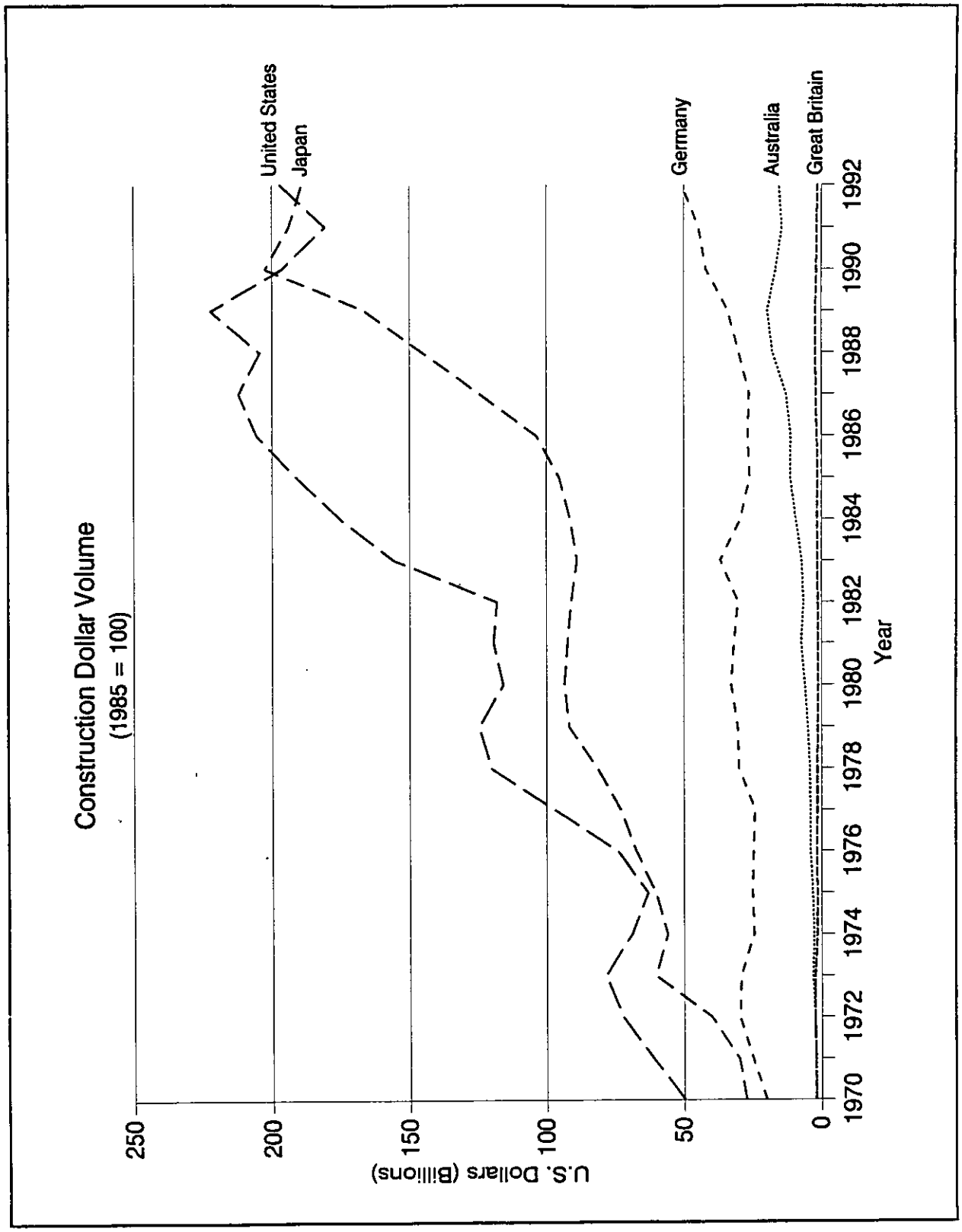

Figure 3-2 Construction Dollar Volume

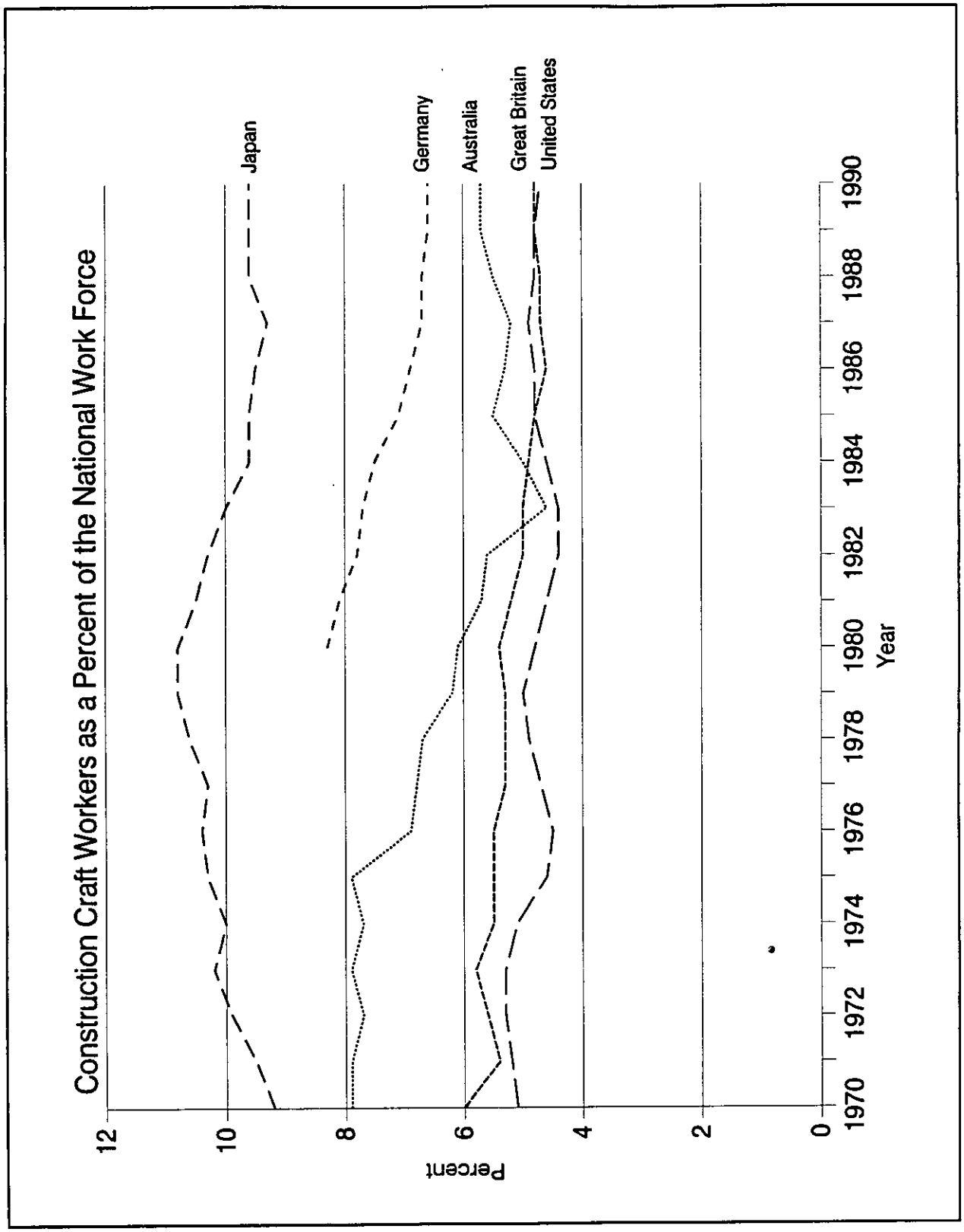

Figure 3-3 Construction Craft Workers as a Percent of the National Work Force

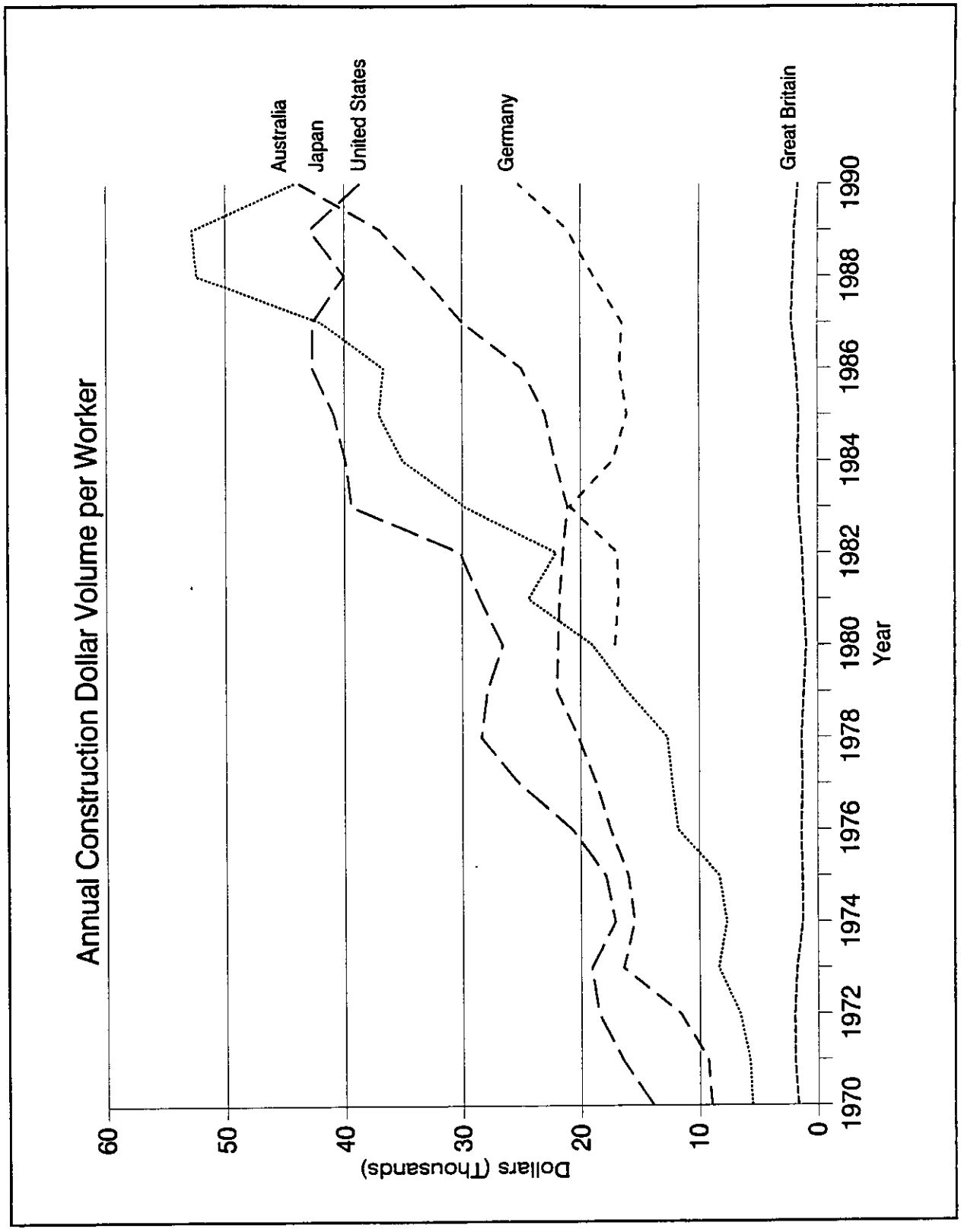

Figure 3-4 Annual Construction Dollar Volume per Worker

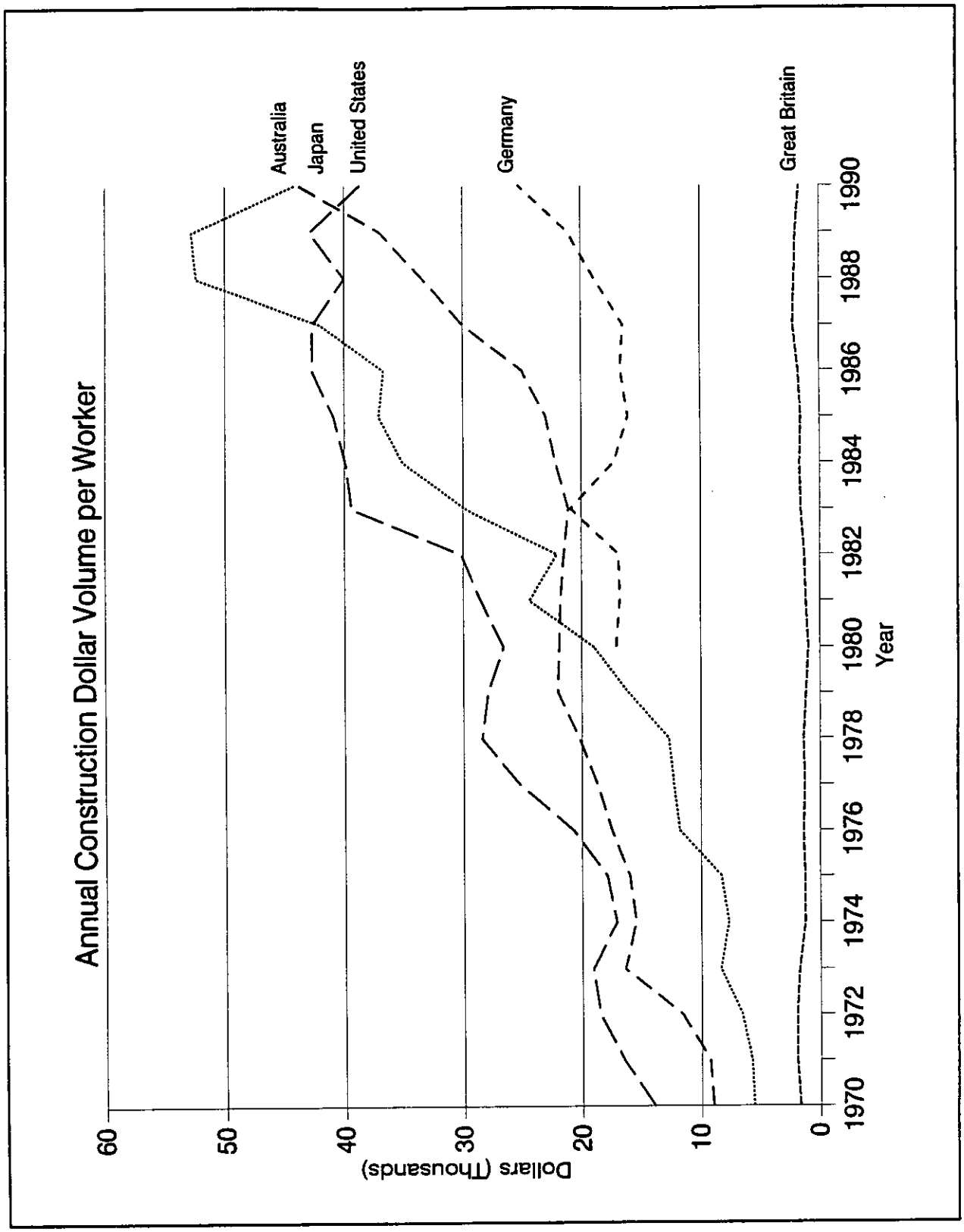

Figure 3-4 Annual Construction Dollar Volume per Worker

It is interesting to note that, with the exception of Japan, the sizes of the construction work force and the annual construction dollar volume of the other countries (Australia, Germany and Great Britain) are fractions of those of the United States. Figure 3-3 is a graph of the percentage of the national work force involved in construction and Figure 3-4 is a graph of the annual construction dollar volume divided by the number of workers. These graphs are included to show the construction work force characteristics of the other countries.

It is also interesting to note that the United States has, generally, the lowest proportion of the national work force employed in the construction industry of all the nations studied. If individual country construction productivity can be measured by the annual dollar volume per worker, then the United States is also among the leaders in individual productivity.

3.2 Germany

The Federal Republic of Germany, a socialist country, has one of the most comprehensive vocational training systems in Europe (Panorama DDR, 1978). Apprenticeship in Germany, as is typical in all developed countries except in the United States and Canada, is primarily a youth training program, targeted at youths aged 16-18 (Glover, 1986). In Germany the national government has authority over vocational and apprenticeship training because of its impact on the national economy, while the states have control over educational programs (Pellegrini, 1988). In Germany the vast majority of all skilled persons in blue collar occupations have completed an apprenticeship training program (Rubens and Harrisson, 1980).

Every child in Germany attends a ten-year general school. Graduates typically choose either apprenticeship or two additional years of schooling to prepare for college. Those who opt for apprenticeship have a selection of 225 occupations to choose from. Those students who are not able to complete the tenth grade, but who have completed the eighth grade, have a selection of 66 occupations to choose from (Panorama DDR, 1978).

Career guidance begins in the sixth grade. Vocational orientation begins in the seventh grade (Panorama DDR, 1978). These programs are geared toward providing the student with first basic and then specialized knowledge about the various occupations and the specific requirements for each profession.

The German apprenticeship system can legitimately be castigated for perpetuating class differentiation and gender favoritism (Hamilton, 1990). By grades five or seven young people classified as non-college bound are assigned to separate school buildings with distinctive curricula, accentuating the segregation among the students (Hamilton, 1990).

3.2.1 Labor Relations

The construction sector percentage of the German Gross Domestic Product has been in steady decline and in 1985 reached its lowest level in 20 years. Employment in the construction industry reflects this reduction with employment declining 17.5% between 1975 and 1985. The lack of continuity in employment in the construction industry has made the industry unattractive. The declining employment levels have reduced the amount of training available and the opportunity to receive training. Apprenticeship in the German construction trades peaked in 1982

at 70,000 but declined dramatically to 20,500 in 1984 and ultimately dropped to 10,300 in 1987. Employment demographics in Germany show that in 1987, the average age of the work force was approximately 40 years with approximately 50% of the foremen 50 years old or older (Pellegrini, 1988).

In 1987 there were approximately 984,800 employees in the primary building trade (Bauhauptgewerbe) with approximately 500,000 employees in the secondary building trade (Ausbaugewerbe) and another 400,000 employees engaged in minor construction activities. The construction industry employees are organized on an industrial basis with approximately 485,055 employees belonging to the IGBSE (Industriegewerkschaft Bau-Steine-Erden) union. Employers are represented by two primary construction organizations, the General Association of the German Construction Industry (Hauptverband der Deutschen Baunindustrie, HDB) and the Central Association of the German Building Trade (Zentralverband des Deutschen Baugewerbes, ZDB) (Pellegrini, 1988).

Collective bargaining agreements are negotiated and signed at the national level between the trade unions and the employer associations. Employees at firms with five or more employees have the right to elect work councils (co-determination) which may further negotiate with employers to improve the terms of the national agreements. In 1988, 4,833 firms had work councils representing approximately 600,000 employees (Pellegrini, 1988).

3.2.2 Training

German employers contributed 21.1% of total wages to a special fund, administered jointly by the trade unions and employer representatives. The vocational training fund receives 2% of total wages from this fund. Approximately 51,000 employers, representing 980,000 employees, contribute to this fund. Apprenticeship in the German, as in the United States, construction industry has the tradition of being privately funded (Pellegrini, 1988).

There are 14 manual crafts in the German construction industry with apprenticeship programs lasting three years for each craft. In the first year the apprentice will spend 20 weeks mastering theoretical knowledge taught at public professional schools, 20 weeks mastering technical knowledge taught at a vocational training center with the remaining 12 weeks spent at the contracting firm. At the conclusion of the first year, the apprentice will choose one of the three main operating groups; above ground (Hochbau), civil engineering (Tiefbau) or finishing trades (Ausbau). During the second year, the apprentice will spend 8-12 weeks at the public professional school, 13 weeks at the vocational training center with the remaining time under the supervision of a skilled worker at a construction site. In Germany, on-the-job apprentice instructors must have a teaching certification to supervise apprentices. Upon completion of the second year of apprenticeship, the apprentice is eligible to take a uniform written and practical exam to be a "generally qualified skilled worker." If the apprentice elects to continue for a third year to be a "specialized skilled worker," the apprentice spends 8-12 weeks at the public professional school, 4 weeks at the vocational training center with the remainder of the time under the supervision of a skilled craft worker on a construction site. A final, uniform, written and practical exam concludes the apprenticeship. The German system of apprenticeship allows

the apprentice to undertake all related training during the regular workday, rather than in the evening, as is the practice in the United States for the building trades (Glover, 1986; Pellegrini, 1988).

3.3 Great Britain

In Great Britain, decisions on the number of apprentices in each construction craft and the training content for each craft is the responsibility of the Construction Industry Training Board (CITB). The CITB is a tripartite committee of employers, trade unions and educators appointed by the Secretary of State. The CITB is divided into 7 committees based on the different sections of the industry. Among the advisory boards are the committees for; Bricks, Building, Civil Engineering, Electrical Engineering, Mechanical Engineering, Scaffolding, and Specialist Building (Pellegrini, 1988; Rubens, 1980).

Apprenticeship in the building trades in Great Britain is on the decline. The poor image of the construction trades and the lack of continuous employment make it difficult to recruit and maintain young workers to the trades. In 1984, CITB estimated there were 49,200 principal craft trainees in the construction trades, a reduction of 37% from 1975 levels. In 1984 CITB sponsored 18,000 of these apprentices with a voluntary levy of 2% maximum of craft payroll was contributed by 30,000 of 110,000 eligible firms (Pellegrini, 1988). Construction trades apprenticeship programs in Great Britain are typically three years in length, with 20-24 weeks of formal vocational schooling the first year and 8-12 weeks of formal vocational schooling the second year. Apprenticeship in the British construction industry, as in the United States and Germany, has the tradition of being privately funded (Glover, 1986).

In 1985, there were approximately 72,896 one person construction firms (43% of all firms) in Great Britain, an increase of 260% from 1975. This employment shift was also evident in the work breakdown where, by 1987, 39.4% of the total construction dollar volume was repair and maintenance work with the remaining 60.6% of construction activity consisting of new work. The employment shifts to smaller construction firms has considerably reduced the opportunity for apprenticeship training in the construction trades (Pellegrini, 1988).

Another reason for the decline in apprenticeship opportunities is the impact of the unions on the starting apprenticeship wage rate. Young people leaving school and entering a 3-year apprenticeship earn, by union pressure, 80 percent of the skilled worker's wage (Hampson, 1985). This is a major deterrent for employers to engage in apprenticeship training activity.

The strategy of coaxing the British educational system to move into the vocational areas has been lethargic. This traditional antithesis is being challenged with the establishment of a "Youth Training Scheme" (Hampson, 1985). This program is similar to a "Youth Apprenticeship" program and is targeted at youths in the 14 to 18 age group.

3.4 Australia

Australian construction trades apprenticeship programs, as in the United States, are descendants of the early British system of trade union structure and traditions. The education system, including continuing and vocational education, is administered by the individual States

(SVITB, 1981). Vocational education is generally provided by post secondary institutions and forms an essential part of the apprenticeship training system.

Generally, apprenticeship training programs in Australia range from three to five years, with four years being the standard term. Participation in the associated vocational instruction is a mandatory characteristic of this apprenticeship training system. The preferred model for providing the specialty instruction is the block system, where the apprentice attends technical class three to four times a year in blocks of four to five days each semester. Vocational instruction is typically concentrated in the first and second years of the apprenticeship (SVITB, 1981).

Apprenticeship training programs are highly decentralized between the states and territories, with each region having a tripartite labor, management, and educator committee administering the apprenticeship program. With the design and operation of the apprenticeship system left to the states, each state has developed an independent and distinctive apprenticeship system (SVITB, 1981). Each apprenticeship authority awards a certificate of proficiency based on the apprentice's competence. The major problem with this system is the acceptability of the skilled worker's credentials from state to state, since there is no national system of trade or craft certification. The fragmentation and decentralization of the Australian apprenticeship program administration have led to the establishment of the Australian Apprenticeship Advisory Committee that coordinates apprenticeship and technical education (Rubens and Harrisson, 1980).

3.5 Japan

Japan once had a large traditional, British model, apprenticeship program, but now has a strong, well-developed system of employer sponsored, firm specific, work-study training programs. Japan also has public vocational training centers that provide broad skill training courses and skill tests that are, at times, referred to as apprenticeship training programs (Glover, 1986; SVITB, 1981; Rubens and Harrisson 1980).

Public vocational training is provided in the Vocational Training Centers operated by national, prefectural, local and regional authorities. Advanced training is also provided in six month programs taught in regional Skill Development Centers. Only licensed vocational instructors can teach in these training centers. The Institute of Vocational Training provides four years of formal courses for professional vocational instructors (SVITB, 1981).

Japanese employers seem to gear training to their individual requirements without governmental guidelines or support. This system embraces the concept of apprenticeship where a period of long term training and the imposition of mutual obligations on both the trainee and the employer is involved. All employer provided training is geared to three levels of certification (SVITB, 1981):

Level	Eligibility
Junior certified skilled worker	Those who successfully pass the statutory basic vocational training.
Second-grade skilled worker	Junior skilled worker with one or two years experience.
First-grade skilled worker	Second-grade skilled worker with three or four years experience.

One myth concerning the Japanese work force that should be dismissed is that employers provide "life time employment" to the Japanese work force. This myth originated during the strong economic growth decades of the late 1960s to late 1980s. This myth is clearly not the case during the current economic downturn when many employers are cutting work force levels (Wall Street Journal, 1993).

As stated at the beginning of this section, there is very little construction industry data available in the United States on the construction craft training practices of other countries. This section was developed from research conducted at the World Bank, the Organization of Economic Co-Operation and Development, the International Labor Organization, the United States Departments of Education and Labor and the Library of Congress, all located in Washington, D.C.

4.0 Introduction

This section includes the responses to the questions asked in Sections F, G & H of the Request for Proposal. Also included are the statistical analyses of the questions where appropriate (complete analyses are included in Appendix C), a craft training simulation model and a cost analysis of the State of Florida's craft training support.

The statistical analysis technique employed on the initial questionnaire responses was a nonparametric one-way analysis of variance, in this case the *Wilcoxon test*. The nonparametric one-way analysis of variance method was chosen because the research questions were designed to detect response differences among the three groups of training providers--joint, nonjoint and vo-tech programs. The Wilcoxon technique assigns a rank to each response, then computes a χ^2 value that is designed to detect differences among the three groups of training providers while eliminating the influence of outliers on the computed χ^2 value. The $\alpha = 0.05$ decision criterion tests the null hypothesis that the population mean response ranks are not significantly different. For values of $Pr\{\chi^2\} \leq 0.05$, there is a significant difference among the sample mean ranks; for values of $Pr\{\chi^2\} > 0.05$, there is no significant difference among the sample mean ranks. The symbol μ indicates mean response value.

Where appropriate, the symbol # was used to indicate the number of responses received from the training provider group--either joint apprenticeship program, nonjoint apprenticeship program, vo-tech job prep program or the total number of responses to the specific question. The

symbol % was used to indicate the percentage of responses received from the training provider group. In some instances, the % column totals may add to greater than 100% since the respondents had the opportunity to choose more than one category.

Each of the respondents to the initial survey instrument was given the opportunity to request a summary copy of the survey results. Sixty of the training providers requested a summary copy of the results. The researcher included a short, follow-up survey instrument designed to test the training provider's impressions of the researcher's proposed recommendations. Statistically valid conclusions concerning the opinions of the entire training provider population cannot be drawn from the results of this follow-up survey.

4.1 Responses to the Posed Questions

1) Provide an outline of the training curriculum offered.

The programs that provided copies of their training program curriculum were either registered apprenticeship or vo-tech job prep programs. The curriculum offered by the registered apprenticeship programs had to meet the guidelines established by the US-BAT and the F-BAT. In Florida, all apprenticeship training providers have the ability to contract with local, publicly funded, secondary and post-secondary institutions to provide the academic portion of the training program. The F-DOE does not require these training programs to meet the F-BAT apprenticeship guidelines. Samples of electrical apprenticeship program outlines (one joint program and two nonjoint programs) are included in Appendix D.

2) How is the training program administered?

As of December 1992, in the State of Florida, there were 58 Joint apprenticeship training providers offering 83 craft training programs with an enrollment of 1,795 apprentices and 39 nonjoint apprenticeship training providers offering 92 craft training programs with an enrollment of 1,671 apprentices (George, 1994). The Florida Department of Education (F-DOE) identified 64 post-secondary vo-tech job prep training providers offering 185 construction related programs with 5,095 enrolled students (George, 1994). The overall response rate to the initial survey instrument was 38%. Since the entire verifiable population of formal construction craft training providers was identified and sampled, statistically valid conclusions can be drawn from the data derived from the primary survey instrument. The number of individual respondents to the survey instrument is identified in the following table.

	Joint Apprenticeship Programs		Nonjoint Apprenticeship Programs		Vo-tech Job Preparation Programs		State Wide Totals	
	# of Joint programs	% of Joint programs	# of Nonjoint programs	% of Nonjoint programs	# of Vo-tech programs	% of Vo-tech programs	# of state wide programs	% of state wide programs
Number of training providers	58	100	39	100	64	100	161	100
Number of survey respondents	19	32	24	62	18	28	61	38

3) Where is the training program presented?

	Joint Apprenticeship Programs		Nonjoint Apprenticeship Programs		Vo-tech Job Preparation Programs		Question Totals	
	# of Joint responses	% of Joint responses	# of Nonjoint responses	% of Nonjoint responses	# of Vo-tech responses	% of Vo-tech responses	Total # of responses	% of total responses
Apprenticeship training facility	14	74	2	8	*	*	16	26
Local community college	*	*	9	33	3	17	12	20
Contractor facilities	*	*	4	17	*	*	4	7
Vo-tech education center	4	21	12	50	15	83	31	51
Local High School	2	10	6	25	1	6	9	15
Other	*	*	1	4	*	*	1	2

Note: Column totals may add to more than 100% since the respondents had the opportunity to choose more than one category.

This question identified the types of facilities utilized by craft training providers. Joint apprenticeship training providers relied primarily on private apprenticeship training facilities while Nonjoint apprenticeship training providers relied primarily on public facilities for apprenticeship training.

4) How many students are enrolled in each class?

The enrollment data on the following page was developed through research at the Florida Departments of Labor and Education, not from responses to the survey instrument.

1. **Boilermaker**
   - 0 Joint
   - 0 Nonjoint
   - 0 Vo-tech
   - 0 Total
2. **Brick Mason & Stone Mason**
   - 38 Joint
   - 5 Nonjoint
   - 214 Vo-tech
   - 257 Total
3. **Carpenter**
   - 259 Joint
   - 31 Nonjoint
   - 594 Vo-tech
   - 884 Total
4. **Cement & Terrazzo Finisher**
   - 0 Joint
   - 0 Nonjoint
   - 0 Vo-tech
   - 0 Total
5. **Electrician**
   - 474 Joint
   - 933 Nonjoint
   - 837 Vo-tech
   - 2,244 Total
6. **Elevator Constructor**
   - 0 Joint
   - 8 Nonjoint
   - 0 Vo-tech
   - 8 Total
7. **Equipment Operator**
   - 17 Joint
   - 0 Nonjoint
   - 0 Vo-tech
   - 17 Total
8. **Insulator**
   - 67 Joint
   - 0 Nonjoint
   - 0 Vo-tech
   - 67 Total
9. **Ironworker**
   - 140 Joint
   - 0 Nonjoint
   - 3 Vo-tech
   - 143 Total
10. **Millwright**
    - 33 Joint
    - 0 Nonjoint
    - 0 Vo-tech
    - 33 Total
11. **Painter**
    - 60 Joint
    - 6 Nonjoint
    - 0 Vo-tech
    - 66 Total
12. **Plasterer, Lather & Drywall Finisher**
    - 7 Joint
    - 0 Nonjoint
    - 21 Vo-tech
    - 28 Total
13. **Plumber**
    - 209 Joint
    - 238 Nonjoint
    - 311 Vo-tech
    - 758 Total
14. **Pipe Fitter**
    - 189 Joint
    - 2 Nonjoint
    - 0 Vo-tech
    - 191 Total
15. **Sprinkler Fitter**
    - 41 Joint
    - 106 Nonjoint
    - 7 Vo-tech
    - 154 Total
16. **Roofer**
    - 50 Joint
    - 0 Nonjoint
    - 0 Vo-tech
    - 50 Total
17. **Sheet Metal Worker**
    - 186 Joint
    - 110 Nonjoint
    - 13 Vo-tech
    - 309 Total
18. **Refrigeration Mechanic**
    - 14 Joint
    - 201 Nonjoint
    - 3,059 Vo-tech
    - 3,274 Total
19. **Tile Setter & Marble Finisher**
    - 6 Joint
    - 29 Nonjoint
    - 31 Vo-tech
    - 66 Total
20. **Other (Glazier)**
    - 2 Joint
    - 2 Nonjoint
    - 1 Vo-tech
    - 5 Total

5) What is the duration of these training programs?

a) How many hours per week are the students exposed to classroom training?

	Joint Apprenticeship Programs	Nonjoint Apprenticeship Programs	Vo-tech Job Preparation Programs	Training Provider Mean
Classroom training hours (mean)	5.7	5.7	20.2	10.1

The statistical, nonparametric, analysis of variance of the responses to this question indicates that, at the α=0.05 level, there is no significant difference in the number of classroom hours the student is exposed to among the joint and nonjoint (χ^2=0.8575) programs. There is however, at the α=0.05 level, a significant difference among the number of classroom hours the student is exposed to in the vo-tech programs and both the joint (χ^2=0.0001) and nonjoint (χ^2=0.0001) programs. This revelation is not surprising since these vo-tech programs are primarily academically orientated.

b) How many hours per week are the students exposed to <u>supervised</u> on-the-job training?

	Joint Apprenticeship Programs	Nonjoint Apprenticeship Programs	Vo-tech Job Preparation Programs	Training Provider Mean
Supervised on-the-job training hours (mean)	40.0	36.4	11.1	29.8

The statistical, nonparametric, analysis of variance of the responses to this question indicate that, at the α=0.05 level, there is a significant difference in the number of supervised on-the-job training hours the student is exposed to among the joint and nonjoint (χ^2=0.0289) programs. There is also, at the α=0.05 level, a significant difference in the number of supervised

on-the-job training hours the student is exposed to among the vo-tech programs and both the joint (χ^2=0.0001) and nonjoint (χ^2=0.0001) programs. This difference in supervised on-the-job training hours among the vo-tech and both the joint and nonjoint programs is not surprising since these vo-tech programs are primarily academically orientated. The difference in supervised on-the-job training hours among joint and nonjoint programs is an unexpected revelation and can be attributed to the prohibition in the joint programs of apprentices working unsupervised while nonjoint programs do allow apprentices to work unsupervised.

6) Who provides the craft training and instruction?

a) Who teaches the academic portion of the program? (check all that apply)

	Joint Apprenticeship Programs		Nonjoint Apprenticeship Programs		Vo-tech Job Preparation Programs		Question Totals	
	# of Joint responses	% of Joint responses	# of Nonjoint responses	% of Nonjoint responses	# of Vo-tech responses	% of Vo-tech responses	Total # of responses	% of total responses
Journeymen	18	95	16	67	*	*	34	56
Contractors	3	17	11	16	*	*	14	23
Manufacturers &/or Suppliers	*	*	3	13	*	*	3	5
Educators	2	11	7	29	*	*	9	15
Local Building Inspectors	*	*	5	21	*	*	5	8
Others	*	*	3	13	*	*	3	5

Note: Column totals may add to more than 100% since the respondents had the opportunity to choose more than one category.

The responses to this question suggests that joint apprenticeship training programs rely heavily upon journeyman craft workers and that nonjoint apprenticeship training programs utilize a broader base of industry professionals to provide craft instruction.

b) Who supervises the apprentice's on-the-job instruction? (check all that apply)

	Joint Apprenticeship Programs		Nonjoint Apprenticeship Programs		Vo-tech Job Preparation Programs		Question Totals	
	# of Joint responses	% of Joint responses	# of Nonjoint responses	% of Nonjoint responses	# of Vo-tech responses	% of Vo-tech responses	Total # of responses	% of total responses
Journeymen	19	100	19	79	3	17	41	67
Contractors	5	26	15	62	7	39	27	44
Apprentice Instructors	3	16	4	17	2	11	9	15
Educators	1	5	1	4	9	50	11	18
Local Building Inspectors	*	*	*	*	*	*	*	*
Others	1	5	4	17	1	6	6	10

Note: Column totals may add to more than 100% since the respondents had the opportunity to choose to more than one category.

The responses to this question suggests that both journeyman craft workers and contractors share the primary responsibility for supervising the apprentice's on-the-job training in the formal apprenticeship programs while educators shoulder this responsibility in the vo-tech programs.

7) Information concerning the craft training instructor background.

a) What are the required instructor qualifications?

	Joint Apprenticeship Programs		Nonjoint Apprenticeship Programs		Vo-tech Job Preparation Programs		Question Totals	
	# of Joint responses	% of Joint responses	# of Nonjoint responses	% of Nonjoint responses	# of Vo-tech responses	% of Vo-tech responses	Total # of responses	% of total responses
Journeyman's License in the particular trade	12	63	12	50	2	11	26	43
Completion of an apprenticeship program & 2 years experience	10	53	7	29	2	11	19	31
Craft experience not at the Journeyman level	*	*	*	*	3	17	3	5
2 year college degree	*	*	1	4	5	28	6	10
4 year college degree	*	*	*	*	5	28	5	8
Teaching certification	18	95	16	67	15	83	49	80
Other	8	42	13	54	7	39	28	46

Note: Column totals may add to more than 100% since the respondents had the opportunity to choose more than one category.

In the "Other" category, craft experience in excess of 6 years and committee approval was cited by the joint and nonjoint programs and meeting the F-DOE guidelines and being a licensed contractor were cited by the vo-tech programs. This question reveals that journeyman licensing, completion of a formal apprenticeship and teaching certification are the most prevalent requirements for apprentice instructors. It should be noted that "teaching certification" means different things to each of these groups. For the joint and nonjoint programs teaching

certification is typically the completion of an instructor training program offered by a national trade organization, while for the vo-tech programs teaching certification means meeting the F-DOE guidelines.

b) Who provides your instructor continuing vocational education/training programs? (check all that apply)

	Joint Apprenticeship Programs		Nonjoint Apprenticeship Programs		Vo-tech Job Preparation Programs		Question Totals	
	# of Joint responses	% of Joint responses	# of Nonjoint responses	% of Nonjoint responses	# of Vo-tech responses	% of Vo-tech responses	Total # of responses	% of total responses
AFL-CIO	17	89	*	*	1	6	18	30
ABC	*	*	4	17	*	*	4	7
Manufacturers &/or suppliers	3	16	9	38	10	56	22	36
AGC	1	5	2	8	1	6	4	7
NAHB	*	*	2	8	*	*	2	3
None	*	*	6	8	2	11	8	13
Others	2	11	10	42	12	67	24	39

Note: Column totals may add to more than 100% since the respondents had the opportunity to choose more than one category.

In the "Other" category, national trade organizations and the Florida university system were cited by all the programs.

c) How often does this program require the instructor's participation in continuing education programs?

	Joint Apprenticeship Programs		Nonjoint Apprenticeship Programs		Vo-tech Job Preparation Programs		Question Totals	
	# of Joint responses	% of Joint responses	# of Nonjoint responses	% of Nonjoint responses	# of Vo-tech responses	% of Vo-tech responses	Total # of responses	% of total responses
Every year	11	58	4	17	5	28	20	33
Every 2 years	*	*	1	4	*	*	1	2
Every 3 years	*	*	1	4	1	6	2	3
Every 4 years	*	*	*	*	*	*	*	*
None	5	26	11	46	2	11	18	30
Other	3	16	3	13	10	56	16	26

Note: Column totals may add to more than 100% since the respondents had the opportunity to choose more than one category.

In the "Other" category, meeting the Department of Education continuing education requirements and "recommended but not required" were cited by the programs. The responses to this question indicates that Joint programs require apprentice instructor participation in continuing education more frequently than either the nonjoint or the vo-tech programs.

d) Should craft training instructors be certified as instructors in the particular craft?

	Joint Apprenticeship Programs		Nonjoint Apprenticeship Programs		Vo-tech Job Preparation Programs		Question Totals	
	# of Joint responses	% of Joint responses	# of Nonjoint responses	% of Nonjoint responses	# of Vo-tech responses	% of Vo-tech responses	Total # of responses	% of total responses
Strongly Agree	16	84	22	92	13	72	51	84
Moderately Agree	1	5	*	*	1	6	2	3
Moderately Disagree	*	*	*	*	1	6	1	2
Strongly Disagree	*	*	1	4	1	6	2	3

These craft training providers strongly believe that certification of instructors should be required.

8) Information concerning the program completion and/or graduation rate.

a) What is the completion or graduation percentage?

	Joint Apprenticeship Programs	Nonjoint Apprenticeship Programs	Vo-tech Job Preparation Programs	Training Provider Mean
Program completion rate (mean)	63.6%	51.1%	52.9%	54.4%

The statistical, nonparametric, analysis of variance of the responses to this question indicates that, at the α=0.05 level, there is no significant difference in the program completion (graduation) rates among the various programs (χ^2=0.2678). A statistical, nonparametric, analysis of the completion rates, by craft, was also performed and found no significant differences, at the α=0.05 level, among the craft completion rates (χ^2=0.7020). The responses to this question indicate that approximately 4 of every 10 new apprentices who enter the industry drop out of the training programs prior to completing the training program.

b) When does the highest rate of student dropout occur?

	Joint Apprenticeship Programs	Nonjoint Apprenticeship Programs	Vo-tech Job Preparation Programs	Training Provider Mean
Student dropout timing (mean # of months)	7.7	9.3	7.3	8.3

The statistical, nonparametric, analysis of variance of the responses to this question indicates that, at the α=0.05 level, there is no significant difference in the dropout rate among

the various programs (χ^2=0.1385). The responses to this question indicate that most students dropout of the training programs within the first year. This suggests a lack of understanding of the realities of the construction industry by individuals entering apprenticeship programs.

9) Do the training programs receive grant money? and if so;

10) Who supplies the grant money?

	Joint Apprenticeship Programs		Nonjoint Apprenticeship Programs		Vo-tech Job Preparation Programs		Question Totals	
	# of Joint responses	% of Joint responses	# of Nonjoint responses	% of Nonjoint responses	# of Vo-tech responses	% of Vo-tech responses	Total # of responses	% of total responses
Industry Monetary Grants	1	5	1	4	*	*	2	3
Industry Equipment Grants	*	*	1	4	1	6	2	3
Public Education Funding	9	47	9	37	*	*	18	42
Federal Education Funding	*	*	*	*	9	50	9	50
Employer Assessments	10	53	6	25	1	6	17	28
JTPA Funds	1	5	2	8	8	44	11	18
Other	*	*	*	*	*	*	*	*

Note: Column totals may add to more than 100% since the respondents had the opportunity to choose more than one category.

The responses to this question indicates the major sources of funding for these training programs are employers and both the state and federal governments.

11) What is the criteria for receiving the grant money?

a) Please identify the funding agency, the funding amount and the funding duration.

The response to this question was insufficient to draw any conclusions.

b) Please identify any specific funding criteria.

The response to this question was insufficient to draw any conclusions.

12) Do these training programs have an office and administrative staff?

a) Does this training program have a permanent or part-time office and administrative staff?

	Joint Apprenticeship Programs		Nonjoint Apprenticeship Programs		Vo-tech Job Preparation Programs		Question Totals	
	# of Joint responses	% of Joint responses	# of Nonjoint responses	% of Nonjoint responses	# of Vo-tech responses	% of Vo-tech responses	Total # of responses	% of total responses
Permanent	19	100	14	58	14	78	47	77
Part-time	1	5	10	42	3	17	14	23

Note: Column totals may add to more than 100% since the respondents had the opportunity to choose more than one category.

The responses to this question indicates that most training programs have a permanent administrative staff.

b) Please identify the number of staff personnel.

	Joint Apprenticeship Programs	Nonjoint Apprenticeship Programs	Vo-tech Job Preparation Programs	Training Provider Mean
Administrative (mean)	1.6	1.8	1.6	1.7
Technical and/or instructors (mean)	4.6	8.8	4.4	6.1
Secretarial (mean)	1.1	1.0	2.9	1.5
Other (mean)	3.5	1.4	1.0	3

The responses to this question indicates the mean size of the training program staff.

c) Please identify the number of staff personnel who report to:

1. The apprenticeship committee.

	Joint Apprenticeship Programs	Nonjoint Apprenticeship Programs	Vo-tech Job Preparation Programs	Training Provider Mean
Administrative (mean)	1.3	1.4	1.3	1.4
Technical and/or instructors (mean)	4.9	7.9	8	7.0
Secretarial (mean)	1.0	0.9	0	0.9
Other (mean)	0	2.6	4.5	2.7

The responses to this question indicates the mean size of the training program staff who report to the apprenticeship committee.

2. The local education agency.

	Joint Apprenticeship Programs	Nonjoint Apprenticeship Programs	Vo-tech Job Preparation Programs	Training Provider Mean
Administrative (mean)	1.4	1.3	1.3	1.3
Technical and/or instructors (mean)	4.3	6.6	5.4	5.5
Secretarial (mean)	0	0.9	1.5	1.1
Other (mean)	0	1.3	8	2.4

The responses to this question indicates the mean size of the training program staff who report to the local education agency.

13) What is the annual budget for the training program?

The response to this question was insufficient to draw any conclusions; however, the few complete responses that were received suggested a yearly training budget of approximately $1700 per student in registered apprenticeship programs taught at publicly funded institutions.

14) What is the annual cost to the student?

	Joint Apprenticeship Programs	Nonjoint Apprenticeship Programs	Vo-tech Job Preparation Programs	Training Provider Mean
Student Cost (mean)	$67.86	$66.42	$505.07	$219.91

The statistical, nonparametric, analyses of variance of the responses to this question indicates that, at the α=0.05 level, there is no significant difference in the cost to the student among the joint and nonjoint (χ^2=0.8896) programs and there is a significant difference in the

cost to the student among the vo-tech programs and the joint (χ^2=0.0001) and nonjoint (χ^2=0.0002) programs. The responses to this question indicates the cost to the student is higher in the vo-tech programs than in either the joint or nonjoint programs.

15) Additional cost questions.

a) What is the annual cost, per student, to the contractor?

	Joint Apprenticeship Programs	Nonjoint Apprenticeship Programs	Vo-tech Job Preparation Programs	Training Provider Mean
Contractor cost (mean)	$/hour assessment	$313.68	$301.67	$312.05

The statistical, nonparametric, analysis of variance of the responses to this question indicates that, at the α=0.05 level, there is no significant difference in the cost per student to the contractor among the nonjoint and the vo-tech programs (χ^2=0.9999). The contractor cost for the joint programs is directly dependent upon the craft hours worked and is, therefore, variable from year to year and from contractor to contractor.

b) What is the annual cost per student, if any, to the public education finance committee?

	Joint Apprenticeship Programs	Nonjoint Apprenticeship Programs	Vo-tech Job Preparation Programs	Training Provider Mean
Public education finance committee cost (mean)	$3176.57	$3912.00	$3884.42	$3788.70

The statistical, nonparametric, analysis of variance of the responses to this question indicates that, at the α=0.05 level, there is no significant difference in the cost to the public

education finance committee among the various programs (χ^2=0.1159). Is should be noted that 7 of the 19 joint programs (37%) and 20 of the 24 nonjoint programs (83%) report receiving public funding.

16) What is this program's estimated expenditure to educate each student per year?

	Joint Apprenticeship Programs	Nonjoint Apprenticeship Programs	Vo-tech Job Preparation Programs	Training Provider Mean
Program annual expenditure (mean)	$2381.21	$992.92	$3072.00	$1990.13

The statistical, nonparametric, analysis of variance of the responses to this question indicates that, at the α=0.05 level, there is no significant difference in the program expenditures among the joint and vo-tech (χ^2=0.0904) programs, but there is a significant difference in the program expenditures among the nonjoint and the joint (χ^2=0.0236) and vo-tech (χ^2=0.0316) programs.

The cost and budget information provided by the survey respondents in questions 13 to 16 is considered suspect. Most of these craft training programs are funded with FTE monies provided by the F-DOE. The reported funding does not closely match the actual FTE funding calculations. The cost and budget information is more fully developed beginning on page 41 of this section under the heading of "Cost to the State of Florida to administer".

17) What qualifications must the student have to participate? (check all that apply)

	Joint Apprenticeship Programs		Nonjoint Apprenticeship Programs		Vo-tech Job Preparation Programs		Question Totals	
	# of Joint responses	% of Joint responses	# of Nonjoint responses	% of Nonjoint responses	# of Vo-tech responses	% of Vo-tech responses	Total # of responses	% of total responses
Minimum 16 years of age	1	5	7	29	*	*	8	13
High School diploma or equivalent	16	84	16	67	*	*	32	53
Minimum score on aptitude tests	12	63	12	50	*	*	24	39
High School algebra	4	21	2	8	*	*	6	10
Prior trade experience	*	*	2	8	*	*	2	3
Other	13	68	10	42	*	*	23	38

Note: Column totals may add to more than 100% since the respondents had the opportunity to choose more than one category.

The "Other" category of this question included a minimum of 18 years of age for both the joint and nonjoint programs, often citing workman's compensation law requirements. It should be noted that compliance with Florida's child labor law is also a hinderance when admitting youths younger than 18 years old into apprenticeship programs. There is legislative activity to change Florida's child labor law to allow 16 year old youths to participate in apprenticeship programs if the students are under the direct and continual supervision of an apprenticeship instructor.

18) How are the students identified and selected for these programs? (check all that apply)

	Joint Apprenticeship Programs		Nonjoint Apprenticeship Programs		Vo-tech Job Preparation Programs		Question Totals	
	# of Joint responses	% of Joint responses	# of Nonjoint responses	% of Nonjoint responses	# of Vo-tech responses	% of Vo-tech responses	Total # of responses	% of total responses
Local advertisements	18	95	17	79	*	*	35	57
Contractor recommendations	16	84	23	96	*	*	39	64
Other student recommendations	16	84	12	50	*	*	28	46
Military Transition Service Centers	5	26	4	17	*	*	9	15
High School recruiting program	14	74	14	58	*	*	28	46
Other	5	26	7	29	*	*	12	20

Note: Column totals may add to more than 100% since the respondents had the opportunity to choose more than one category.

The "Other" category of this question included the Florida Job Service for both joint and nonjoint Programs. The responses to this question indicates that Military Transition Service Centers are the least utilized resource for attracting new recruits to apprenticeship programs.

19) What is being done by the construction industry to encourage people to participate in these programs?

At the time of this writing, Orange and Seminole Counties, in conjunction with the Academy of Construction Trades, Inc., have entered into an agreement to establish "Youth Apprenticeship" programs for the building trades, specifically the electrical, plumbing, fire sprinkler, carpentry and sheet metal crafts. This contract (see Appendix A) has been approved

by the F-DOE and F-DOL and the researcher suggests that it be used as the model for other contractor/school board Youth Apprenticeship alliances.

20) Do we need to require aptitude tests at the middle school level to help young people with their career goals?

Aptitude testing such as the General Aptitude Test Battery (GATB) utilized by the US-DOL throughout the United States Employment Service has proven to be a useful and valuable psychometric tool when used as a supplement in the career planning process (Hartigan & Wigdor, 1989). The predictive power of standardized test batteries, such as the GATB, is not high enough for these types of testing procedures to be the sole method of career determination. Standardized testing methods have also been criticized for gender and racial biases which, critics contend, limit social mobility. Given the limits of universal occupational testing, these tests should be used at the middle school level as *one* method of increasing the individual student's career awareness and would provide useful career evaluation information for the students.

21) What does the industry have to do to improve its image?

The following excerpts are from the questionnaire written responses from the survey respondents.

> "Our primary need is for the academic faculty, advisors [and] administrators of the public schools to realize the need for quality vocational programs and career counseling in the high schools. The construction industry has historically been the 'dumping grounds' for the students who are not considered to be college oriented. Today's technology demands workers who are prepared well in Math, English and the work ethics necessary to succeed in this demanding industry."

> "Craft training has suffered a decline over the past couple of decades because of the emphasis on a college education as the only way to succeed in life.... As a

result, many of those gravitating to the trades are not second, third or fourth generation craftsmen as in the past, but those who were unable to 'cut the mustard' in other career ventures."

"... companies have become increasingly specialized. There are few construction companies (general contractors) who hire their own crews. Work is usually 'subbed out', so it is difficult to get well-rounded training in some crafts, such as carpentry which is now very specialized. Additionally workers in hard construction jobs are not overly interested in going to school in the evenings after putting in a hot, physical day."

"The construction industry has a very bad reputation. The industry must change the perception that the profit motive is the bottom line and that the craft workers are expendable."

These responses indicate the views of the training providers regarding some of the problems that must be addressed by the construction industry. Many of these problems need to be addressed at the secondary school level, specifically the problems associated with deficient vocational guidance and the student's inadequate math and writing skills. The construction industry has historically attempted to minimized training costs by choosing to hire away skilled craft workers from another firm instead of investing in training. Incentives to invest in extensive craft training are also diminished, given the labor market volatility that results from the contractor's willingness to discharge workers when business slows down and workers' readiness to change jobs. These are industry wide structural difficulties that are not readily correctable.

22) How many registered apprenticeship training programs are currently being funded in the construction trade and what is their budget?

As of December 1992, there were 83 registered joint apprenticeship craft training programs in Florida with a mean, reported, annual training expenditure of $2,381.21 per

apprentice. There were also 92 registered nonjoint apprenticeship craft training programs in Florida with a mean, reported, annual training expenditure of $992.92 per apprentice.

23) How many vocational programs are there in the elementary schools that are being funded by the Department of Education?

Officials at the F-DOE are not aware of any elementary school programs that offer vocational or technical education courses. The general consensus was that middle schools were the starting point for vocational education in Florida.

24) Are there any other States using elementary schools as the starting point for vocational education?

Officials at US-DOE are not aware of any school district that uses the elementary school system to introduce vocational education.

25) Is there any data which supports exposure at elementary school level versus junior high level would foster the desire of students to look at construction as a good long term goal.

No. The traditional skilled construction trades constitute only a small portion of Florida's expected labor market change. The expected change in *all* construction related employment is expected to be just 3.3% of the total change in Florida's employment between 1990 and 2005. To help all the youth who would benefit from middle and secondary school based vocational training, broad based "career awareness" programs would be required at the elementary level.

26) Would a magnet school program at the elementary level allow for focus on construction related trades and services?

Magnet schools at the elementary level are not practical. First, specialized vocational magnet schools and/or area vocational centers are viable only in the larger metropolitan areas where there are sufficiently large student populations with suitable transportation systems. However, the main problem with magnet schools at the elementary level is they would bolster the belief that schools channel youth toward different levels of the social system. The employment prospects and the values associated with vocational education tend to attract young people from lower-class families and then, by reinforcing those values, would perpetuate the student's lower socioeconomic caste (Hamilton, 1990).

27) Would a "Business Skills" training program at either elementary school or junior high school yield more new people to the construction field?

Career awareness programs that would introduce the student, at the middle school level, to various occupations including those in construction, coupled with the educational and technical requirements for each profession, are recommended.

28) Does "Shop" at the junior high and high school level yield a significant amount of people into the construction field or is it just used by students to avoid other classes?

Large-scale surveys have found that vocational enrollees tend to have working-class backgrounds, they consistently have poorer academic records than those in college preparatory programs, and that many of the students have no intention of entering the vocation for which they are ostensibly being trained with only one-third of the graduates finding training-related jobs (Hamilton, 1990). Some of the vocational educators, many of whom have not worked in their

occupation for decades, if at all, can be so worn down by the difficulties of teaching that they offer very little to their students (Hamilton, 1990).

29) Does the D.C.T. or like programs encourage and train High schools students toward construction related fields?

There are D.C.T. programs located throughout Florida, generally in the smaller school districts, that offer carpentry and masonry experiential education programs.

30) How do other industries who do not require a college education recruit new people into the field?

The more progressive German firms, Mercedes Benz, BMW and Siemens have established school-to-work transition programs in the local secondary school system and formal apprenticeship programs taught through the local postsecondary program. These are the same recommendations presented for the construction industry.

31) Determine the yield of good quality construction workers who are in the current work force via the organizations training programs?

For registered apprenticeship programs the expected training rate is:

Craft	Training Sponsor	Apprenticeship Training Programs, State-Wide Total	Current Average Level of Annual Apprentice Completions	Projected Annual Number of Craft Openings	Percent of Annual Craft Openings Filled by Apprenticeship
Electrician	Nonjoint Joint Total	21 11 32	233 95 328	Growth 664 Separations 648 Total 1,312	**25%**
Plumber	Nonjoint Joint Total	16 9 25	60 42 102	Growth 481 Separations 478 Total 959	**19%**

Craft	Training Sponsor	Apprenticeship Training Programs, State-Wide Total	Current Average Level of Annual Apprentice Completions	Projected Annual Number of Craft Openings	Percent of Annual Craft Openings Filled by Apprenticeship
Pipe Fitter	Nonjoint Joint Total	3 10 13	1 38 39	w /Plumber	w/Plumber
Sprinkler Fitter	Nonjoint Joint Total	6 1 7	35 8 43	w/Plumber	w/Plumber
Carpenter	Nonjoint Joint Total	10 6 16	8 65 73	Growth 975 Separations 1,068 Total 2,043	4%
Millwright	Nonjoint Joint Total	0 5 5	0 8 8	Growth 22 Separations 37 Total 59	14%
Flooring Installer	Nonjoint Joint Total	0 0 0	0 0 0	Growth 45 Separations 43 Total 88	0%
Drywall Finisher	Nonjoint Joint Total	1 1 2	0 2 2	Growth 103 Separations 154 Total 257	1%
Lather	Nonjoint Joint Total	0 1 1	0 0 0	Growth 8 Separations 13 Total 21	0%
Plasterer	Nonjoint Joint Total	1 2 3	0 0 0	Growth 38 Separations 102 Total 140	0%
Refrigeration Mechanic &/or HVAC Installer	Nonjoint Joint Total	11 2 13	67 4 71	Growth 371 Separations 236 Total 607	12%
Sheet Metal Duct Installer	Nonjoint Joint Total	11 4 15	26 47 73	Growth 41 Separations 49 Total 90	81%
Painter	Nonjoint Joint Total	2 4 6	2 20 22	Growth 645 Separations 569 Total 1,214	2%
Ironworker	Nonjoint Joint Total	1 6 7	0 47 47	Growth 70 Separations 105 Total 175	27%
Roofer	Nonjoint Joint Total	0 2 2	0 17 17	Growth 207 Separations 142 Total 349	5%
Equipment Operator	Nonjoint Joint Total	1 5 6	0 6 6	Growth 98 Separations 96 Total 194	3%

Craft	Training Sponsor	Apprenticeship Training Programs, State-Wide Total	Current Average Level of Annual Apprentice Completions	Projected Annual Number of Craft Openings	Percent of Annual Craft Openings Filled by Apprenticeship
Tile Setter	Nonjoint Joint Total	1 2 3	10 2 12	Growth 29 Separations 48 Total 77	16%
Glazier	Nonjoint Joint Total	2 2 4	1 1 2	Growth 63 Separations 76 Total 139	1%
Asbestos Worker/ Insulator	Nonjoint Joint Total	1 3 4	0 17 17	Growth 45 Separations 152 Total 197	9%
Elevator Constructor	Nonjoint Joint Total	1 0 1	2 0 2	Growth 8 Separations 13 Total 21	10%
Stone Mason	Nonjoint Joint Total	0 3 3	0 0 0	Growth 5 Separations 9 Total 14	0%
Brick Mason	Nonjoint Joint Total	2 3 5	2 13 15	Growth 96 Separations 147 Total 243	6%
Concrete & Terrazzo Finisher	Nonjoint Joint Total	1 1 2	0 0 0	Growth 126 Separations 336 Total 462	0%
Boilermaker	Nonjoint Joint Total	0 0 0	0 0 0	Growth 6 Separations 11 Total 17	0%
Other Trades				Growth 239 Separations 138 Total 377	
Totals	Nonjoint Joint Total	92 83 175	447 432 879	Growth 4,385 Separations 4,670 Total 9,055	10%

The information on the previous pages show the average level of apprentice completions for each of the identified crafts, the projected annual number of craft openings and the percentage of craft openings currently being filled by apprenticeship completers.

The information on the following pages show the average level of vo-tech job prep graduations for each of the identified crafts, the projected number of craft opening and the percentage of craft openings currently being filled by job prep graduates. The projected number of craft openings information was developed by the Florida Department of Labor and Employment Security, Bureau of Labor Market Information, and published in the *Florida Industry and Occupational Employment Projections 1990 - 2005,* October 1992 issue.

For vo-tech job prep training programs the expected graduation rate was calculated to be:

Craft	Vo-tech Job Preparation Programs, State-Wide Total	Current Average Level of Annual Graduation	Projected Annual Number of Craft Openings	Percent of Annual Craft Openings Filled by Job Prep Graduates
Electrician	38	222	Growth 664 Separations 648 Total 1,312	2%
Plumber	15	82	Growth 481 Separations 478 Total 959	9%
Pipe Fitter	w/Plumber	w/Plumber	w/Plumber	w/Plumber
Sprinkler Fitter	1	2	w/Plumber	w/Plumber
Carpenter	54	157	Growth 975 Separations 1,068 Total 2,043	8%
Millwright	1	1	Growth 22 Separations 37 Total 59	2%
Flooring Installer	0	0	Growth 45 Separations 43 Total 88	0%
Drywall Finisher	1	6	Growth 103 Separations 154 Total 257	2%
Lather	0	0	Growth 8 Separations 13 Total 21	0%
Plasterer	0	0	Growth 38 Separations 102 Total 140	0%

Craft	Vo-tech Job Preparation Programs, State-Wide Total	Current Average Level of Annual Graduation	Projected Annual Number of Craft Openings	Percent of Annual Craft Openings Filled by Job Prep Graduates
Refrigeration Mechanic &/or HVAC Installer	43	810	Growth 371 Separations 236 Total 607	133%
Sheet Metal Duct Installer	2	3	Growth 41 Separations 49 Total 90	3%
Painter	0	0	Growth 645 Separations 569 Total 1,214	0%
Ironworker	1	1	Growth 70 Separations 105 Total 175	1%
Roofer	0	0	Growth 207 Separations 142 Total 349	0%
Equipment Operator	0	0	Growth 98 Separations 96 Total 194	0%
Tile Setter	2	8	Growth 29 Separations 48 Total 77	10%
Glazier	1	0	Growth 63 Separations 76 Total 139	0%
Asbestos Worker/ Insulator	0	0	Growth 45 Separations 152 Total 197	6%
Elevator Constructor	0	0	Growth 8 Separations 13 Total 21	0%
Stone Mason	0	0	Growth 5 Separations 9 Total 14	0%
Brick Mason	27	16	Growth 96 Separations 147 Total 243	7%
Concrete & Terrazzo Finisher	0	0	Growth 126 Separations 336 Total 462	0%
Boilermaker	0	0	Growth 6 Separations 11 Total 17	0%

Craft	Vo-tech Job Preparation Programs, State-Wide Total	Current Average Level of Annual Graduation	Projected Annual Number of Craft Openings	Percent of Annual Craft Openings Filled by Job Prep Graduates
Other Trades			Growth 239 Separations 138 Total 377	
Total (adjusted for Refig. Mech.)	186	1,105	Growth 4,385 Separations 4,670 Total 9,055	**12%**

Note: It should be noted that the total average graduation column total is adjusted to projected labor demand for Refrigeration Mechanics. The projected, annual, number of construction craft openings for Refrigeration mechanics is the projected demand minus the annual number of apprenticeship graduates (607-71) or 536 annual openings. The supply of vo-tech job prep graduates is 271 individuals greater than the demand.

Construction Craft Training Model Simulation Results

The Construction Craft Training Model (Figure 4-1) shows the craft progression from unskilled and semiskilled to the skilled craft worker status of Journeyman and Foreman. The only means to achieve this skilled worker status is by completing either a joint or nonjoint apprenticeship program with its structured and supervised on-the-job training component, graduating from a vo-tech job prep program coupled with a period of informal on-the-job training upon graduation, or by progressing through the helper route and receiving only informal on-the-job training. Since it has already been shown that registered apprenticeship programs and vo-tech job prep programs are filling only a small portion of the construction industry's annual demand for labor, the question arises: *How many individuals are filling the annual demand for skilled construction craft labor who have received no formal skill training*?

Both the construction craft training model and the computer simulation of the model were designed to calculate the number of individuals who fill the demand for skilled construction craft

workers who receive no formal craft training, the helper path. The initial craft levels in each of the labor pools was determined using the formula described by Levitt (1979) in *Union Versus Nonunion Construction in the U.S.* and by using the current percentages of unionized construction craft workers in the United States (20%) (Tomsho, 1993). The number of individuals enrolled in each of the joint and nonjoint apprenticeship programs and the vo-tech job prep programs were determined using information provided by F-BAT and F-DOE. The annual levels of industry separations and growth were determined from the BLMI data. All this information was utilized to determine the rate equations (R1 through R25) in the model. The construction craft training model was simulated using *Professional DYNAMO Plus* software published by Pugh-Roberts Associates in 1986.

The computer simulation was first tested on the electrical construction trade. Electricians were chosen because the craft labor projections were straight forward and the craft training rates were among the highest in the industry. Once the model was tested and debugged using the electrical craft data, the model was reformulated to use the entire construction industry craft training levels and projected labor demand data. The computer simulation results presented in this section are for the entire construction industry.

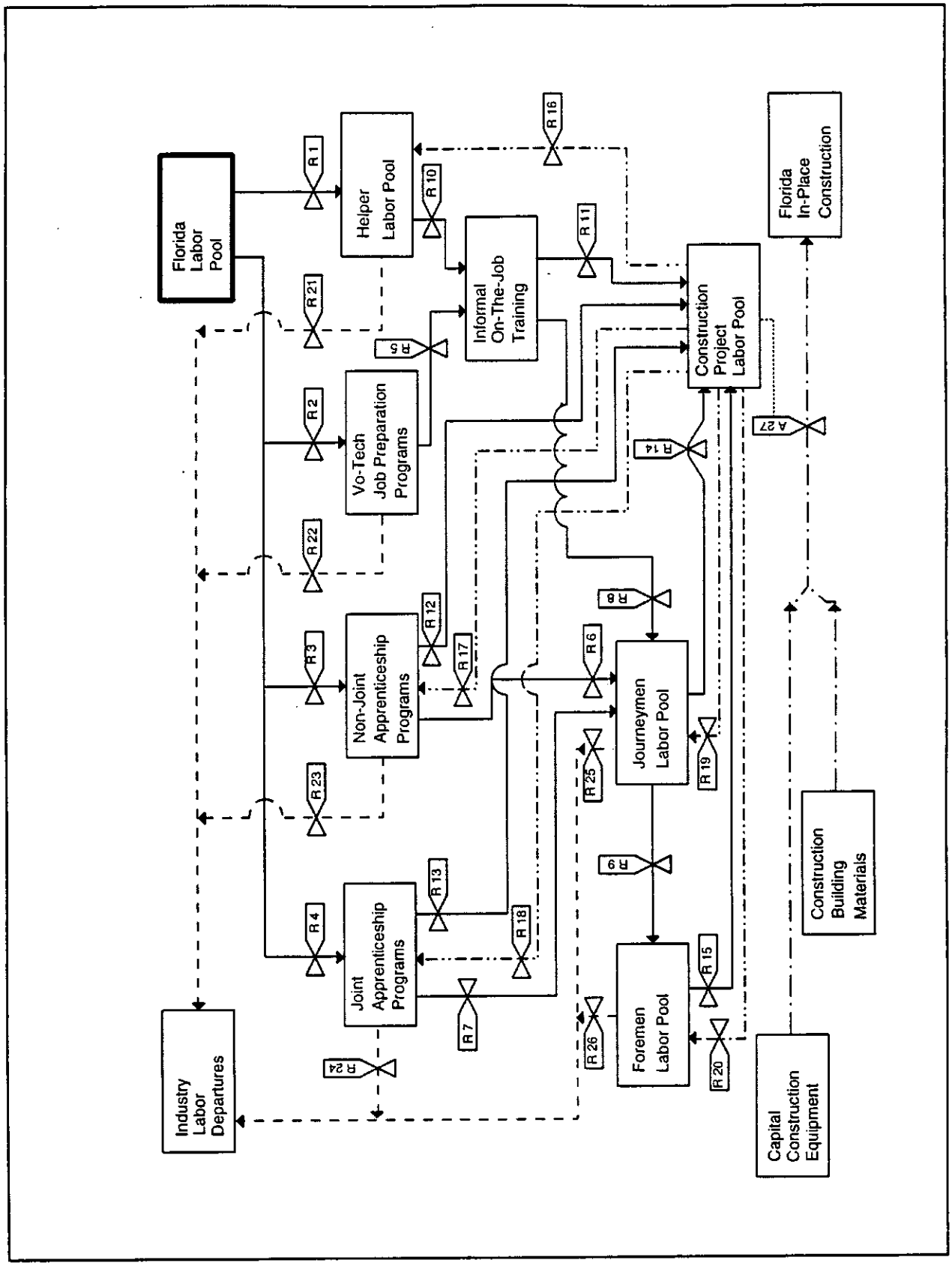

Figure 4-1 Construction Craft Training Model

The areas of primary interest were the expected number of individuals completing both joint and nonjoint apprenticeship programs, the expected number of individuals graduating from vo-tech job prep programs, and the projected demand for skilled craft workers during the 15-year calculation period. The analysis of the simulation model indicates that over the period of 1990 to 2005, the construction industry replacement demand for skilled craft workers, the separation and growth calculations for journeymen and foremen ($\sum$ of equations R5, R6, R7 & R8), was calculated to be approximately 103,243 skilled craft workers. If there is no increase in apprenticeship and/or job prep training, the demand for the skilled craft workers will be filled according to the following formulas:

The supply of craft workers graduating from vo-tech job prep programs is expected to be

$$\sum_{y=1990}^{2005} R_5 = 17{,}440$$

The supply of craft workers completing nonjoint apprenticeship programs is expected to be

$$\sum_{y=1990}^{2005} R_6 = 7{,}152$$

The supply of craft workers completing joint apprenticeship programs is expected to be

$$\sum_{y=1990}^{2005} R_7 = 6{,}912$$

The projected demand for skilled labor is expected to be

$$\sum_{y=1990}^{2005} (R_8 + R_7 + R_6) = 103{,}243$$

The expected labor departures from the skilled labor pools (journeymen and foremen) are also of concern.

$$\sum_{y=1990}^{2005} (R_{5} + R\ ) = 39{,}852 + 14{,}907 = 54{,}759$$

Using these calculations, joint apprenticeship programs are expected to fill 6.7% of the demand for skilled workers, nonjoint apprenticeship programs are expected to fill 6.9% of the demand for skilled workers, vo-tech job prep programs are expected to fill 16.9% of the demand for skilled workers, *while approximately 69.5% of the demand for skilled craft workers will be filled by individuals who have received no formal craft training.*

The projected training route to "Skilled Craft Worker" status is

Training Route	Number of "Skilled" Craft Workers	Percent of "Skilled" Craft Workers
Helper with informal on-the-job training	71,739	69.5%
Vo-tech job prep with informal on-the-job training	17,440	16.9%
Nonjoint apprenticeship with formal on-the-job training	7,152	6.9%
Joint apprenticeship with formal on-the-job training	6,912	6.7%
Total	103,243	100%

This model also indicates that the expected number of formal apprenticeship completions is insufficient to replace the number of supervisory craft workers (foremen) leaving the industry during this calculation period (14,907 departures vs. 14,064 completions).

The initial journeyman and foreman labor pool levels were 110,059 and 41,127 craft workers, respectively, or an estimated total of 151,186 skilled craft workers in the construction labor pool. This calculates to one skilled craft labor force turnover approximately every 22 years.

$$\frac{151{,}186 \text{ Original Skilled Craft Labor Pool Level}}{\dfrac{103{,}243 \text{ New Entrants into Skilled Labor Pool}}{15 \text{ Year Calculation Period}}} = 22 \text{ years}$$

Therefore, by the year 2015, unless the current levels of formal construction craft training are increased *significantly*, approximately 70% of the "skilled" craft work force will have received the majority of their training by observing other craft workers who may or, more likely, may not know how to properly perform the work. The current levels of construction craft training will lead to a serious decline in the skill level of the construction craft work force.

Figures 4-2, 4-3 and 4-4 show the projected demand for skilled craft workers and the sources of craft training. Figure 4-2 shows projected demand, both growth and departures, and the increasing industry reliance on informal on-the-job training as the primary skill development tool and training source for the craft work force. Figure 4-3 shows the projected growth of the skilled craft work force and the supply of formally trained craft workers. Figure 4-4 shows the projected departures of the skilled craft work force and the supply of formally trained craft workers.

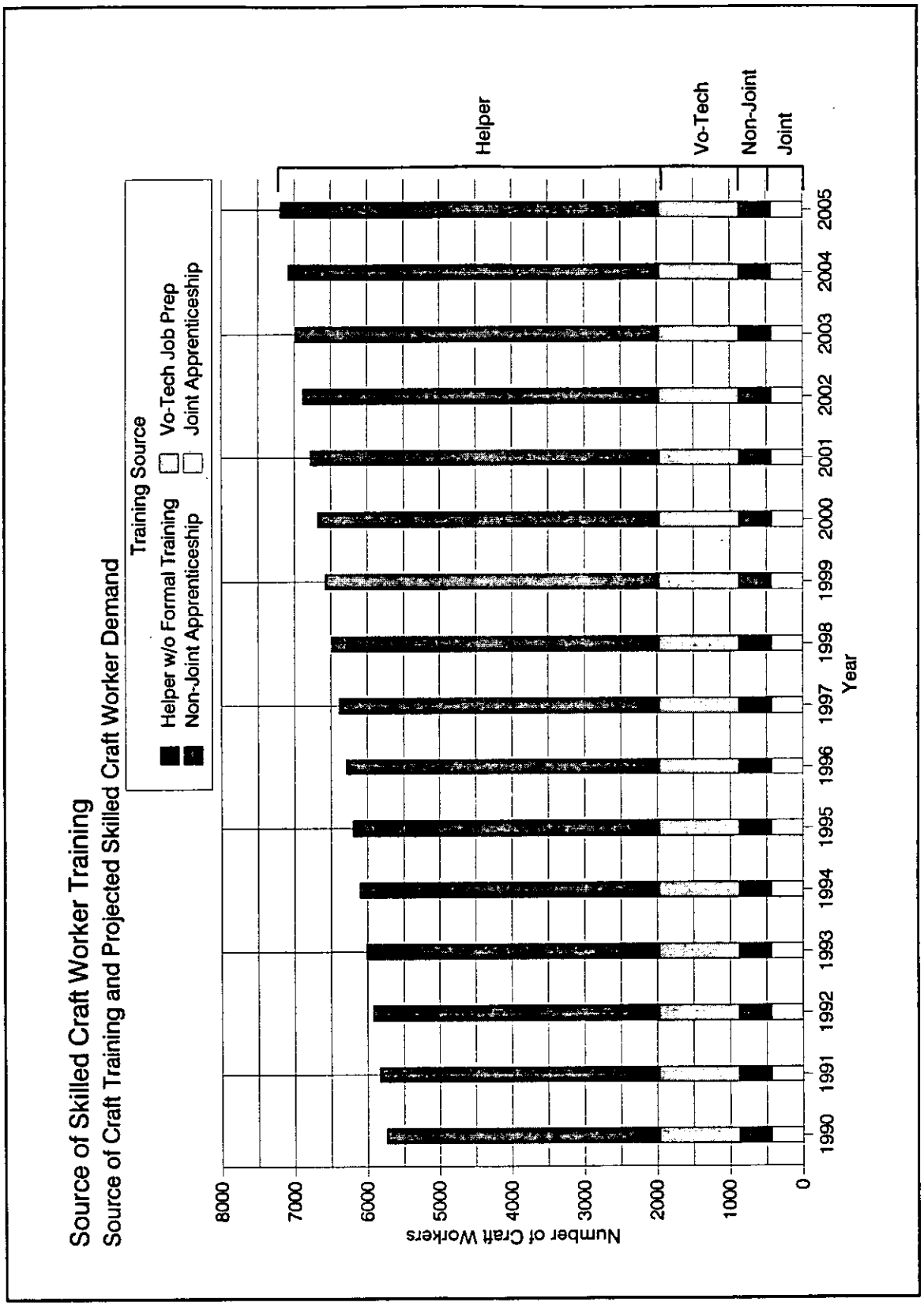

Figure 4-2 Source of Craft Training for Workers Filling the Demand for Journeyman and Foreman Level Craft Workers

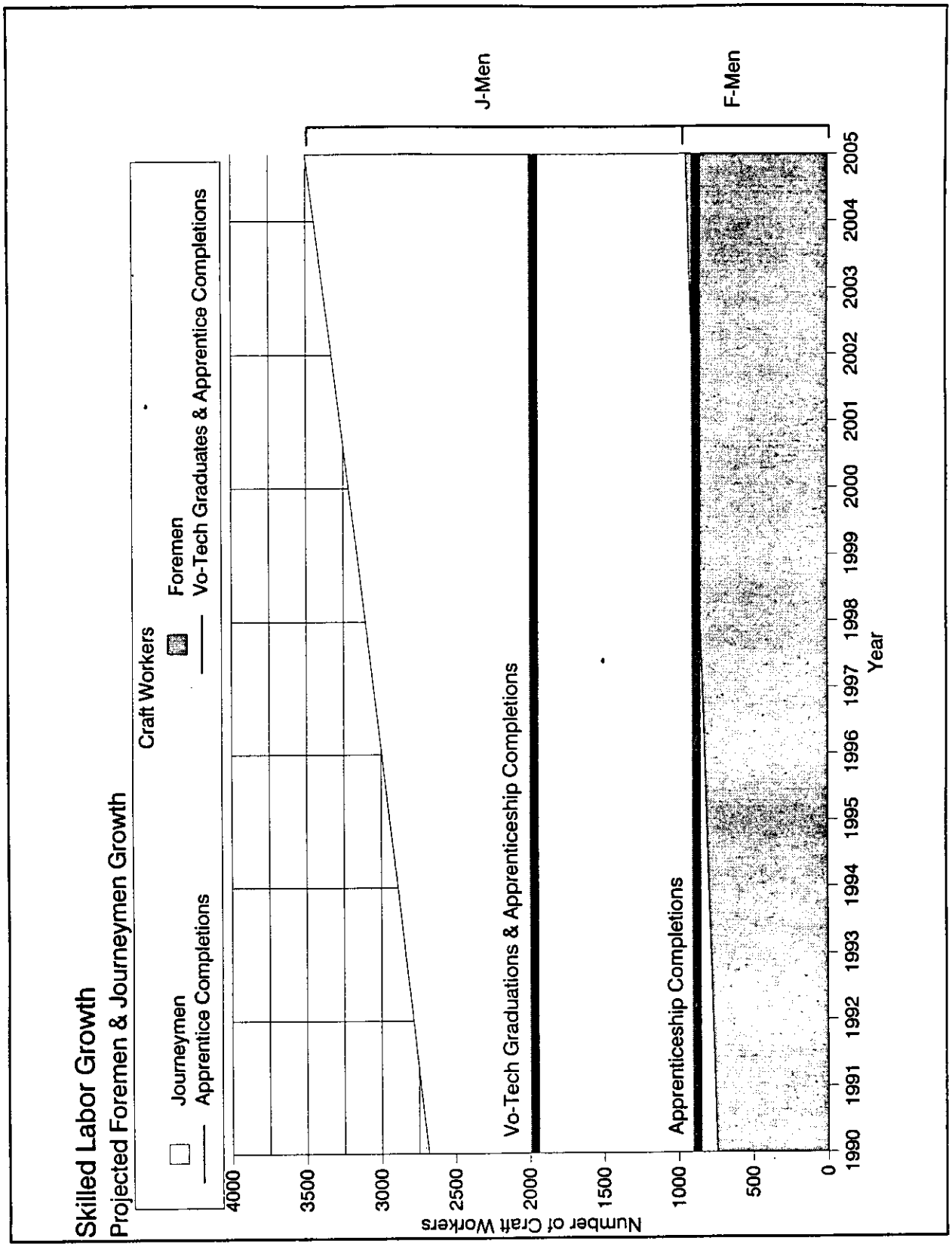

Figure 4-3 Projected Skilled Labor Growth and the Supply of Formally Trained Craft Workers

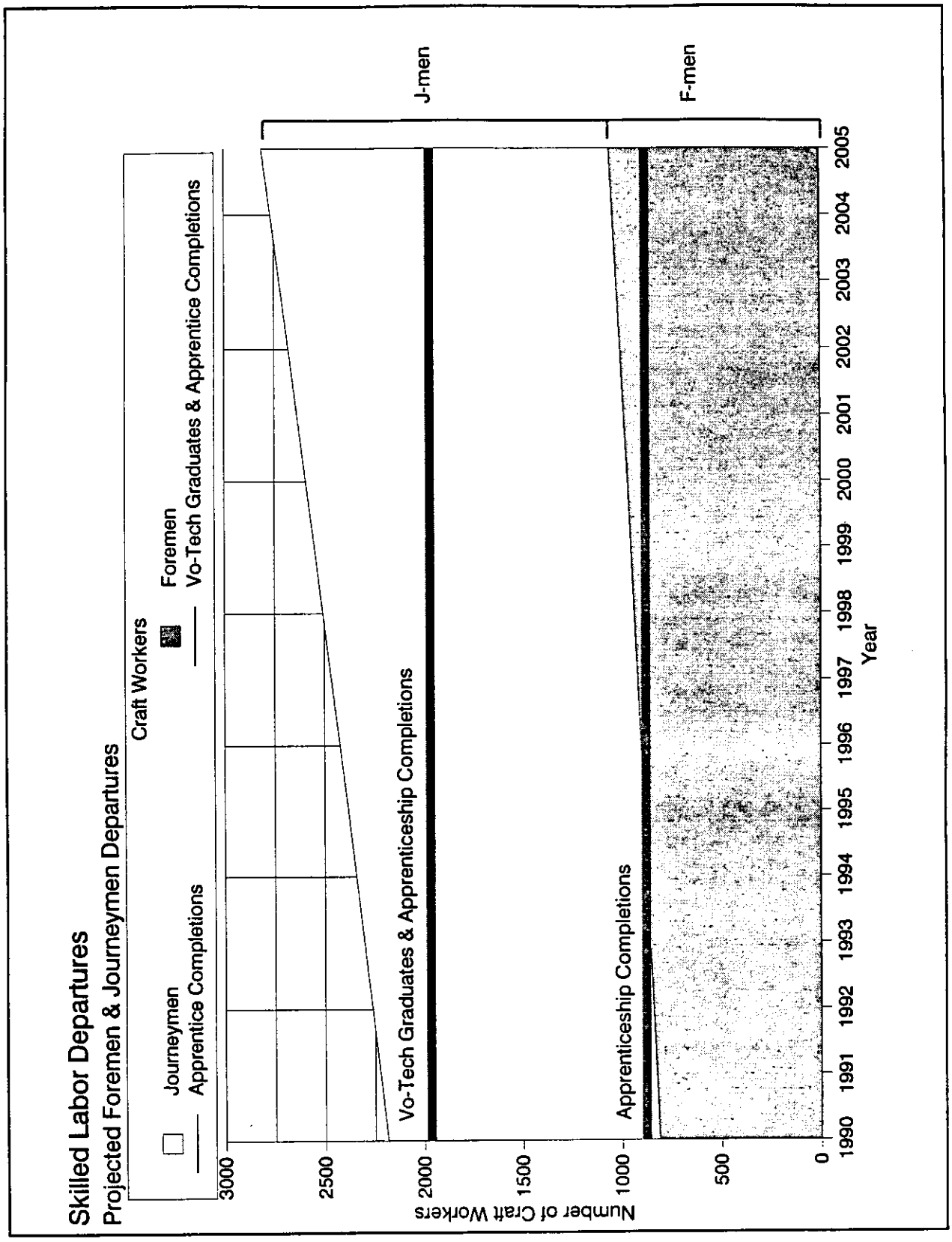

Figure 4-4 Projected Skilled Labor Departures and the Supply of Formally Trained Craft Workers

It is interesting to note that the supply of apprenticeship-trained craft workers is approximately equal to either the expected growth or the expected departures of foremen level craft workers, but not both. It is also interesting to note that the supply of vo-tech trained craft workers is insufficient to meet either the expected growth or the expected departures of journeyman level craft workers.

g) Must the construction industry require mandatory vocational/continuing education for its participants to make vocational training work?

Evidence has been presented that indicates only 22% of the required construction craft labor force is currently receiving formal training (10% in apprenticeship programs and 12% in job prep programs). Mandating journeyman craft worker levels on construction job sites by state and/or local code bodies, with the legislative requirement of formal craft training program completion as a precursor to journeyman licensing, is the only feasible method of requiring craft worker mandatory vocational/continuing education. This may be a viable solution for those trades involved in life safety code compliance but will prove to be a difficult political challenge in other crafts.

h) What effect will mandatory education have on the industry regarding:

1) Cost of education to business overhead.

Florida Statutes §239.117 specifies students who are enrolled in approved apprenticeship programs are exempt from any requirement for the payment of fees for instruction provided the contributions of facilities, personnel or equipment made on the behalf of the students equal or exceed the total value of fee exemptions. The post-secondary adult education instruction fees for

fiscal year 1993-1994 range from $0.33 to $0.63 per contact hour with the norm being $0.56. The Fitzgerald Act requires "A minimum of 144 hours per year of organized technical instruction." The number of contact hours per year in the sample curriculums in Appendix D range from 150 hours to 180 hours per year. Therefore, for craft apprenticeship training programs taught in post-secondary institutions, the apprenticeship committee contribution in facilities, personnel or equipment must equal approximately $100.00 per apprentice per year (180 contact hours * $0.56 = $100.80).

2) Cost to the customer.

If these costs are passed directly to the customer, assuming the apprentice works the normal 2,000 hours per year, the cost to the customer would be approximately $0.05 per apprentice man hour.

3) Job safety.

The available evidence clearly shows that safety performance on the job site is directly correlated with three factors; 1) the age of the craft worker, 2) the level of formal training, and 3) the regularity of job site safety meetings (Dedobbeleer, et. al., 1990). The inclusion of safety training in the first sessions of all craft training programs will increase the craft worker's awareness of job site hazards.

4) Quality of the product.

A study done by FMI Corporation identified the lack of a trained craft work force and the lack of competent field management as the number one and five barriers, respectively, to

implementing Total Quality Management programs in the construction industry (McCollough, 1993). For the craft work force, the problem was the lack of formal craft training opportunities. For the field managers, the problem was the lack of construction management training opportunities. This study verified that the lack of training has a negative impact on the quality of the constructed product.

5) Cost to the State of Florida to administer.

There are many cost items that must be considered when analyzing the expense of providing construction craft training. These cost items include, but are not limited to the following:

1. Tooling & Equipment Costs
2. Training Material Costs
3. Instructor Salaries
4. Instructor Continuing Education Training
5. Facilities Overhead
6. Administrative Overhead

A series of questions were asked of the training providers to determine these costs, and others, and to determine any possible revenue sources and the funding amounts. The responses to these questions were met with mixed results which will be discussed later in this section.

One of the first things that had to be considered was to determine the existing training program's maximum yearly training capacity for new students. The mean responses for the individual training programs were

Joint Apprenticeship Programs $\mu = 25$ students
Nonjoint Apprenticeship Programs $\mu = 23$ students

Vo-tech Job Preparation Programs μ = 16 students

Industry Average μ = 24 students

The statistical analysis of variance of the responses to this question indicates no significant differences in the maximum yearly training capacity of the various programs (χ^2=0.3254). The responses to this question indicate that a maximum yearly class size of 20 to 25 students would be possible for the existing training infrastructure.

The most costly item faced by construction craft training providers is the investment in the physical training facilities. Following are the questions and tabular responses of the training provider responses as to the adequacy of the existing training infrastructure, classroom facilities, shop facilities, and administrative facilities. The responses to these questions indicate the current classroom, shop, and administrative facilities utilized to provide construction craft training are considered adequate for the existing training levels.

Are the existing classroom facilities adequate?

	Joint Apprenticeship Programs		Nonjoint Apprenticeship Programs		Vo-tech Job Preparation Programs		Question Totals	
	#	%	#	%	#	%	Total #	% of Total
Fully adequate	15	79	10	42	10	56	35	57
Moderately adequate	4	21	12	50	5	28	21	34
Moderately inadequate	*	*	1	4	3	17	4	7
Completely inadequate	*	*	*	*	*	*	*	*

Are the existing shop facilities adequate?

	Joint Apprenticeship Programs		Nonjoint Apprenticeship Programs		Vo-tech Job Preparation Programs		Question Totals	
	#	%	#	%	#	%	Total #	% of Total
Fully adequate	14	74	7	29	8	44	29	48
Moderately adequate	4	21	13	54	5	28	22	36
Moderately inadequate	1	5	3	13	5	28	9	15
Completely inadequate	*	*	1	4	*	*	1	2

Are the existing administrative facilities adequate?

	Joint Apprenticeship Programs		Nonjoint Apprenticeship Programs		Vo-tech Job Preparation Programs		Question Totals	
	#	%	#	%	#	%	Total #	% of Total
Fully adequate	17	90	15	63	10	56	42	69
Moderately adequate	2	11	7	29	4	22	13	21
Moderately inadequate	*	*	1	4	2	11	3	5
Completely inadequate	*	*	*	*	1	6	1	2

A final question concerning the training facilities that was asked was whether the location of the training program meets the needs of the students. The responses to this question indicate the current location of the facilities were adequate to meet the needs of the students.

Does the location of the training facility location meet the needs of the students?

	Joint Apprenticeship Programs		Nonjoint Apprenticeship Programs		Vo-tech Job Preparation Programs		Question Totals	
	#	%	#	%	#	%	Total #	% of Total
Fully adequate	14	74	11	46	11	61	36	59
Moderately adequate	4	21	13	54	7	39	24	39
Moderately inadequate	*	*	*	*	*	*	*	*
Completely inadequate	*	*	*	*	*	*	*	*

The responses of the training providers indicates the existing training infrastructure is adequate to meet the current enrollment needs. To determine the mean annual enrollment in existing training programs, the current average level of annual joint and nonjoint apprenticeship completions and vo-tech graduations data previously presented can be compared with the verified number of training programs. The following is a comparison of the mean current annual student enrollment calculations for the various programs with the mean annual training capacity data

	Mean Enrollment	Mean Capacity
Joint Apprenticeship Programs	μ = 5 students	μ = 25 students
Nonjoint Apprenticeship Programs	μ = 5 students	μ = 23 students
Vo-tech Job Preparation Programs	μ = 6 students	μ = 16 students
Industry Average	μ = 5 students	μ = 24 students

This comparison indicates a conspicuous under-utilization of capacity in the existing training programs. This information suggests that there would not have to be a major capital investment in developing additional training facilities if there was a significant (200%) increase in construction craft apprenticeship training.

A series of questions were asked of the training providers in an attempt to determine the following:

1. The annual training program budget
2. The annual cost to the student
3. The annual cost per student to the contractor
4. The annual cost per student to the public education finance committee
5. The program's estimated annual expenditure per student

This information has previously been presented in this section. Only the summary information will be presented again.

The response to the question concerning the annual training budget was insufficient to draw any statistically valid conclusions; however, the few complete responses that were received suggested a yearly training budget of approximately $1700 per student.

The responses to the question concerning the annual cost to the student produced the following mean costs:

Joint Apprenticeship Programs	μ = $67.86
Nonjoint Apprenticeship Programs	μ = $66.42
Vo-tech Job Preparation Programs	μ = $505.07
Industry Average	μ = $219.91

The responses to the question concerning the annual cost per student to the contractor produced the following mean costs:

Joint Apprenticeship Programs	μ = $/hour assessment
Nonjoint Apprenticeship Programs	μ = $313.68

Vo-tech Job Preparation Programs	μ = \$301.67
Industry Average	μ = \$312.05

The responses to the question concerning the annual cost per student to the public education finance committee produced the following mean costs:

Joint Apprenticeship Programs	μ = \$3176.57
Nonjoint Apprenticeship Programs	μ = \$3912.00
Vo-tech Job Preparation Programs	μ = \$3884.42
Industry Average	μ = \$3788.70

The question concerning the program's estimated expenditure to educate each student per year produced the following mean costs:

Joint Apprenticeship Programs	μ = \$2381.21
Nonjoint Apprenticeship Programs	μ = \$992.92
Vo-tech Job Preparation Programs	μ = \$3072.00
Industry Average	μ = \$1990.13

It should be noted that all this cost information must be considered suspect. The annual cost per student to the public education finance committee is based on FTE funding from the Department of Education and is conspicuously different than actual funding provided. The reasons for these discrepancies may be

1. The individual was unaware of the actual dollar amounts.
2. The individual was confused about what the question was asking.
3. The funding levels were considered confidential by the individual committees.
4. The individual purposely responded with inaccurate information.

5. The dollar amounts may be skewed due to sample size.

6. All training costs may not have been considered.

The actual equation for determining program funding allocations from the F-DOE is:

$$FTE * \begin{matrix} program \\ cost \\ factors \end{matrix} =$$

$$\begin{matrix} weighted \\ FTE \\ students \end{matrix} * \begin{matrix} base \\ student \\ allocation \end{matrix} * \begin{matrix} district \\ cost \\ differential \\ factor \end{matrix} + \begin{matrix} declining \\ enrollment \\ supplement \end{matrix} + \begin{matrix} sparsity \\ supplement \end{matrix} + \begin{matrix} hold \\ harmless \\ adjustment \end{matrix}$$

$$= \begin{matrix} STATE \\ PLUS \\ LOCAL \\ FEFP \\ DOLLARS \end{matrix}$$

Where

Program Cost Factor	=	Determined by the Legislature
Base Student Allocation	=	Determined by the Legislature
District Cost Differential	=	Determined by the Commissioner
Declining Enrollment Supp.	=	Calculated Annually
Sparsity Supplement	=	Based Upon Population
Hold Harmless Adjustment	=	Based Upon Enrollment

The FTE funding equation can be reduced to an equation that is applicable to each school district. The simplified equation for arriving at the appropriate FTE funding dollar amount for apprenticeship is:

$$FTE_A = \frac{W_n * HRS_w}{HRS_s} * FTE_{iw} * FTE_b$$

Where

FTE_A	=	FTE dollar allocation per apprentice
FTE_{iw}	=	Industrial Education weighted FTE
FTE_b	=	FTE base dollar value
HRS_w	=	Yearly hours per week of on-the-job training
HRS_s	=	Standard hours per year (180 day/year program)
W_n	=	Number of weeks worked per year

Therefore, using fiscal year 1991-1992 data:

$$\$5{,}131.04 = \frac{50 * 25}{900} * 1.477 * \$2501.05$$

This dollar allocation to the public education finance committee is clearly in excess of the $3788.70 calculated using the responses provided by the construction craft training providers.

Additional information has been provided by the Florida Department of Education in order to more accurately estimate the FTE funding for both joint and nonjoint apprenticeship training programs in Florida. Postsecondary, publicly funded, Vocational and Technical Education Centers located throughout the state reported, for funding purposes, 3,179 construction trades apprentices enrolled during fiscal year 1991-1992. A further breakdown of this figure estimates that approximately 1,893 of these apprentices are enrolled in joint apprenticeship programs with the remaining 1,286 apprentices enrolled in nonjoint apprenticeship programs. Therefore, the estimated FTE funding for construction apprenticeship is approximately $9,713,058 annually for

joint training programs and $6,598,518 annually for nonjoint training programs or a total of $16,311,576 annually just for vo-tech centers.

The FTE funding calculation for the construction craft related job preparation training programs at vo-tech centers vary slightly

$$FTE_{JP} = FTE_{iw} * FTE_{b}$$

Where

FTE_{JP} = FTE dollar allocation per job prep student
FTE_{iw} = Industrial Education weighted FTE
FTE_{b} = FTE base dollar value

Therefore, using fiscal year 1991-1992 data, the FTE cost was

$$\$3,694.05 = 1.477 * \$2501.05$$

The difference between the funding levels for apprenticeship training programs and job prep training programs is that students enrolled in apprenticeship on-the-job training programs can be counted as 25 hours per week (50 weeks @ 25 hours = 1,250 hours of instruction) while job prep programs are counted as 900 hours of instruction (Florida Department of Education, 1993).

Information provided by the Department of Education indicates there were approximately 5,095 students enrolled in construction related vo-tech job prep programs during fiscal year 91-92. Therefore, the FTE funding for vo-tech job prep programs for fiscal year 91-92 was approximately $18,821,189.

The cost of construction-related craft training, both apprenticeship and job preparation, funded through F-DOE vocational and technical training programs was approximately

$16,311,576 for apprenticeship training and $18,821,189 for job preparation training, or a total of $35,132,765 for fiscal year 1991-1992. If the variations in individual craft apprenticeship training program durations are considered, the average annual number of apprenticeship completions is approximately 879 per year, or an average funding level of approximately $18,900 per apprenticeship completion. If the projected dropout rate is considered for job preparation programs, the average annual number of job prep graduates is 1,308 students, or an average annual funding level of approximately $14,390 per job prep graduate.

6) Develop a plan to promote the construction industry in middle schools (grades 6-8) and high schools (grades 9-12) on a continuing basis.

The Youth Apprenticeship Program developed by Orange and Seminole Counties, and approved by the F-DOE and F-DOL is included in Appendix A. A summary of this program is to develop occupational awareness programs in the 7th through 10th grades, develop youth apprenticeship partnerships with local contractor organizations with 30% of the student's time spent on-the-job during the 11th grade and 50% of the student's time spent on-the-job during the 12th grade. Upon successful completion of the program and subsequent skill examination the student would be issued "Standard Skill Certification."

5.0 Introduction

This concluding chapter will present a summary of the research findings, conclusions drawn from the research, recommendations for improving construction craft training in Florida, and recommendations for further research. The final section will be concluding remarks from the researcher.

5.1 Summary

The central hypothesis of this study was that the construction industry was training insufficient numbers of individuals to meet the industry's annual demand for skilled craft workers. The U.S. Department of Labor study *How Workers Get Their Training: A 1991 Update* (Bureau of Labor Statistics, 1992) illustrated that, nationally, 38% of the construction trades work force reported receiving some type of informal on-the-job training (of these individuals, approximately 10% also reported receiving postsecondary school-based job preparation training), 19% of the work force reported a formal company-based program as their source of training (apprenticeship programs), 4% reported receiving "other" training, with the remaining 39% of the craft work force declaring they have received no formal or informal craft training. Other construction industry observers suggested the construction industry was providing training opportunities to approximately two-thirds of the projected number of craft workers needed by the industry (Gasperow, 1990). The purpose of this study was to test this premise by using Florida as a paradigm, quantifying the actual number of individuals in formal construction craft training

programs, and developing a simulation procedure that accurately delineates Florida's annual need for skilled construction craft workers.

The literature review indicated construction industry observers consider vo-tech job preparation training a complement to apprenticeship training, not a substitute for apprenticeship training. Classroom-only, construction-related job prep training was viewed as providing only elementary vocational skills and deficient in providing the student with crucial elements of career preparedness (Kenny, 1988). The formal structure and skilled craft worker supervision of the apprentice's on-the-job training were considered the most valuable sources of skill development. However, the literature also suggested the theoretical aspects of each craft was most effectively presented in an academic setting (Rubens, 1980).

The research procedure at F-BAT and F-DOE identified every registered craft training provider in Florida. These identified craft providers were subdivided into three groupings: joint apprenticeship training providers, nonjoint apprenticeship training providers and vo-tech job preparation training providers. A survey instrument was designed and distributed to each of the identified training providers. The statistical analyses, which used a nonparametric one-way analysis of variance technique, were designed to detect response differences among the three groups of training providers. Since the entire verifiable population of formal construction craft training providers was identified and sampled, and a 38% overall response rate to the survey instrument was generated, statistically valid conclusions can be drawn from the data derived from the primary survey instrument.

A systems dynamics model of the construction craft training process was developed that utilized information derived from the construction craft training provider survey and the BLMI's annual industry and occupational employment projections. The model simulation verified that only 16% (900 individuals) of the industry's projected annual demand for journeyman-level craft workers (5,750 individuals) was being filled by apprenticeship program completers, with an additional 19% (1,100 individuals) of the yearly demand being filled by semi-skilled vocational and technical education job preparation program graduates. The results of the construction craft training model simulation indicated that annual apprenticeship completions were scarcely sufficient to fill either the annual projected departures (813 individuals) or the annual expected growth (747 individuals) for foreman-level craft worker labor pool, but not both. Simulation results also indicated that annual job prep graduations were explicitly incapable of filling either annual projected departures (2,185 individuals) or annual expected growth (2,005 individuals) for the journeyman-level craft worker labor pool. This investigation confirmed that Florida's construction industry is providing the craft work force with insufficient formal training opportunities.

The State of Florida currently provides approximately $35 million annually to support postsecondary construction craft training programs. If vo-tech job preparation program training levels remain constant and apprenticeship training programs taught in publicly funded educational institutions are increased by 200% over the next five years (from approximately 900 annual completions to 2,700 annual completions), the state FTE expenditure for support of construction craft training will be approximately $68 million annually (1993 dollars). Although this additional $33 million of FTE funding may seem like an unreasonably high figure, it represents an increase

in F-DOE FTE funding of approximately 0.7% over 1993-1994 appropriation levels of $4,526,812,758 (Florida Department of Education, 1993).

The model simulation also suggested the skilled craft labor work force turnover rate is approximately once every 22 years. If there is no increase in construction craft training, by the year 2010 the percentage of the construction work force having received some type of formal craft training will have dropped to 22%, with 78% of the craft work force having received only informal on-the-job training or, more likely, no training at all.

Increasing construction craft training levels decreases employee turnover by 18%, increases productivity by an average of 18% and results in an average rate of return on the training investment of 2:1 (Liska, 1994). Completion of a formal craft training program also beneficially affects employee on-the-job safety by reducing accident frequency, which lowers contractors' workers compensation costs (Dedobbeleer, Champagne and German, 1990). Everything presented in this treatise supports increasing construction craft training efforts, and review of the relevant literature found no studies that suggested any drawbacks associated with craft training.

5.2 Conclusions

This analysis of construction craft training presented the general belief of industry observers that increasing the current levels of craft training would benefit the construction industry by

1. Reducing industry-wide craft labor departures,
2. Increasing the quality of the constructed product,

3. Increasing the individual's productivity,
4. Reducing the contractor's worker's compensation costs, and
5. Increasing the craft worker's lifetime earning potential.

To realize these expected benefits, the industry must develop increased contractor commitment, specifically from the nonunion sector of the industry, to support, promote and expand current levels of apprenticeship craft training (Rubens and Harrisson, 1980; Metcalf, 1985).

The construction craft training simulation model confirmed the industry is training insufficient numbers of craft workers to meet the annual labor demand for skilled craft workers. If the industry were to increase its commitment to craft training and provide apprenticeship opportunities to workers at approximately 80% of the annual demand for skilled workers, a 200% increase in apprenticeship training levels would have to occur.

It is difficult to understand why contractors in Florida are either unwilling or unable to increase apprenticeship training levels. There are virtually no barriers to implementing improved craft training programs. Florida Statute §239.117 exempts students enrolled in approved apprenticeship programs from the payment of tuition. This exemption means that there is no cost to the student for instruction if the apprenticeship committee contracts with a local public education committee or institution. The negotiated cost to the apprenticeship committee would, therefore, be reduced to the contributions of facilities, personnel, tools and training materials that must equal or exceed the total value of the fee exemptions.

5.3 Recommendations

This section is the proposed recommendations for the existing vocational/continuing education programs for the building trades. A series of questions was asked in the initial survey instrument, and in the follow-up survey sent to the initial survey respondents, which tested proposed recommendations.

5.3.1 Responses to Proposed Recommendations, Initial Survey Instrument

Should craft training instructors be certified as instructors in the particular craft?

	Joint Apprenticeship Programs		Nonjoint Apprenticeship Programs		Vo-tech Job Preparation Programs		Question Totals	
	# of Joint responses	% of Joint responses	# of Nonjoint responses	% of Nonjoint responses	# of Vo-tech responses	% of Vo-tech responses	Total # of responses	% of total responses
Strongly Agree	16	84	22	92	13	72	51	84
Moderately Agree	1	5	*	*	1	6	2	3
Moderately Disagree	*	*	*	*	1	6	1	2
Strongly Disagree	*	*	1	4	1	6	2	3

Note: Column totals may not add to 100% since some respondents did not answer this question.

These craft training providers strongly believe that certification of craft training instructors should be required.

There is a strong belief that some type of "Career Awareness" program should be introduced at the junior high school level.

Should "School-to-Work" Transition and/or "Youth Apprenticeship" programs be introduced in Florida's High Schools?

Strongly Agree		Moderately Agree		Moderately Disagree		Strongly Disagree	
#	%	#	%	#	%	#	%
20	74	4	15	1	4	2	7

There is a strong belief that some type of "School-to-Work" and/or "Youth Apprenticeship" program should be introduced at the high school level.

Should Post-Secondary training providers develop stronger contractor ties?

Strongly Agree		Moderately Agree		Moderately Disagree		Strongly Disagree	
#	%	#	%	#	%	#	%
20	74	4	15	2	7	1	4

There is a strong belief that post-secondary construction craft training providers should develop stronger contractor ties.

Should apprenticeship training providers contract with post-secondary institutions to provide training wherever practical?

Strongly Agree		Moderately Agree		Moderately Disagree		Strongly Disagree	
#	%	#	%	#	%	#	%
15	56	9	33	1	4	2	7

There is a strong belief that some type of "Career Awareness" program should be introduced at the junior high school level.

Should "School-to-Work" Transition and/or "Youth Apprenticeship" programs be introduced in Florida's High Schools?

Strongly Agree		Moderately Agree		Moderately Disagree		Strongly Disagree	
#	%	#	%	#	%	#	%
20	74	4	15	1	4	2	7

There is a strong belief that some type of "School-to-Work" and/or "Youth Apprenticeship" program should be introduced at the high school level.

Should Post-Secondary training providers develop stronger contractor ties?

Strongly Agree		Moderately Agree		Moderately Disagree		Strongly Disagree	
#	%	#	%	#	%	#	%
20	74	4	15	2	7	1	4

There is a strong belief that post-secondary construction craft training providers should develop stronger contractor ties.

Should apprenticeship training providers contract with post-secondary institutions to provide training wherever practical?

Strongly Agree		Moderately Agree		Moderately Disagree		Strongly Disagree	
#	%	#	%	#	%	#	%
15	56	9	33	1	4	2	7

There is a strong belief that construction craft apprenticeship training providers should contract with publicly funded post-secondary institutions to provide the academic portion of the training program.

Should "Standard Skill Certification" be required of all apprenticeship graduates?

Strongly Agree		Moderately Agree		Moderately Disagree		Strongly Disagree	
#	%	#	%	#	%	#	%
20	74	5	19	2	7	*	*

There is a strong belief that a uniform "Standard Skill Certification" examination should be of all apprenticeship graduates.

Should "Standard Skill Certification" be required of all Vo-tech job prep graduates?

Strongly Agree		Moderately Agree		Moderately Disagree		Strongly Disagree	
#	%	#	%	#	%	#	%
18	67	9	33	*	*	*	*

There is a strong belief that a uniform "Standard Skill Certification" examination should be required of all Vo-Tech job prep graduates.

Should construction craft trainers be required to complete 6 construction and/or craft related continuing education units every 2 years?

Strongly Agree		Moderately Agree		Moderately Disagree		Strongly Disagree	
#	%	#	%	#	%	#	%
10	37	10	37	5	19	2	7

There is agreement that all construction craft instructors should be required to complete at least 6 construction and/or craft related continuing education units ever 2 years.

Should the State of Florida provide tax incentives to contractors who establish and maintain registered apprenticeship training programs?

Strongly Agree		Moderately Agree		Moderately Disagree		Strongly Disagree	
#	%	#	%	#	%	#	%
18	67	7	26	*	*	2	7

There is a strong belief that the State should provide tax incentives for those contractors who establish and maintain registered apprenticeship training programs.

The current number of apprenticeship graduates fills approximately 10% of the construction industry's annual need for craft workers. Should the State of Florida attempt to increase the annual number of graduates from the current level of 879 per year to 2,700 per year (200% increase) within 5 years?

Strongly Agree		Moderately Agree		Moderately Disagree		Strongly Disagree	
#	%	#	%	#	%	#	%
14	51	7	26	1	4	5	19

There is a strong belief that the State should support an increase in construction craft apprenticeship training levels.

The State of Florida is currently providing approximately $20 million per year to fund construction craft apprenticeship, approximately $5,100 per enrolled apprentice per year. Should the Department of Education make additional funds available to increase the number of apprenticeship graduates?

Strongly Agree		Moderately Agree		Moderately Disagree		Strongly Disagree	
#	%	#	%	#	%	#	%
17	62	4	15	1	4	5	19

There is a strong belief that the Florida Department of Education should increase the funds available to support an increase in construction craft apprenticeship training.

5.4 Discussion of Recommendations

Implementation of these recommendations and potential execution impediments will be discussed in the following section. The follow-up survey instrument (presented in §5.3.2) tested the initial survey instrument respondents' attitudes towards the proposed recommendations in this section. In every case the follow-up survey respondents supported the following recommendations.

5.4.1 Secondary Education System

The principal recommendation for the secondary school system is to implement construction-related school-to-work transition programs. Ideally, these programs would begin in the 7th through 10th grades with a career awareness program that would be coupled with both site and employer visits. The school system would then establish a "youth apprenticeship" partnership with local contractor organizations. In the 11th grade, students would spend 30% of their time receiving on-the-job construction craft training (typically during the summer months). By the 12th grade students would spend 50% of their time receiving on-the-job training (one semester of the school year), with the remaining 50% of their time spent on required academic instruction supplemented with craft-related instruction. Upon graduation students would be tested and receive a Standard Skill Certification if they passe the examination.

Virtually every national contractor trade organization provides a skill development curriculum. There is no need for school districts to "reinvent the wheel" when it comes to construction-related curricula. These existing training curricula can be modified to fit the needs of individual programs.

At the time of this writing, there is also a push in Florida to establish school-to-work transition programs in the form of tech prep and youth apprenticeship programs. Orange and Seminole counties in Florida (Orlando area) have established construction craft youth apprenticeship programs at the secondary school level.

There is also a national belief that some form of school-to-work transition program is necessary at both the secondary and postsecondary level. Senate Bill 1993 S. 1396 will provide seed money to the states to facilitate youth apprenticeship demonstration projects. A focus of this legislation is to provide career awareness that will, hopefully, reduce the squandering of training funds and resources at the postsecondary level.

5.4.2 Postsecondary Education System

The postsecondary educational institutions that provide construction craft training programs, both job prep and apprenticeship, should develop stronger ties with local contractor organizations. This would benefit both parties. Strong contractor ties would allow the school to know if the provided training meets industry needs and would provide contractors with access to a better-trained work force.

Each graduate of a vo-tech job prep training program should be required to complete a Standard Skill Certification examination. Only by the uniform testing of each graduate would program training effectiveness be determined.

5.4.3 Apprenticeship Training System

Apprenticeship training providers should contract with local postsecondary educational institutions, wherever practical, to provide the academic portion of apprenticeship training. This arrangement would allow the apprenticeship committee access to state funding.

Each graduate of an apprenticeship training program should be required to complete a Standard Skill Certification examination. Only by the uniform testing of each apprentice would program training effectiveness be determined.

5.4.4 Construction Craft Training Instructors

The paramount problem with providing high-quality construction craft training is providing erudite, craft-orientated instructors. The minimum requirements for each craft training instructor should be completion of a formal craft apprenticeship program, a journeyman's license in the specific craft and a minimum of two years' experience at the journeyman level.

The skills and abilities of the craft instructors are paramount to the effectiveness of the training program. To enhance the caliber of instruction, construction craft training instructors should be certified as instructors in the particular craft. Craft training instructors also should be

required to complete six construction- and/or craft-related continuing education units every two years.

5.4.5 State of Florida

It is implausible to expect that the State of Florida could mandate Journeyman-level craft worker licensing for all crafts. However, since the state is contributing significant resources in support of construction craft training, the state would be well advised to mandate craft worker skill certification for all job prep and apprenticeship training programs supported with public funds. Since the quality of instruction varies from program to program, this is the only feasible way to determine training program effectiveness.

The vast majority of construction craft training programs are being taught in state-funded secondary and postsecondary educational institutions. Since the state is currently underwriting these craft training programs, the state also has the responsibility to supervise instructor competence. A primary method of guaranteeing instructor expertise is to legislatively mandate certification of craft training instructors.

The State of Florida should provide tax incentives for construction contractors who establish and maintain *registered* craft apprenticeship training programs. Since apprenticeship committees already have the ability to contract with both secondary and postsecondary educational institutions to provide training, the tax incentives should encourage, and also be limited to, the deduction of any fees collected by the apprenticeship committee and the cost of materials and tooling donated to the training programs.

The F-DOE currently has established enrollment ceilings (caps) for adult job preparatory vocational programs. These enrollment ceilings should be raised to at least 80% of the annual calculated demand for construction craft apprentices.

The State of Florida has, as its primary interest, the goal of providing broad-based construction craft training. The funding levels in excess of $35 million annually and the cyclical nature of the industry dictate the need for broad-based training so individuals will have enough skills to be able to get a job on the next construction project. Narrowly based craft skills will not ensure continuing industry employment.

5.5 Recommendations for Further Research

5.5.1 Craft Training Providers

A longitudinal study should be undertaken to see how many of the individuals completing both Vo-Tech job prep and formal apprenticeship training programs continue working in the industry. This type of study could be done entirely in Tallahassee by using Department of Education student records (the student's social security number) and Department of Labor employer records (the employee's social security number). Longitudinal studies of this nature would require mainframe computer capability due to the size of the database searches. The benefits of this study would be to help determine training program effectiveness by identifying the number of individuals who have received formal craft training and have left the industry after completing their training. Those crafts with the highest drop out rates could be targeted for further research.

The other area of further research on craft training providers would be to perform the craft training simulation for each of the individual construction crafts. This would help to determine the appropriate training level for each of the individual crafts.

5.5.2 Training Provider Funding Methods

A secondary objective of this investigation was to develop a cost analysis of the construction craft training process. It became apparent during the research phase that the apportionment allocated to the craft training programs was significantly less than the FTE funding levels. The final recommendation for further research would be to conduct a comprehensive analysis of the construction craft training program funding process to determine the actual funding levels and verify where and how the money is actually being spent.

5.6 Concluding Remarks

Objective evidence was presented confirming that the current levels of construction craft training are shamefully short of the needs of Florida's construction industry. Without significant increases in craft training levels, serious shortages of skilled craft workers will occur, and these shortages will adversely affect the industry. The construction craft training simulation model presented in this investigation is a tool that can be used by craft training providers and policy setters to determine appropriate levels of construction craft training.

There is also a growing belief in this country that more attention needs to be paid to those high school students who are not college bound. The United States Departments of Education and Labor are currently promulgating school-to-work transition program legislation supporting

the development of tech-prep and youth apprenticeship demonstration programs. It is the belief of the researcher that the construction industry, with its long history of craft apprenticeship, is perfectly suited to take advantage of this movement. However, it is the responsibility of the local contractors to cooperate in these training programs, or the consequences will be a serious and continual decline in the skills and abilities of the craft work force.

Appendix A

Orange and Seminole Counties
Youth Apprenticeship
Program Requirements

TABLE OF CONTENTS

MISSION STATEMENT

The MISSION of the Construction Trades Apprentice Program is to develop a working relationship between the School Board of Seminole County, Florida, and the Academy of Construction Trades, Inc. (ACT) for the purpose of developing a better trained work force in the various construction trades.

PROGRAM GOALS/OBJECTIVES

1. Develop student's attitudes, work habits and competencies necessary to succeed in the job market, complete the apprenticeship program, and continue education at the postsecondary level.

2. Develop the student's ability to solve problems, think critically and work cooperatively with others to complete a project.

3. Develop in each student a sense of individual responsibility and pride in craftsmanship.

4. Prepare students to contribute to the economic growth of the construction industry as skilled, stable, and productive employees.

5. Provide a structured career path which will lead students directly into the job market and continuation to postsecondary education upon graduation.

INTENDED OUTCOMES:

After successfully completing this program, the student will be able to:

1. Demonstrate knowledge of safe and efficient work practices.

2. Apply fundamental skills related to the specific occupation, craft or trade.

3. Properly use and care for equipment.

4. Properly use materials of the trade.

5. Demonstrate manipulative skills of the trade.

6. Demonstrate appropriate communication skills, math skills, understanding of basic science, and employability skills.

7. Be in a position to successfully enter the construction trade in the area in which he/she has demonstrated interest and aptitude.

8. Be equipped to continue and complete the apprenticeship program in the chosen field.

9. Be encouraged and prepared to continue education at the postsecondary level.

BENEFITS TO STUDENTS

Students will receive:

1. A program of study intended to provide for a smooth school-to-work transition.
2. A Program that will enable students to link instruction received in school-related construction classes and laboratories with training received at the job site.
3. An opportunity to earn while they learn.
4. Counseling, testing, and the opportunity to master academic and pre-identified occupational skills which will allow entry into the apprenticeship with advanced standing.
5. Program options that will lead to job performance competency and self sufficiency to enable students to enter the labor force directly upon high school graduation.

STUDENT RESPONSIBILITIES

The student will:

1. Perform the assigned duties in a loyal manner and work to the best interest of all concerned.
2. Report job problems to supervisor/mentor and/or high school coordinator.
3. Adhere to employer's company policy. (Note: employment may be terminated for the same reasons as for regular employees.)
4. Be regular in attendance at school and on the job. If unable to report to work, the employer and high school coordinator must be notified by the student before the start of the normal work day.
5. Student apprentice's may be terminated from the apprenticeship employment upon withdrawal from school.
6. Maintain a Grade Point Average (GPA) of 2.0.

BENEFITS TO EMPLOYERS

The employer will receive:

1. A program that ensures the availability of a quality construction work force to local contractors that possesses the necessary specific trade skills.
2. Apprentices who exhibit a proven work ethic and enhanced safety practices.
3. Reduced recruiting costs and less employee attrition.
4. Less difficulty in meeting current and future training quota requirements.
5. The opportunity to become more competitive due to higher productivity and higher-quality finished products.
6. An active feeder program to encourage participation in the existing postsecondary apprenticeship training.

CONTRACTOR RESPONSIBILITIES

1. To adhere to all state and federal regulations regarding employment, child labor laws, minimum wages, and workmen's compensation. Each contractor must furnish to the School Board a copy of sponsor's current Workers Compensation Certificate of Insurance and a letter from their carrier stating that the student apprentice is a "covered" employee.
2. To recognize and support the educational objectives of the Program Requirements For The Construction Trades Apprenticeship Program and to provide employment for the student apprentice on a regular, continuous basis.
3. To appoint a training supervisor/mentor for the student apprentice.
4. To agree to follow the "training plan" designed by the Program's instructors and the training supervisor/mentor appointed by the contractor; to give the student apprentice a variety of work assignments according to the "training plan" and to provide comprehensive instruction under the direction of qualified personnel.
5. To provide a "Safety Orientation" on the job site for ALL new youth apprentices followed up with continuous safety instruction throughout the apprenticeship training program.
6. To provide adequate equipment, materials, and other facilities required in order to provide an appropriate learning experience for the student apprentice.
7. To keep accurate records of the student's attendance.
8. To notify the sending high school if the student is absent without notification.
9. To pay the youth apprentices at the same rate as any other beginning employee in the same job.
10. To permit the school's representative(s) to visit the student and supervisor at the place of employment to determine progress, obtain direct feedback, and make adjustments in the "training plan" whenever necessary.
11. To perform periodic evaluations of the student's accomplishments and performance by the training supervisor on a form provided by the high school; and to advise the high school coordinator when a training problem arises.
12. To provide six weeks of summer employment beginning in 1993 for Seminole County construction teachers during their first year as an instructor in the Youth Apprenticeship Program. The Seminole County Public Schools will provide for partial compensation along with the construction contractors. These instructors must experience current trends in the industry.
13. If contractor intends to terminate a student, the contractor shall provide five (5) days advance written notice to ACT, to the student, and to the home school stating intent to terminate the student.

BENEFITS TO HIGH SCHOOLS

1. Provides an opportunity to address the increasing gap between emerging job requirements and the ability of Florida's high school graduates to meet them.
2. Assists high school students' transition into meaningful careers with promising futures.
3. Provides an opportunity to reduce the dropout rate by offering year-long Construction Trades Survey Courses, and by offering instruction which enables the student to clearly see the relationship of school to the workplace.
4. Provides an opportunity for fewer high school disciplinary problems by offering more relevant occupational core training in grades 9-12.
5. Provides on going staff development programs for construction teachers.

HIGH SCHOOL RESPONSIBILITIES

1. To provide core curriculum instruction and relevant trade-specific instruction from the occupational instructor.
2. To provide an On-The-Job Training Program under the direct supervision of a certified cooperative education coordinator/instructor.
3. To assure visitation to the student and employer by the cooperative education coordinator on a regular basis at the employer's site.
4. Student work attendance record will be completed by the contractor and reported to the home high school.
5. To provide safety instruction in the classroom and enforce work habits in the lab.
6. Each high school will send an application in EACH specific trade area for Partial Waivers listing the names of all student apprentices to the Florida Department of Education. Next, the DOE will send the approved application for Partial Waivers back to the high school with the instructions to keep a copy on file and send the appropriate copies to the employer/contractor, ACT, the apprentice, and the Child Labor Section.
7. The participating high school agrees to award credits earned in the Apprenticeship Program toward the student's high school diploma.
8. The participating high school agrees to adhere to the curriculum and Program Requirements for The Youth Apprenticeship Program In The Construction Trades.
9. Students must meet the participating employer's employment requirements to enter the OJT Training Program.
10. Students must have completed the core curriculum prior to OJT training.
11. To permit ACT's representative and the contractor's representatives to visit the classroom and/or laboratory to determine the effectiveness of instruction and curriculum delivery.

MINIMUM QUALIFICATIONS FOR APPRENTICESHIP APPLICANTS

The qualifications of all applicants for apprenticeship shall be determined by the youth apprenticeship committee. The following information shall be submitted to the youth apprenticeship committee by each applicant for apprenticeship:

a. Evidence that student is at least 16 years of age.

b. Evidence that the student has completed the 10th grade.

c. Transcript of school courses and grades.

d. Evidence that the student has completed an apprenticeship application in its entirety.

e. Each student shall participate in an interview.

f. Substance abuse testing, if allowable by law.

g. Agreement to submit to Aptitude Testing for the school year 94-95 and after.

EQUAL OPPORTUNITY STATEMENT

Selection of apprentices under the program shall be made from qualified applicants without regard to race, creed, color, national origin, sex or occupationally irrelevant physical requirements, in accordance with objective standards, which permit review after full and fair opportunity for application.

REQUIREMENTS FOR ENTRANCE INTO ON-THE-JOB TRAINING

The student must meet the participating employer's employment requirements to be accepted into the OJT portion of the Youth Apprenticeship Program. The student must also have completed the Core Curriculum prior to employment and must have received a Partial Waiver from the Florida Department of Labor (Education) regarding the State's Child Labor Law.

TERM OF APPRENTICESHIP

The minimum number of hours for the trade involved will be determined by the Academy of Construction Trades, and shall be realistic in terms of attainment of predetermined competencies and relative to national industry standards.

PROBATIONARY PERIOD

All apprentices, in accordance with these program requirements, will be subject to a probationary period not exceeding eighteen (18) weeks. During this probationary period, cancellation of the apprenticeship agreement shall be made by the request of either the apprentice, The Academy of Construction Trades, or the contractor.

NOTICE OF ADVERSE ACTION

The apprentice shall be given five (5) school days advance written notice of any proposed adverse action affecting their apprenticeship status, and shall have an opportunity to present to the coordinator his/her response to the proposed action.

APPRENTICESHIP AGREEMENT

The apprentice (and, if a minor, his/her parent or guardian) shall sign the apprenticeship agreement, which shall also be signed by the Academy of Construction Trades.

RESPONSIBILITY OF THE YOUTH ACADEMY OF CONSTRUCTION TRADES

The Academy of Construction Trades is hereby responsible to carry out the provisions of these program requirements of apprenticeship.

DUTIES OF THE ACADEMY OF CONSTRUCTION TRADES

The Academy of Construction Trades is the administrative body responsible for successful overall operation of the apprenticeship program.

(A) ACT is responsible for enforcing program requirements, and ensuring that proper training is conducted so that a skilled person graduating from the program is fully qualified in those areas of training designated by the program requirements.

(B) ACT is the body that, together with the schools involved, selects individuals for apprenticeship and refers them to participating firms for training.

(C) ACT refers apprentices under written agreement for placement in the program.

(D) ACT advises the schools in establishing minimum standards for related core and specific trade instruction, establishes on-the-job training and supervises the apprentice to see that these criteria are adhered to during the training period.

(E) ACT listens to all complaints of violations of apprenticeship agreements, whether it be employer or apprentice and takes appropriate action within the guidelines of the Program Requirements.

APPRENTICE COMPLAINT PROCEDURE POLICY

In the event that an apprentice believes there is a basis for complaint, the apprentice must first discuss the alleged complaint with the occupational instructor and/or the cooperative education coordinator.

In case of failure by an apprentice in related occupational instruction, The Academy of Construction Trades shall fulfill its obligations, including the right to suspend him/her from the program for a specific length of time/ or for sufficient reasons, take steps to have his/her apprenticeship agreement removed after a hearing the The Academy of Construction Trades. The apprentice shall be given five (5) school days notice of any adverse action taken against him/her.

COMPLIANCE WITH APPRENTICESHIP PROGRAM REQUIREMENTS

The signing of the following listed Construction Trades apprenticeship agreements shall bind ALL parties to the Program Requirements:

A. Apprenticeship Partnership Agreement between the Seminole County Public Schools and the Academy of Construction Trades, Inc. (ACT).

B. Apprenticeship Agreement between the apprentice and the Academy of Construction Trades, Inc. (ACT).

C. Participating Employer's Apprenticeship Agreement between the Contractor and the Academy of Construction Trades, Inc. (ACT).

D. Participating High School Apprenticeship Agreement between the Parent, Student, Contractor, Coop Coordinator, and Principal.

Apprentices entering into an apprenticeship agreement with the Academy of Construction Trades shall receive and acknowledge receipt of a copy of these Program Requirements.

SAFETY

The Academy of Construction Trades, Inc. agrees that safety will be included as part of the instruction provided at the on-the-job training site and that OSHA standards will be strictly enforced.

RECORDS

All records pertaining to the progress and training of apprenticeship will become a part of the apprenticeship cumulative folder, and be maintained for not less than five (5) years.

ATTACHMENTS

The following Attachments hereby become a part of the Program Requirements:

A. Seminole County Public School's Construction Trades Curriculum Model.

B. Curriculum for construction Trades Year-Long Survey Course.

C. Curriculum for Electrical Youth Apprenticeship Program.

D. Curriculum for Carpentry Youth Apprenticeship Program.

E. Curriculum for Plumbing Youth Apprenticeship Program.

F. Curriculum for Fire Sprinkler Youth Apprenticeship Program.

G. Curriculum for Sheet Metal Youth Apprenticeship Program.

H. Models for 11th and 12th grade class scheduling including On-The-Job Training.

I. Apprenticeship Partnership Agreement between the County Public Schools and the Academy of Construction Trades, Inc. (ACT).

J. Apprenticeship Agreement between the apprentice and the Academy of Construction Trades, Inc. (ACT).

K. Participating Employer's Apprenticeship Agreement between the Contractor and the Academy of Construction Trades, Inc. (ACT).

L. Participating High School Apprenticeship Agreement between the Parent, Student, Contractor, and High School.

M. The On-The-Job Training Plan for the Construction Trades Youth Apprenticeship Program.

N. Construction Trades Apprentice Application.

O. Florida Department of Labor Proposed Child Labor Rule including form LET/CLL-104.

SEMINOLE COUNTY PUBLIC SCHOOL'S CONSTRUCTION TRADES CURRICULUM MODEL

9th	10th	11th	12th
	JOB PREP		
PRACTICAL	TRADE SKILLS	TRADE SKILLS	TRADE SKILLS
Survey Course	Elect.		
(1 cr.)	Plumb.		Option 1
	Carp.		(Youth Apprentice Opportunity)
	Sheet Mt.		
	Fire Sprk.		Option 2
	(1 cr.)	(Multiple Credits)	(Multiple Credits)
	Gold Seal Opportunity	Coop In Summer	

Seminole County's Construction Trades INDUSTRIAL EDUCATION Program Selections:

A. Residential Electric Wiring # 8727100
B. Residential Plumbing # 8721700
C. Carpentry Skills # 8722000
D. Basic Sheet Metal # 8754100
E. Basic Fire Sprinkler Installation # 8721900

SPECIAL NOTE: The Vocational Industrial Clubs of America, Inc. (VICA), is the vocational student organization which reinforces classroom instruction by providing communications, leadership, human relations and employability training experiences. It also reinforces specific vocational skills. When provided, these activities are considered an integral part of these programs.

CURRICULUM FOR
CONSTRUCTION TRADES
YEAR-LONG SURVEY COURSE
Grade 9

* Major Emphasis:

A. Promote Applied Math and Applied Science courses for 9th graders not enrolled in Algebra I or Biology.

B. During the 9th grade, promote students to enroll in as many semester (1/2 credit) high school requirements as possible. For example: Personal Fitness, Physical Education, Life Management Skills, etc.

C. Promote as many 9th graders as possible to enroll in the ONE CREDIT Industrial Education course entitled: Practical Construction Trades - 8700330.

Major Content: The purpose of this course is to provide individuals with practical skills, knowledge, and attitudes concerning the construction trades.

Intended Outcomes:

01. Identify occupations in the construction trades.
02. History of the Apprenticeship Program.
03. Draw and interpret plans.
04. Using measuring and layout tools.
05. Use hand tools for construction work.
06. Use power tools for construction work properly and safely.
07. Construct projects or complete tasks pertinent to the construction trades.
08. Identify materials used in the construction trades.
09. Demonstrate appropriate communication skills.
10. Demonstrate appropriate math skills.
11. Demonstrate appropriate understanding of basic science.
12. Demonstrate leadership skills.
13. Job Shadowing/Field Trips to Apprenticeship Sites.
14. Demonstrate an understanding of workplace readiness and workplace ethics.
15. Use employability skills to research job and training opportunities.

CURRICULUM FOR ELECTRICAL YOUTH APPRENTICESHIP PROGRAM

Residential Electric Wiring

Program # 8727100

MAJOR CONTENT: The purpose of this program is to prepare students for employment as electricians. The content will include the following: installation, maintenance, and repair of electrical systems. The content should also include training in safe, efficient work practices, communication, leadership, human relations and employability skills.

Intended Outcomes:

01. Demonstrates proper and safe procedures while working with technological tools, apparatus, equipment, systems, and materials.
02. Demonstrates appropriate math skills for the construction trades.
03. Select, inspect, operate, and maintain common hand tools used in the construction trades.
04. Select, inspect, operate, and maintain common power tools used in the construction trades.
05. Demonstrates the ability to read and interpret BLUEPRINTS and construction trade documents.
06. Identify basic procedures for rigging and moving materials and equipment.
07. Identify materials used in the electrical construction trade.
08. Demonstrates an understanding of workplace readiness and workplace ethics.
09. Demonstrates an understanding of the make-up of the construction industry.
10. Performs basic electrical laboratory safety and calculation skills.
11. Demonstrates basic electrical circuit skills.
12. Demonstrates direct current (DC) circuit skills.
13. Demonstrates alternating current (AC) circuit skills.
14. Demonstrates wiring skills.
15. Demonstrates appropriate communication skills.
16. Demonstrates appropriate understanding of basic science.
17. Demonstrates employability skills.
18. Demonstrates an understanding of entrepreneurship.

CURRICULUM FOR ELECTRICAL YOUTH APPRENTICESHIP PROGRAM

Curriculum DRAFT For Students Entering In The 11th Grade

11th	12th
1 credit in class/lab	1 credit in class/lab
Coop in Summer (300 Hours) 1 + credits	OJT During Senior Year (Multiple Credits)

Semester One (1/2 credit--90 Hrs.)

Intended Outcomes:

01.
02.
03. CORE CURRICULUM
04.
05.
06. 72.5 Hrs.

07. Identify materials used in the electrical construction trade. 6.0 Hrs.
09. Demonstrate an understanding of the make up of the construction industry. 5.0 Hrs.
18. Demonstrates an understanding of entrepreneurship. 6.5 Hrs.

Sub Total 90.0 Hrs.

Second Semester (1/2 credit--90 Hrs.)

Intended Outcomes:

10. Perform Basic Electrical Laboratory Safety and calculation skills. 22.0 Hrs.
12. Demonstrates direct current (DC) circuit skills. 10.0 Hrs.
13. Demonstrates alternating current (AC) circuit skills. 12.0 Hrs.
14. Demonstrates Wiring Skills 31.0 Hrs.
15. Demonstrates appropriate Communication Skills. 5.0 Hrs.
16. Demonstrates appropriate understanding of Basic Science 5.0 Hrs.
17. Demonstrate Employability Skills 5.0 Hrs.

Sub Total 90.0 Hrs.

Summer Between 11th and 12th Grades
On-The-Job-Training
(270-300 Hours--1 + credits)

Third & Fourth Semesters (1 credit--180 Hrs.)

Intended Outcomes:

10. Performs basic electrical laboratory safety and calculation skills. 17.0 Hrs.
11. Demonstrates basic electrical circuit skills. 35.0 Hrs.
12. Demonstrates direct current (DC) circuit skills. 24.0 Hrs.
13. Demonstrates alternating current (AC) circuit skills. 24.0 Hrs.
14. Demonstrates Wiring Skills 50.0 Hrs.

Sub Total 150.0 Hrs.

08. Demonstrates an understanding of workplace readiness and workplace ethics. 30.0 Hrs.

Total 180.0 Hrs.

CURRICULUM FOR CARPENTRY YOUTH APPRENTICESHIP PROGRAM

Carpentry Skills

Program # 8722000

MAJOR CONTENT: The purpose of this program is to prepare students for employment as carpenters. The content will include the following: Basic trade skills used in fabricating and erecting residential and commercial structures. The content should also include training in safe, efficient work practices, communication, leadership, human relations and employability skills.

Intended Outcomes:

01. Demonstrate proper and safe procedures while working with technological tools, apparatus, equipment, systems, and materials.
02. Demonstrate appropriate math skills for the construction trades.
03. Select, inspect, operate, and maintain common hand tools used in the construction trades.
04. Select, inspect, operate, and maintain common power tools used in the construction trades.
05. Demonstrate the ability to read and interpret BLUEPRINTS and construction trade documents.
06. Identify basic procedure for rigging and moving material and equipment.
07. Identify characteristics of construction lumber.
08. Demonstrate an understanding of workplace readiness and workplace ethics.
09. Demonstrate an understanding of the make-up of the construction industry.
10. Demonstrate proper handling and storage of materials.
11. Perform site preparation and layout activities.
12. Set up and use a transit and builder's level.
13. Demonstrate appropriate math skills of the carpentry trade.
14. Demonstrate appropriate communication skills.
15. Demonstrate appropriate understanding of basic science.
16. Demonstrate employability skills.
17. Demonstrate an understanding of entrepreneurship.
18. Utilize nails, fasteners, and adhesives common to carpentry.
19. Demonstrate an understanding of floor systems.
20. Demonstrate an understanding of wall systems.
21. Identify concrete and reinforcement materials.
22. Demonstrate a knowledge of concrete handling and placement.
23. Demonstrate a knowledge of forming foundations and flatwork.
24. Demonstrate appropriate carpentry skills.

CURRICULUM FOR CARPENTRY YOUTH APPRENTICESHIP PROGRAM

Curriculum DRAFT For Students Entering In The 11th Grade

11th	12th
1 credit in class/lab	1 credit in class/lab
Co-op in Summer (300 hours) 1 + credits	OJT During Senior Year (Multiple credits)

Semester One (1/2 credit--90 Hrs.)

Intended Outcomes:

01.
02.
03. CORE CURRICULUM
04.
05.
06. 72.5 Hrs.

07. Identify characteristics of construction lumber 5.0 Hrs.

08. Demonstrate an understanding of the make-up of the construction industry. 7.5 Hrs.

13. Demonstrate appropriate math skills of the carpentry trade 5.0 Hrs.

Sub Total 90.0 Hrs.

Second Semester (1/2 credit--90 Hrs.)
Intended Outcomes:

17. Demonstrate an understanding of entrepreneurship. 5.0 Hrs.

18. Utilize nails, fasteners, and adhesives common to carpentry. 5.0 Hrs.

10. Demonstrate proper handling and storage of materials 5.0 Hrs.

19. Demonstrate an understanding of floor systems. 20.0 Hrs.

20. Demonstrate an understanding of wall systems. 10.0 Hrs.

24. Demonstrate appropriate carpentry skills. 22.0 Hrs.

11. Perform site preparation and layout activities. 10.0 Hrs.

16. Demonstrate employability skills. 13.0 Hrs.

Sub Total 90.0 Hrs.

Summer Between 11th and 12th Grades
On-The-Job-Training
(270-300 Hours--1 + credits)

Third & Fourth Semesters (1 credit--180 Hrs.)

Intended Outcomes:

21. Identify concrete and reinforcement materials.
    5.0 Hrs.

22. Demonstrate a knowledge of concrete handling and placement.
    5.0 Hrs.

23. Demonstrate a knowledge of forming foundations and flatwork.
    5.0 Hrs.

24. Demonstrate appropriate carpentry skills to include:
    A. Rough Framing
    B. Finish Framing (Trim)
    C. Roof & Rafter Framing
    90.0 Hrs.

08. Demonstrate an understanding of workplace readiness and workplace ethics.
    30.0 Hrs.

14. Demonstrate appropriate Communication Skills.
    10.0 Hrs.

15. Demonstrate appropriate understanding of Basic Science
    15.0 Hrs.

13. Demonstrate appropriate math skills of the carpentry trade
    10.0 Hrs.

05. Demonstrate the ability to read and interpret BLUEPRINTS and construction trade documents.
    10.0 Hrs.

    Total 180.0 Hrs.

On-The-Job-Training During the Senior Year
(Multiple Credits)

CURRICULUM FOR PLUMBING YOUTH APPRENTICESHIP PROGRAM

Residential Plumbing

Program # 8721700

MAJOR CONTENT: The purpose of this program is to prepare students for employment as plumbers. The content will include the following: use of tools and equipment, blueprint reading, installation and repair of pipes, fittings and fixtures of heating, water and drainage systems according to specifications and plumbing codes. The course content should also include skills training in communication, leadership, human relations and employability skills; safe, efficient work practices will be stressed during all phases of instruction.

Intended Outcomes:

01. Demonstrate proper and safe procedures while working with technological tools, apparatus, equipment, systems, and materials.
02. Demonstrate appropriate math skills for the construction trades.
03. Select, inspect, operate, and maintain common hand tools used in the construction trades.
04. Select, inspect, operate, and maintain common power tools used in the construction trades.
05. Demonstrates the ability to read and interpret BLUEPRINTS and construction trade documents.
06. Identify basic procedures for rigging and moving material and equipment.
07. Demonstrate proficiency in performing basic plumbing skills.
08. Demonstrate appropriate math skills for plumbing.
09. Demonstrate an understanding of the make-up of the plumbing industry.
10. Demonstrate proficiency in laying out a job.
11. Demonstrate proficiency in joining pipe.
12. Demonstrate proficiency in installing first rough (underground).
13. Demonstrate proficiency in installing second rough.
14. Demonstrate proficiency in trimming out plumbing.
15. Demonstrate proficiency in repairing, servicing, and maintaining plumbing systems.
16. Demonstrate an understanding of workplace readiness and workplace ethics.
17. Demonstrate appropriate communication skills.
18. Demonstrate appropriate understanding of basic science.
19. Demonstrate employability skills.
20. Demonstrate an understanding of entrepreneurship.

CURRICULUM FOR PLUMBING YOUTH APPRENTICESHIP PROGRAM

Curriculum DRAFT For Students Entering In The 11th Grade

11th	12th
1 credit in class/lab	1 credit in class/lab
Co-op in Summer (300 hours) 1 + credits	OJT During Senior Year (Multiple credits)

Semester One (1/2 credit--90 Hrs.)

Intended Outcomes:

01.
02.
03. CORE CURRICULUM
04.
05.
06. 72.5 Hrs.

07. Demonstrate proficiency in performing basic plumbing skills 7.0 Hrs.

08. Demonstrate appropriate math skills. 5.0 Hrs.

09. Demonstrate an understanding of the make-up of the plumbing industry. 5.5 Hrs.

Sub Total 90.0 Hrs

Second Semester (1/2 credit--90 Hrs.)
Intended Outcomes:

05. Demonstrate proficiency in reading and interpreting blueprints 10.0 Hrs.

10. Demonstrate proficiency in laying out a job. 15.0 Hrs.

11. Demonstrate proficiency in joining pipe. 65.0 Hrs.

Sub Total 90.0 Hrs.

Summer Between 11th and 12th Grades
On-The-Job-Training
(270-300 Hours--1 + credits)

First Semesters (1/2 credit--90 Hrs.)

Intended Outcomes:

11. Demonstrate proficiency in joining pipe.
35.5 Hrs.

12. Demonstrate proficiency in installing first rough (underground)
7.5 Hrs.

13. Demonstrate proficiency in installing second rough.
5.0 Hrs.

14. Demonstrate proficiency in trimming out plumbing.
7.0 Hrs.

15. Demonstrate proficiency in repairing, servicing, and maintaining plumbing systems.
5.0 Hrs.

16. Demonstrate an understanding of workplace readiness and workplace ethics.
30.0 Hrs.

Sub Total 90.0 Hrs.

Second Semester (1/2 credit--90 Hrs.)

Intended Outcomes:

17. Demonstrate appropriate communication skills.
30.0 Hrs.

18. Demonstrate appropriate understanding of basic science.
30.0 Hrs.

19. Demonstrates employability skills.
15.0 Hrs.

20. Demonstrates an understanding of entrepreneurship.
15.0 Hrs.

Total 90.0 Hrs.

On-The-Job-Training During the Senior Year
(Multiple Credits)

CURRICULUM FOR
FIRE SPRINKLER YOUTH
APPRENTICESHIP PROGRAM

Basic Fire Sprinkler Installation — Program # 8721900

MAJOR CONTENT: The purpose of this program is to prepare students for employment as fire sprinkler systems installers. The content will include the following: basic trade skills used in the fire sprinkler systems installed in residential and commercial structures. The content should also include training in safe, efficient work practices, communication, leadership, human relations and employability skills.

Intended Outcomes:

01. Demonstrates proper and safe procedures while working with technological tools, apparatus, equipment, sys tems, and materials.
02. Demonstrate appropriate math skills for the construction trades.
03. Select, inspect, operate, and maintain common hand tools used in the construction trades.
04. Select, inspect, operate, and maintain common power tools used in the construction trades.
05. Demonstrates the ability to read and interpret BLUEPRINTS and construction trade documents.
06. Identify basic procedures for rigging and moving material and equipment.
07. Demonstrates an understanding of workplace readiness and workplace ethics.
08. Perform basic piping skills.
09. Perform pipe joining.
10. Layout a job and install underground.
11. Install a first floor and above.
12. Trim out fire protection system.
13. Repair, service and maintain fire protection system.
14. Demonstrate general knowledge of fire protection.
15. Apply water supply requirements for sprinkler system.
16. Demonstrate installation of wet system.
17. Demonstrate installation of a dry system.
18. Demonstrate appropriate communication skills.
19. Demonstrate appropriate understanding of basic science.
20. Demonstrate employability skills.
21. Demonstrate entrepreneurship skills.

CURRICULUM FOR FIRE SPRINKLER YOUTH APPRENTICESHIP PROGRAM

Curriculum DRAFT For Students Entering In The 11th Grade

11th	12th
1 credit in class/lab	1 credit in class/lab
Co-op in Summer (300 hours) 1 + credits	OJT During Senior Year (Multiple credits)

Semester One (1/2 credit--90 Hrs.)

Intended Outcomes:

01.
02.
03. CORE CURRICULUM
04.
05.
06. 72.5 Hrs.

14. Demonstrate general knowledge of fire protection. 11.0 Hrs.

21. Demonstrate entrepreneurship skills. 6.5 Hrs.

Sub Total 90.0 Hrs.

Second Semester (1/2 credit--90 Hrs.)
Intended Outcomes:

08. Perform basic piping skills. 30.0 Hrs.

09. Perform pipe joining. 25.0 Hrs.

10. Layout a job and install underground. 20.0 Hrs.

18. Demonstrate appropriate Communication Skills 5.0 Hrs.

19. Demonstrate appropriate understanding of Basic Science 5.0 Hrs.

20. Demonstrate employability skills. 5.0 Hrs.

Sub Total 90.0 Hrs.

Summer Between 11th and 12th Grades
On-The-Job-Training
(270-300 Hours--1 + credits)

Third and Fourth Semesters (1 credit--180 Hrs.)

Intended Outcomes:

11. Install first floor and above. 30.0 Hrs.

12. Trim out fire protection system 25.0 Hrs.

13. Repair, service and maintain fire protection system. 30.0 Hrs.

15. Apply water supply requirements for sprinkler system. 25.0 Hrs.

16. Demonstrate installation of a wet system. 20.0 Hrs.

17. Demonstrate installation of a dry system. 20.0 Hrs.

07. Demonstrates an understanding of workplace readiness and workplace ethics. 30.0 Hrs.

Total 180.0 Hrs.

On-The-Job-Training During the Senior Year
(Multiple Credits)

CURRICULUM FOR SHEET METAL YOUTH APPRENTICESHIP PROGRAM

Basic Sheet Metal

Program # 8754100

MAJOR CONTENT: The purpose of this program is to prepare students for employment as sheet metal workers. The content will include the following: Basic trade skills used in fabricating and erecting residential and commercial HVAC systems. The content should also include training in safe, efficient work practices, communication, leadership, human relations and employability skills.

Intended Outcomes:

01. Demonstrate proper and safe procedures while working with technological tools, apparatus, equipment, systems, and materials.
02. Demonstrate appropriate math skills for the construction trades.
03. Select, inspect, operate, and maintain common hand tools used in the construction trades.
04. Select, inspect, operate, and maintain common power tools used in the construction trades.
05. Demonstrate the ability to read and interpret BLUEPRINTS and construction trade documents.
06. Identify basic procedures for rigging and moving material and equipment.
07. Identify characteristics of steel and other metals common to the sheet metal trade.
08. Demonstrate appropriate math skills common to the sheet metal trade.
09. Demonstrate an understanding of workplace readiness and workplace ethics.
10. Demonstrate an understanding of the make-up of the construction industry.
11. Demonstrate proper handling and storage of materials.
12. Demonstrate knowledge of sheet metal layout techniques.
13. Fabricate and install mechanical systems.
14. Fabricate and install architectural/roofing sheet metal.
15. Fabricate specialty sheet metal.
16. Fabricate food and beverage dispensing equipment.
17. Demonstrate sheet metal welding skills.
18. Locate and interpret standards related to construction and installing low pressure duct.
19. Demonstrate appropriate communication skills.
20. Demonstrate appropriate understanding of basic science.
21. Demonstrate employability skills.
22. Demonstrate an understanding of entrepreneurship.
23. Demonstrate appropriate sheet metal skills.

CURRICULUM FOR SHEET METAL YOUTH APPRENTICESHIP PROGRAM

Curriculum DRAFT For Students Entering In The 11th Grade

11th
1 credit in class/lab

Co-op in Summer
(300 hours) 1 + credits

12th
1 credit in class/lab

OJT During Senior Year
(Multiple credits)

Semester One (1/2 credit--90 Hrs.)

Intended Outcomes:

01.
02.
03. CORE CURRICULUM
04.
05.
06. 72.5 Hrs.

07. Identify characteristics of steel and other metals common to the sheet metal trade. 2.5 Hrs.

08. Demonstrate appropriate math skills common to the sheet metal trade. 12.5 Hrs.

10. Demonstrate an understanding of make-up of the construction industry. 2.5 Hrs.

Sub Total 90.0 Hrs.

Second Semester (1/2 credit--90 Hrs.)

Intended Outcomes:

22. Demonstrate an understanding of entrepreneurship. 5.0 Hrs.

11. Demonstrate proper handling and storage of materials. 5.0 Hrs.

12. Demonstrate knowledge of sheet metal layout. 20.0 Hrs.

13. Fabricate and install mechanical systems. 15.0 Hrs.

14. Fabricate and install architectural/roofing sheet metal. 10.0 Hrs.

15. Fabricate specialty sheet metal.

5.0 Hrs.

16. Fabricate food and beverage dispensing equipment.

5.0 Hrs.

17. Demonstrate sheet metal welding skills.

15.0 Hrs.

21. Demonstrate employability skills.

10.0 Hrs.

Sub Total 90.0 Hrs.

Summer Between 11th and 12th Grades
On-The-Job-Training
(270-300 Hours--1 + credits)

Third and Fourth Semesters (1 credit--180 Hrs.)

Intended Outcomes:

09. Demonstrate an understanding of workplace readiness and workplace ethics.

30.0 Hrs.

18. Locate and interpret standards related to constructing and installing low pressure duct.

10.0 Hrs.

19. Demonstrate appropriate communication skills.

30.0 Hrs.

20. Demonstrate appropriate understanding of basic science.

30.0 Hrs.

23. Demonstrate appropriate sheet metal skills.

80.0 Hrs.

Total 180.0 Hrs.

On-The-Job-Training During the Senior Year
(Multiple Credits)

YOUTH APPRENTICESHIP PROGRAM
Class Scheduling Model

11th Grade | **Option # 1**

Period	First Semester (18 Weeks)	Second Semester (18 Weeks)
1	• English III	• English III
2	• Algebra, Geometry	• Algebra, Geometry
3	• Physics, Principles of Technology or Chemistry	• Physics, Principles of Technology or Chemistry
4	• American History	• American History
5	• Elective	• Elective
6	• Core - (Wheels of Learning)	• Electricity I and Lab

SUMMER SCHOOL

On-The-Job Training

Minimum 300 hours

Additional hours optional

12th Grade

Period	First Semester (18 Weeks)	
	Group I	Group II
1	• English IV (2 periods)	On-The-Job Training (18 Weeks, 720 hours)
2	• American Government	
3	• Economics	
4	•	
5	• Electricity I and Lab	
6		

First Semester (18 Weeks)	
Group I	Group II
On-The-Job Training (18 Weeks, 720 hours)	• English IV (2 periods) • American Government • Economics •
	• Electricity I and Lab

Potential OJT Hours

1.	Summer	300 +
2.	12th Grade	720
		1020 Hrs.

CONSTRUCTION TRADES YOUTH APPRENTICESHIP SCHOOL-TO-WORK PARTNERSHIP AGREEMENT

This agreement is between the Seminole County Public Schools and the Academy of Construction Trades, Inc., located at 665 Harold Avenue, Suite F, Winter Park, FL 32789.

The Seminole County Public Schools and the Academy of Construction Trades, Inc. will work cooperatively or in cooperation to assess, select, and prepare high school students for a successful school-to-work transition. To accomplish this, the partners will cooperate in delivering classroom instruction, laboratory instruction using applied learning strategies at the local high schools and through work experiences at selected Central Florida work-sites. All course work, training assignments, job site assignments, and evaluations will be reviewed and approved by both parties.

Both parties will participate in periodic reviews of the program and its participants. The partnership is being formed to better prepare the student participants for the world of work, and to insure they have the requisite skills to contribute effectively in a construction trades environment. This shall be provided through the mutually agreed upon PROGRAM REQUIREMENTS FOR THE YOUTH APPRENTICESHIP PROGRAM IN THE CONSTRUCTION TRADES, this partnership will offer a balance of training activities developed and delivered by both partners. The Apprenticeship PROGRAM REQUIREMENTS referred to herein are hereby incorporated in and made a part of this agreement. (See Enclosure)

Each student in the Construction Trades Program will maintain a course of study at his/her participating high school. In addition to these studies, each student will receive On-The-Job-Training at selected construction work sites. While on-the-job, students will be paid apprentice scale wages by the employer. The employers will conduct and supervise "hands-on" work assignments and benefits for students. The basic core curriculum

provided by the school system will include basic safety, basic math, hand tools, power tools, reading blueprints, work place readiness, and work-place ethics. Tests and hands on projects will be assigned, monitored and evaluated by the curriculum instructor.

The Academy of Construction Trades, Inc. agrees to notify the Vocational Directors from Orange and Seminole County before contacting State Department of Education personnel regarding matters related to the apprenticeship program, and to notify the appropriate Vocational Director before contacting Orange and/or Seminole County School Boards or other personnel.

All requests for funds, local, state, and federal, will be coordinated and developed jointly with the Orange and/or Seminole County Vocational Directors.

Agreed upon this date: August 24, 1993

Approved: Seminole County Public Schools

By: _____
Chairman, Seminole County Public Schools

By: _____
Superintendent

By: _____
Director of Vocational and Technical Education

Approved: The Academy of Construction Trades, Inc.

By: _____
Chairman (ACT)

By: _____
First Vice Chairman (ACT)

By: _____
Second Vice Chairman (ACT)

APPRENTICESHIP AGREEMENT
Between Apprentice
and
YOUTH APPRENTICESHIP PROGRAM COMMITTEE

THIS AGREEMENT, entered into this _____ day of___ 19__ between the parties to the PROGRAM REQUIREMENTS FOR THE YOUTH APPRENTICESHIP PROGRAM IN THE CONSTRUCTION TRADES represented by the YOUTH APPRENTICESHIP PROGRAM COMMITTEE, herein referred to as the Academy of Construction Trades, Inc. (ACT), and _____ hereinafter referred to as the APPRENTICE, and (if minor) hereinafter referred to as his/her guardian.

WITNESSETH THAT:

The Youth Apprenticeship Program Committee agrees to be responsible for the selection, placement, and training of said apprentice in the CONSTRUCTION TRADES as work is available, and in consideration said apprentice agrees diligently and faithfully to perform the work of said specific construction trade in accordance with the PROGRAM REQUIREMENTS FOR THE YOUTH APPRENTICESHIP PROGRAM IN THE CONSTRUCTION TRADES. The Apprenticeship PROGRAM REQUIREMENTS referred to herein are hereby incorporated in and made a part of this agreement.

This agreement may be terminated by mutual consent of the signatory parties.

By: _____	By: _____
Signature of Apprentice	Representing Apprenticeship Program Committee
_____	_____
Address	Title
_____	_____
Parent or Guardian	Address

AGREEMENT

Between

THE ACADEMY OF CONSTRUCTION TRADES, INC.

and

_____ **("SPONSOR")**

AGREEMENT, made this _____ day of_____ 19___ , by and between THE ACADEMY OF CONSTRUCTION TRADES, INC. (ACT) and _____ _____ ("SPONSOR"), as follows:

WHEREAS, it is the intent of ACT and SPONSOR to enter into this Agreement to serve the mutual benefit of our nation's youth, the construction industry, and the affiliated educational institutions; and

WHEREAS, ACT was established to unify, with the common purpose of benefiting our nation's youth, the construction industry, educational institutions, parents, students, and local communities; and

WHEREAS, ACT's purpose is to promote and support viable high school based youth apprenticeship programs operating concurrently with academic studies: and

WHEREAS, the primary objectives of the program are (1) to provide noncollege bound students the opportunity to learn and develop work/trade skills during their high school careers, and (2) to facilitate, upon successful completion and graduation, the student's immediate transition into the work force with a pay scale at an apprentice level, and additional employer sponsored training at postsecondary vocational schools or community colleges.

NOW, THEREFORE, "SPONSOR" has agreed to sponsor 11th or 12th grade students per year during the period _____ through _____. "SPONSOR's" responsibilities include:

- Providing safety orientation programs and continuous on-site safety supervision for each student.
- Payment to ACT of an annual sponsorship fee of $300.00 per student.
- Providing paid co-op (OJT) apprenticeship opportunities for sponsored students during the student's 11th and 12th grades and during the summer months between those grades.
- Providing an on-site mentor for each sponsored student.
- Endeavoring not to hire any high school dropout, even if the dropout is a participant in the program, unless the dropout has been previously approved by the school system and has enrolled in an alternative degree completion program.
- Providing work-site access to school coordinators so they can assist all high school students.
- Providing ACT and each school board with a copy of "SPONSOR's" current workers' compensation certificate of insurance.
- Keeping accurate records of each student's OJT hours.
- Notifying the student's school within 24 hours if the student is absent.
- Supporting sponsorship and employment following student's high school graduation in the postsecondary apprenticeship programs until program completion.
- Providing an in-house coordinator who will be responsible for placing the student apprentice in a job compatible with his/her current training.
- Abiding by the by-laws of ACT.

In return for your sponsorship, your company will have an employee who:

- Has been taught and has demonstrated a positive work ethic.
- Agrees to remain in high school and to graduate.
- Agrees to maintain achievement standards.
- Enters your work force with a good basic knowledge of work site safety.
- Is aware of the skills and requirements of your particular trade.

Please execute this Agreement where provided below and return it to:

Academy of Construction Trades, Inc.
665 Harold Avenue
Suite F
Winter Park, Florida 32789

If you need additional information, please contact ACT at (407) 647-6766.

ACADEMY OF CONSTRUCTION TRADES, INC.

By: _____
Program Manager

"SPONSOR"

_____
Name of Company

_____
Address

_____

(___) _____
Telephone

By: _____

Title: _____

SEMINOLE COUNTY PUBLIC SCHOOLS

PARTICIPATING HIGH SCHOOL APPRENTICESHIP AGREEMENT Between Parent, Student, Contractor and High School

PROGRAM PURPOSE: To provide students with the academic and construction trade skills necessary to successfully complete an apprenticing trade of their choosing.

PARENT AGREEMENT

I, the parent or guardian, agree that this Apprenticeship Program in the Construction Trades is in the best interest of my son/daughter to pursue. Furthermore I have read the enclosed goals and agree with their intent.

Goals:

1. Meet state requirements for high school graduation.
2. Develop job entry skills.
3. Learn trade skills in a selected specific construction trade.
4. Successfully enter the construction trade in the area he/she has demonstrated interest and aptitude.

I acknowledge receipt of a copy of the PROGRAM REQUIREMENTS FOR THE YOUTH APPRENTICESHIP PROGRAM IN THE CONSTRUCTION TRADES, and have read the provisions therein. I further understand that all questions and contacts pertaining to the program between the school and myself or between the contractor/employer and myself are to be made through the occupational instructor and/or cooperative education coordinator. I further understand that my son/daughter must work 240 hours successfully for each out-of-class work experience credit. Finally, I understand that the PROGRAM REQUIREMENTS referred to herein are hereby incorporated in and made a part of this agreement.

Date: _____ _____ _____

Parent/Guardian Signature Phone No.

STUDENT AGREEMENT

I agree that the pursuit of the above Apprenticeship Program goals meets my interests now and for the foreseeable future. I agree to cooperate with my school's, occupational instructor, cooperative education coordinator, contractor/employer, and parents/guardian in fulfilling my responsibilities to meet these Apprenticeship Program goals and perform satisfactorily all tasks assigned. I understand and accept the conditions stated in my PARENT'S AGREEMENT above, and the PROGRAM REQUIREMENTS FOR THE YOUTH APPRENTICESHIP PROGRAM IN THE CONSTRUCTION TRADES given to me by the occupational instructor. I understand that my performance in the apprenticeship program classroom, laboratory, and on-the-job are all a part of the evaluation process for grading and continuance or termination from the program.

Date: _____ _____

Student Signature

CONTRACTOR'S AGREEMENT

Realizing that this student apprentice is depending on me to provide valuable apprentice job training for his/her immediate and long range goals in life, I agree to furnish adequate supervision and the necessary instruction to develop the skills as outlined in the TRAINING PLAN designed by this firm, the school coordinator, and the apprentice. I also agree to provide the school's coordinator a monthly report and verification of the hours worked and recorded by the student during the month. Also each apprentice will be assigned a mentor at the job site. I further agree to read and follow the intent of the PROGRAM REQUIREMENTS FOR THE YOUTH APPRENTICESHIP PROGRAM IN THE CONSTRUCTION TRADES as given to me by the school coordinator. This includes compliance with state and federal Child Labor Laws, requiring each contractor to furnish a copy of certificate of insurance stating they do have workmen's compensation on their employees, and other pertinent legislation in force or that may be enacted from time to time. I will also notify the school coordinator as soon as possible when a problem arises with an apprentice. The PROGRAM REQUIREMENTS referred to herein are hereby incorporated in and made a part of this agreement.

Date: _____ _____
Signature-Contractor Representative Title

Name of Business: _____

Name of Mentor/Supervisor: _____

Address of Business: _____

Business Telephone: _____

Student's Job Title: _____

Hours per Week: _____ Rate of pay $_____per_____

SCHOOL'S AGREEMENT

I, the Cooperative Education Coordinator, agree to work within the guidelines of the PROGRAM REQUIREMENTS FOR THE YOUTH APPRENTICESHIP PROGRAM IN THE CONSTRUCTION TRADES which includes evaluating the apprentice's program, keeping records of students progress and OJT hours worked, determining the grade to be assigned, award credits earned, enter such information on the apprentice's records as is necessary, visit apprentice and mentor/supervisor on a regular basis, and to develop an effective realistic formal TRAINING PLAN with the assistance of the contractor's supervisor in order to fit the needs of the apprentice. Finally, I understand that the PROGRAM REQUIREMENTS referred to herein are hereby incorporated in and made a part of this agreement.

Date: _____ _____
Coordinator's Signature

Approved: _____ _____
Principal's Signature

CONSTRUCTION TRADES
YOUTH APPRENTICESHIP PROGRAM
ON-THE-JOB TRAINING PLAN

This OJT TRAINING PLAN assures exposure and rotational experiences with all the competencies and work procedures identified as essential for the program.

STUDENT INFORMATION

1. School _____
2. Student Name _____
3. Social Security Number ___/ _____/ _____

APPRENTICESHIP INFORMATION

4. Specific Trade Area _____
5. Name of Contractor _____
6. Name of Mentor/Supervisor _____
7. Student's Job Title _____

AGREEMENT

We agree that the intended outcomes and student performance standards or job tasks identified herein are comprehensive of job skills related to the OJT experience, and that appropriate OJT instruction will be approved.

_____ _____
Employer Date

_____ _____
Employment Mentor Date

_____ _____
Teacher/Coordinator Date

_____ _____
Student Date

Attachment M

OJT TRAINING PLAN
OJT PERFORMANCE ASSESSMENT FORM

This assessment must be completed jointly by the OJT teacher/coordinator and employer.

Student Name: _____

Job Title: _____

Place of Employment: _____

Period of Employment: _____

SELECTED STUDENT PERFORMANCE STANDARDS FOR ASSESSMENT

The teacher and employer must identify selected student performance standards or job tasks from the Training Plan for this assessment.

Rating:			
	5	outstanding	(performs job task with no supervision)
	4	good	(performs job task with minimal supervision)
	3	average	(performs job task with moderate supervision)
	2	fair	(performs job task only with supervision)
	1	poor	(fails to perform job task under any condition)

Student Performance Standard Job Task						Rating
1. _____	5	4	3	2	1	
2. _____	5	4	3	2	1	
3. _____	5	4	3	2	1	
4. _____	5	4	3	2	1	
5. _____	5	4	3	2	1	
6. _____	5	4	3	2	1	
7. _____	5	4	3	2	1	
8. _____	5	4	3	2	1	
9. _____	5	4	3	2	1	
10. _____	5	4	3	2	1	

Attach additional sheet if needed

Specific attention should be given to # _____

Corrective Action taken _____

The student has demonstrated satisfactory performance on the skills listed above.

____ Yes ____ No

These results have been discussed with the student __ Yes _____ No

_____ _____
Teacher/Coordinator Date

_____ _____
Trainer/Mentor Date

Attachment M

OJT TRAINING PLAN
STUDENT PERFORMANCE STANDARDS/JOB TASKS

Student Name: _____

Job Title: _____

Place of Employment: _____

Period of Employment: _____

Place a (√) beside each SPS when competency is attained.

(√)	STUDENT PERFORMANCE STANDARDS
	1.
	2.
	3.
	4.
	5.
	6.
	7.
	8.
	9.
	10.
	11.
	12.
	13.
	14.
	15.
	16.
	17.
	18.
	19.
	20.

Attach Additional Sheets as Need

Attachment N

ACADEMY OF CONSTRUCTION TRADES (ACT)
APPRENTICESHIP APPLICATION

Name: _____ _____ _____
Last First Age

Student I.D. #: _____ Birth Date: _____

Home Address: _____ Home Phone: _____

High School: _____

List the Vocational Classes you have completed (9-12)

Course	Grade Level	Teacher
_____	_____	_____
_____	_____	_____
_____	_____	_____

List the Math Classes you have taken.

_____ _____
_____ _____
_____ _____

Employment Experience

Employer: _____ Dates: _____

Type of Work:

Employer: Dates:

Type of Work:

List the Apprenticeship(s) you would consider.

1. _____ 2. _____

Do you have your own transportation? _____ Yes _____ No

Why do you wish to participate in the Academy of Construction Trades Apprenticeship Program?

What are your educational and/or career goals after high school?

Enclosed is the PROPOSED Child Labor Administrative Rule. The new State of Florida Child Labor Administrative Rule should be official by November 1, 1993.

ATTACHMENT O

DEPARTMENT OF LABOR AND EMPLOYMENT SECURITY

Division of Labor, Employment and Training

RULE CHAPTER TITLE:	RULE CHAPTER NO.:
Child Labor Rule	38H-14
RULE TITLES:	**RULE NOS.:**
Compliance with Other Laws	38H-14.001
Definitions	38H-14.002
Proof of Age and Removal of Nonage Disability	38H-14.003
Safe Work Place and Safety Equipment	38H-14.004
Additional Hazardous Occupations Prohibited	38H-14.005
Employment of Minors in the Entertainment Industry	38H-14.006
Partial Waivers	38H-14.007
Response to Request for Inspection of Records	38H-14.008
Employment in Violation of Law or Rules	38H-14.009
Administrative Hearings	38H-14.010
Vocational Education	38H-14.011
Forms, Poster, Federal Regulations, and Bulletins	38H-14.012

NOTICE OF WITHDRAWAL

Notice is hereby given that the above proposed Notice of Rulemaking and Notices of Changes to Proposed Rules which were previously published in Volume 18, No. 38, September 18, 1992; Volume 18, No. ; Volume 18, No. of the Florida Administrative

Weekly have been withdrawn.

DEPARTMENT OF LABOR AND EMPLOYMENT SECURITY

Division of Labor, Employment and Training

RULE CHAPTER TITLE:	RULE CHAPTER NO.:
Child Labor Rule	38H-14
RULE TITLES:	RULE NOS.:
Reserved	38H-14.001
Definitions	38H-14.002
Proof of Age and Removal of Nonage Disability	38H-14.003
Safe Work Place and Safety Equipment	38H-14.004
Additional Hazardous Occupations Prohibited	38H-14.005
Employment of Minors in the Entertainment Industry	38H-14.006
Partial Waivers	38H-14.007
Response to Request for Inspection of Records	38H-14.008
Employment in Violation of Law or Rules	38H-14.009
Administrative Hearings	38H-14.010
Vocational Education	38H-14.011
Forms, Poster, Federal Regulations, and Bulletins	38H-14.012

PURPOSE AND EFFECT OF THE RULE: Chapter 38H-14, Florida Administrative Code is intended to establish the standards, restrictions, and limitations deemed necessary by the Division of Labor, Employment and Training to ensure that employment of minors is not hazardous or detrimental to their health, morals, education,

or welfare, as required by "Child Labor Law," Chapter 450, Part I, Florida Statutes (Supp. 1992).

SUMMARY OF RULE: Chapter 38H-14, Florida Administrative Code will set forth the standards, limitations, and restrictions associated with the employment of minors, including, definitions, proof of age and removal of disability of nonage, safe work place and safety equipment, hazardous occupations, employment in the entertainment industry, Partial Waivers, inspection of records, employment in violation of law or rules, administrative hearings, vocational education, forms, poster, federal regulations, and bulletins.

RULEMAKING AUTHORITY: 120.53, 450.061, 450.095, 450.121, 450.132, 450.141 F.S.

LAW IMPLEMENTED: Chapter 450, Part I, F.S.

SUMMARY OF THE ESTIMATE OF THE ECONOMIC IMPACT OF THE RULE: The anticipated costs of the proposed rule include the costs associated with noticing and publishing the proposed rulemaking and repeal of the existing child labor rule. Additional costs associated with implementing this rule will be greater than with the previous rule because the statute mandates increased regulation of minors' employment than previously existed. The rule will affect both minor employees, and employers of minors because it prohibits employment of minors in certain hazardous occupations which were not previously prohibited under state law, and because the rule requires employers of minors in the entertainment industry to take specified measures intended to ensure that their minor employees are not employed under conditions that are injurious or detrimental to their health, safety or education.

PUBLIC HEARINGS REGARDING THE PROPOSED RULE WILL BE HELD AT THE FOLLOWING TIMES, DATES, AND PLACES:

TIME AND DATE: Wednesday, May 26, 1993, at 9:00 a.m. - 12:00 p.m.;

PLACE: Metro Dade Center, Room 18-3, 111 N.W. 1st Street, Miami, Florida; and

TIME AND DATE: Thursday, May 27, 1993 at 9:00 a.m. - 12:00 p.m.;

PLACE: Council Chambers, Orlando City Hall, 400 South Orange Avenue, Orlando, Florida.

THE PERSON TO BE CONTACTED REGARDING THE PROPOSED RULE, THE SUMMARY OF THE COMMENTS RECEIVED PURSUANT TO THE NOTICE OF RULEMAKING, AND PUBLIC HEARING, AND THE ECONOMIC IMPACT STATEMENT IS: Francisco R. Rivera, 2012 Capital Circle S.E., Suite 307, Tallahassee, FL 32399-2189, (904) 488-9370.

THE FULL TEXT OF THE PROPOSED RULE IS:

[[38H-14.001 Reserved.

38H-14.002 Definitions. Unless otherwise specified, the terms and definitions contained in section 450.012, Florida Statutes (1991, Supp. 1992), are incorporated by reference. As used in rule chapter 38H-14, F.A.C., and the Child Labor Law, Chapter 450, Part I, F.S., the following words, phrases or terms shall mean:

(1) "Age" -- When a particular age is cited, it shall mean any person who has not yet reached his or her next birthday. For example, "10 years of age or younger" refers to persons who have not yet reached their eleventh (11th) birthday; and "minors 16 and 17 years of age" refer to persons who have reached their sixteenth (16th) birthday, but have not reached their eighteenth (18th) birthday.

(2) Reserved.

(3) "Child Labor Law" shall mean Chapter 450, Part I, F.S.

(4) "Close Supervision" shall mean supervision by an adult who remains within sight of the minor.

(5) "Corrosives" shall mean all substances, liquid or solid, that cause destruction of human skin tissue or have a severe corrosion rate on steel or aluminum.

(6) "Domestic work" shall mean household chores such as baby sitting, sweeping, mopping, cleaning, and/or emptying trash, which are performed in a private residence or nursing home.

(7) "Electric utility" shall have the same meaning as the term is defined at subsection 366.02(2), Florida Statutes.

(8) "Employ" shall mean put to use or service, engage the

services of, or cause, permit, or suffer anyone to work.

(9) "Employer" shall mean any person, business, company, corporation, officer or director of a corporation, or general or limited partner of a business which employs a minor, or has control over the hours and/or working conditions of the minor.

(10) "Guardian" shall mean a person appointed by a court of this state, or any other state, or country, to act on behalf of a minor's person.

(11) "Hazardous occupations" shall mean those occupations designated as hazardous occupations in section 450.061, F.S. (1991), and in rule 38H-14.005(2).

(12) "Pesticide" shall mean those chemicals defined in subsection 487.153(21), F.S. (1991).

(13) "School day" shall mean any day or days designated for school attendance for a particular minor by the school in which the minor is enrolled. When a student is participating in a vocational or home-schooling program approved by the minor's assigned school or school district, that student's school days shall be set by the student's vocational instructor or home-teacher.

(14) "School hours" shall mean those hours designated for school attendance for a particular minor by the school in which the minor is enrolled. When a student is participating in a vocation or home-schooling program approved by the minor's assigned school or school district, that student's school hours shall be set by the student's vocational instructor or home-teacher.

(15) "Six consecutive days" shall mean six consecutive 24-

hour periods during which work is performed without a 24-hour period of non-work.

(16) Reserved.

(17) "Touring company" shall mean any for-profit employer in the entertainment industry which presents entertainment productions to the public on a touring basis and which, as part of such tour, presents any such production(s) in Florida as part of a multi-state tour. The term is not intended to cover performances by minors employed by theme parks which may have many locations, nor is it intended to cover production or promotional activities which may require travel.

(18) "Toxic substance" shall mean those substances defined in subsection 442.102(21), F.S. (1991).

(19) Reserved

(20) "Vocational Education" shall mean those vocational education programs defined in subsection 228.041(22), F.S. (1991), and all Department of Education approved job training programs, and job preparatory programs administered by the Department of Labor and Employment Security, or by other departments of the state, and federal programs, including the following programs now existing or similar programs developed hereafter: Work Experience and Career Exploration, Diversified Cooperative Training, Marketing Education, Adult Migrant Education, Job Training Partnership Act, Vocational Rehabilitation, Apprenticeship, and Job Corps.

(21) "Work" shall mean any activity performed by a minor at the direction of, or scheduled by, his or her employer, and shall

include time spent by the minor in training, rehearsal, wardrobe, make-up, hair-dressing, fittings, interviews, promotional publicity, personal appearances, and audio recording when such activities are scheduled by, or performed at the direction of, the minor's employer. The term shall not include time spent in traveling unless otherwise required by contract, federal law, the Child Labor Law, or this Rule, nor does the term include time spent in school, studying, or receiving instruction, even where such school, studying, or instruction is required by contract, the Child Labor Law, or rule chapter 38H-14.

Specific Authority 450.061, FS, Law Implemented 450.001, 450.021, 450.061, 450.081, 450.161 FS, History -- New _____.

38H-14.003 Proof of Age and Removal of Disability of Nonage.

(1) Proof Of Age. In addition to the acceptable forms of proof enumerated in subsection 450.045(1), F.S., age may also be established by a photocopy of the child's identification card issued by the Florida Department of Highway Safety and Motor Vehicles.

(2) Proof Of Removal of Nonage Disability. Prior to employing a person who claims his or her disability of nonage has been removed by the occurrence of one of the events enumerated in subsections 450.012(3)(a)-(e) F.S., employers shall require the employee produce a certified copy of the document or record which establishes the claimed exemption. Employers shall obtain and maintain a photocopy of such document on file during the entire period of employment. Employers are reminded that subsection

450.021(4), F.S., section 450.061, F.S., and rule 38H-14.005, are applicable whether or not the employee's disabilities of nonage have been removed by marriage or otherwise.

Specific Authority 450.121 FS. Law Implemented 450.012, 450.021, 450.045, 450.061, 450.081, FS. History -- New _____.

38H-14.004 Safe Work Place, and Safety Equipment.

(1) Safe Work Place. Employers of minors shall not require minors to work in any situation that places the minor in clear and present danger to life or limb.

(2) Safety Equipment. The employer shall provide any safety equipment recognized in the industry as necessary for protection from injury, and shall ensure usage of such equipment by their minor employees.

Specific Authority 450.121 FS. Law Implemented 450.061, 450.132 FS. History -- New _____.

38H-14.005 Additional Hazardous Occupations Prohibited.

(1) General. Rule 38H-14.005 lists the occupations and places of employment which the Division has determined and declared are hazardous or injurious to the life, health, safety, or welfare of minors. Pursuant to section 450.061, F.S., employers shall not require, permit, or suffer minors to work in these occupations, unless the minors' activities are limited to office, sales or stockroom work, and the employment will not place the minor in clear and present danger to life or limb.

(2) Occupations Prohibited by the United States Department of Labor. Employers of Minors shall not require, permit, or suffer

minors to work in the following occupations and places of employment which are declared hazardous by the United States Department of Labor. The occupations and places of employment listed in rule 38H-14.005, subparagraphs (2)(a), and (2)(b), are defined and described in 29 Code of Federal Regulations [C.F.R.] Part 570, Subparts C, E, and E-1 (1993), and such definitions and descriptions are adopted and incorporated by reference into this rule. Employers should obtain copies of the federal regulations which contain these definitions as provided in rule 38H-14.012(3)

(a) Occupations Prohibited for All Minors. In addition to the hazardous occupations prohibited in subsection 450.061(2), F.S., employers shall not cause any minor to work in the following occupations or places of employment as are defined and described in 29 C.F.R. Part 570, Subpart E:

1. Occupations in or about plants or establishments manufacturing or storing explosives or articles containing explosives or articles containing explosive components (29 C.F.R. § 570.51);

2. Motor-vehicle driver and outside helper (29 C.F.R. § 570.52);

3. Occupations in connection with mining (29 C.F.R. § 570.53, and 570.60);

4. Logging occupations and occupations in the operation of any sawmill, lath mill, shingle mill, or cooperage stock mill (29 C.F.R. § 570.54);

5. Occupations involved in the operation of power-driven

woodworking machines (29 C.F.R. § 570.55);

6. Occupations involving exposure to radioactive substances and to ionizing radiations (29 C.F.R. § 570.57);

7. Occupations involved in the operation of power-driven hoisting apparatus (29 C.F.R. § 570.58);

8. Occupations involved in the operations of power-driven metal forming, punching, and shearing machines (29 C.F.R. § 570.59);

9. Occupations involving slaughtering, meat packing or processing, or rendering (29 C.F.R. § 570.61);

10. Occupations involved in the operation of bakery machines (29 C.F.R. § 570.62);

11. Occupations involved in the operation of paper-products machines (29 C.F.R. § 570.63);

12. Occupations involved in the manufacture of brick, tile, and kindred products (29 C.F.R. § 570.64);

13. Occupations involved in the operations of circular saws, band saws, and guillotine shears (29 C.F.R. § 570.65);

14. Occupations involved in wrecking, demolitions, and shipbreaking operations (29 C.F.R. § 570.66);

15. Occupations in roofing operations (29 C.F.R. § 570.67); and

16. Occupations in excavation operations (29 C.F.R. § 570.68).

(b) Occupations Prohibited for Minors Under the Age of Sixteen. In addition to the hazardous occupations prohibited in

subsections 450.061(1), and (2), F.S., and in rule 38H-14.005, paragraph (2)(a) of this Rule, employers shall not cause any minor under the age of sixteen to work in the following occupations or places of employment as are defined and described in 29 C.F.R. Part 570, Subpart C.

1. Manufacturing, mining, or processing occupations, including occupations requiring the performance of any duties in work rooms or work places where goods are manufactured, mined or otherwise processed (29 C.F.R. § 570.33);

2. Operating or tending hoisting apparatus or using any power-driven machinery other than office machines (29 C.F.R. § 570.33);

3. Operating a motor vehicle or serving as a helper on motor vehicles (29 C.F.R. § 570.33);

4. Public messenger service (29 C.F.R. § 570.33);

5. Occupations in connection with:

a. Transportation of persons or property by rail, highway, air, water, pipeline, or other means;

b. Warehousing and storage;

c. Communications and electric utilities; and

d. Construction (including demolition and repair) (29 C.F.R. § 570.33);

6. Work performed in or about boiler or engine rooms (29 C.F.R. § 570.34);

7. Work in maintaining or repairing machines or equipment (29 C.F.R. § 570.34);

8. Outside window washing that involves working from window sills, and all work requiring the use of ladders, scaffolds, or their substitutes (29 C.F.R. § 570.34);

9. Cooking (except at soda fountains, lunch counters, snack bars, or cafeteria serving counters and baking (29 C.F.R. § 570.34);

10. Operating, setting up, adjusting, cleaning, oiling, or repairing power-driven food slicers and grinders, food choppers, and cutters, and bakery-type mixers (29 C.F.R. § 570.34);

11. Work in freezers and meat coolers and all work in the preparation of meats for sale except for wrapping, sealing, labeling, weighing, pricing and stocking in areas physically separate from freezers and coolers (29 C.F.R. § 570.34);

12. Loading and unloading goods to and from trucks, railroad cars, or conveyors (29 C.F.R. § 570.34);

13. All occupations in warehouses except office and clerical work (29 C.F.R. § 570.34).

14. Occupations involved in agriculture as defined at 29 C.F.R. 570.71.

(3) Compressed Gasses. Employers shall not allow any minor to dispense, or to transport, service, modify or alter tanks, cylinders or other equipment used for storing, any inert or compound gas, including air, which has been compressed to a pressure that exceeds 40 pounds per square inch (psi), except that minors who are sixteen (16) years or older may fill balloons, and bicycle or car tires (but not truck or heavy equipment) if given

proper instruction and the tank or cylinder containing the compressed gas is fixed and secure.

(4) Door-to-door Sales. As provided in subsection 450.061(1)(n) F.S., door-to-door sales on behalf of nonprofit organizations are allowable for minors who are under the age of sixteen years, but the organizations shall ensure that such sales are undertaken under close supervision as defined in subsection 38H-14.002(4) of this Rule.

Specific Authority 450.121 FS. Law Implemented 450.061 FS. History -- New _____.

38H-14.006 Employment of Minors by the Entertainment Industry.

(1) General. Section 38H-14.006 sets forth the work conditions determined necessary by the Division to protect minor employees in the entertainment industry. The requirements in this section are intended to ensure that minors are not employed under conditions that are injurious or detrimental to their health, safety or education.

(2) Permit to Hire and Reporting Requirements for Employers.

(a) Permit to Hire. Employers of minors in the entertainment industry shall obtain a Permit to Hire prior to employing any minor in Florida, or within 60 days of this Rule's adoption for productions already in progress. Application for a Permit to Hire shall be made by submitting to the Division a completed Form CLL-102A, available as provided in subsection 38H-14.012(1) of this Rule. Failure to complete any item in the application form, after

being requested to do so, or if the completed application form evinces work conditions that are hazardous or detrimental to the health, morals, or education, shall be grounds to deny the application. Permits shall be limited in duration to the employer's schedule of production, or tour within the state of Florida, not to exceed one (1) year.

(b) Reporting Requirements. Employers of minors in the entertainment industry shall provide the Division with information relative to each "shoot" or separate program of a series as required in subsection 450.132(5) F.S. After each production, or upon completion of employment in Florida, the employer shall submit to the Division a completed Final Report, Form CLL-107, available as provided in subsection 38H-14.012(1) of this Rule. Failure to submit such Final Report shall be grounds to deny any future application for Permit to Hire.

(3) Parental Notice and Authorization for Medical Care.

(a) Parental Notice of Terms and Conditions of Employment. Employers of minors in the entertainment industry shall notify the minor's parent(s) or guardian of the terms and conditions of employment, including the activities required of the minor, the place and duration of location work, and the names of the producer and stunt coordinator (if applicable).

(b) Authorization for Medical Care. Prior to the minor's beginning employment, the employer shall obtain written authorization from the minor's parent or guardian to consent for medical treatment on behalf of the minor in case of an emergency.

(4) Child Labor Coordinator. The employer shall designate one (1) individual on each set where minors are employed, or in each touring company which includes minor employees, to act as Coordinator of Child Labor. The Coordinator shall respond to all communications from the Division regarding the employment of minor(s). The employer shall provide the name of the coordinator(s) to the Division, the minor, and the minor's parent(s), guardian, or chaperon.

(5) Time Limitations.

(a) Work Day. The work day for a minor shall begin no earlier than 7:00 a.m. and shall end no later than 11:00 p.m.

(b) Work Week. A minor shall not be required or permitted to work more than six (6) consecutive days.

(c) Work Hours, and Maximum Hours at Place of Employment per Age Group. Working hours, and hours spent at the place of employment may not exceed the following time limitations in a twenty-four (24) hour period unless a Partial Waiver is granted by the Division.

1. Minors Under Two (2) Years. Employers of minors under two (2) years of age shall not require such minors to remain at the place of employment for more than four (4) hours per day, subject to the following limitations:

a. Minors Under Six (6) Months. Minors under six (6) months of age shall not be exposed to light of an intensity greater than one hundred (100) foot candlelight for more than one (1) minute in every fifteen (15) minute period, and shall not be required to work

more than twenty (20) minutes per day.

b. Minors Six (6) Months to Under One (1) Year. Minors six (6) months of age to under one (1) year of age shall not be exposed to camera lights for more than two (2) minutes in every fifteen (15) minute period, and shall not be required to work more than two (2) hours per day.

c. Minors One (1) to Under Two (2) Years. Minors one (1) year of age to under two (2) years of age shall not be required to work more than three (3) hours per day.

2. Minors Two (2) Years to Under Six (6) Years. Minors two (2) years of age to under six (6) years of age shall not be required to remain at the place of employment more than six (6) hours per day, and shall not be required to work more than four (4) hours per day.

3. Minors Six (6) Years to Under Nine (9) Years. Minors six (6) years of age to under nine (9) years of age shall not be required to remain at the place of employment more than nine (9) hours per day, and shall not be required to work more than six (6) hours per day.

4. Minors Nine (9) to Under Sixteen (16) Years. Minors nine (9) years of age to under sixteen (16) years of age shall not be required to remain at the place of employment more than ten (10) hours per day, and shall not be required to work more than seven (7) hours per day.

5. Minors Over Sixteen (16) Years. Minors who have reached their sixteenth (16th) birthday shall not be required to remain at

the place of employment more than ten (10) hours per day.

(d) Meal Periods. All work hours are exclusive of the meal period. The work hours may be extended by a meal period not longer than one-half (1/2) hour.

(e) Travel Time.

1. Daily. Time spent in traveling from a studio to a location, or from a location to a studio, shall count as part of the work day of a minor. For employers who are touring companies, time spent in traveling from a minor's touring residence, i.e. train, bus, or other living quarters, to the location of performance or rehearsal, and the return trip back to the minor's living quarters, shall count as part of the working day of a minor

2. Long Distance. Time spent in traveling from a minor's home to a location, when the location is sufficiently far from the minor's home to require an overnight stay, shall be considered work hours for the minor. However, if such long distance travel causes the minor's work hours to exceed the allowable hours for his or her age group, the hours spent in travel will not count as work hours, unless the minor is required to work within twelve hours of their arrival. For employers who are touring companies, time spent in traveling from one performance location to another performance location, such as occurs between shows by either train, car or bus, shall not count as work hours for minor employees, unless the minor is required to work within twelve hours of the time of their arrival.

(f) Rest Period After Dismissal. The employer shall set the

minor's dismissal on the last day of the minor's employment so that the minor will have a twelve (12) hour rest period between the end of the employment period and the minor's return to their school. For example, a minor returning to school at 8:30 a.m., shall be dismissed from employment by 8:30 p.m. the previous evening.

(g) After-the-Fact Partial Waiver for Emergency Extension of Work Hours. If unexpected, or emergency situations arise which will result in violation of applicable work hours restrictions for the minor, and prior application for Partial Waiver is not possible, the Division shall grant an after-the-fact Partial Waiver for Emergency Extension of Work, provided the employer notifies the Division of the situation which required the extended work hours, on the next working day, and demonstrates that the situation was resolved with the best interest of the minor in mind.

(6) Sanctions. In addition to the sanctions set out in sections 450.141 and 450.151, F.S., any violation of the Child Labor Law or this Rule shall be grounds for assessing civil money penalties, or denying, suspending, or revoking any Permit to Hire or Partial Waiver.

Specific Authority 450.121, 450.132 FS. Law Implemented 450.001 - 450.161 FS. History -- New _____.

38H-14.007 Partial Waivers.

(1) Generally. Pursuant to section 450.095, when it clearly appears to be in the best interest of the child, the Division, or school district designee, if the minor is enrolled in the public school system, may grant a waiver of any restriction imposed by the

Child Labor Law, or by these rules. Application may be made by the minor, his or her parent(s), or guardian, or by employers of minors. When determined to be in the best interest of the minor the Division, or the school district designee shall issue a Partial Waiver which shall specify the restriction(s) waived, and shall be valid for a period specified on the Partial Waiver, not to exceed one (1) year. Employers shall keep a copy of any Partial Waiver granted with respect to the Child Labor Law or this Rule in their file during the entire period of employment for which the Partial Waiver is applicable.

(2) Application Requirements. Application for a Partial Waiver shall be made by submitting to the Division, or the school superintendent a completed form CLL-104, available as provided in subsection 38H-14.012(1). Applications must be filled out completely and must specify the provision or provisions of the Child Labor Law or this Rule from which the Partial Waiver is sought. The applicant shall provide supportive factual information and documentation to justify the Partial Waiver sought.

(3) Criteria for Justifying A Partial Waiver. In determining whether to grant a Partial Waiver, the Division shall consider all relevant information which may establish what is in the best interest of the minor, including:

(a) School Status. The Division, or school district designee may grant a Partial Waiver based on school status when:

1. The minor will receive instruction by a tutor at the place of employment;

2. The minor has been authorized by the District School Superintendent to complete his or her education through alternative methods such as home school;

3. The minor has been permanently expelled from the public school system;

4. The minor is enrolled in school in a foreign country and is visiting Florida during his or her home country's non-school period; or

5. The employment would provide an educational, vocational, or public service experience that would be beneficial to the minor.

Documentation to justify a Partial Waiver based on school status may consist of written confirmation from the minor's school principal or the Superintendent of the School District and of copies of school records clearly defining the minor's school status.

(b) Financial Hardship. The Division may grant a Partial Waiver based on financial hardship when compliance with the Child Labor Law or this Rule will result in undue financial hardship for the minor or the minor's immediate family. Documentation to justify a Partial Waiver based on financial hardship may consist of a notarized letter, explaining the particular circumstances creating a hardship, from a parent, guardian, or other adult, who knows and can attest to the minor's financial hardship; written confirmation from a school recently attended; documentation from a social service agency; or verification of participation in AFDC,

Food Stamp, Project Independence, or other similar programs. The Division may require other documentation which proves financial hardship.

(c) Medical Hardship. The Division may grant a Partial Waiver based on medical hardship when compliance with the Child Labor Law or this Rule will result in physical or mental hardship for the minor. Documentation to justify a Partial Waiver based on medical hardship may consist of written confirmation from the minor's physician stating the specific medical reason(s) that require the minor to be excused from mandatory school attendance and affirming that the minor to be excused from mandatory school attendance may be allowed to work the requested hours, or that the minor should be considered an adult for the purpose of work hours.

(d) Other Hardship. The Division may grant a Partial Waiver based on other hardship when compliance with the Child Labor Law or this Rule will result in unreasonable restrictions being placed upon the minor in specific situations.

(e) Court Order. The Division shall grant a Partial Waiver based on a court order when compliance with the Child Labor Law or this Rule will result in the minor violating an order issued by a court mandating that the minor work specified hours or in a specified occupation.

Specific Authority 450.121 FS. Law Implemented 450.095 FS. History -- New _____.

38H-14.008 Response to Request for Inspection of Records. Employers shall provide the Division with any and all records and

documentation required to be kept by the Child Labor Law, these rules or any other federal or state statute regulating employment immediately upon request for inspection of such records. Where records are kept in a location other than the immediate situs where the request to inspect is made, the employer shall notify the Division and produce the records within two (2) working days so that inspection of the records may take place. Specific Authority 450.121 FS. Law Implemented 450.121 FS. History -- New _____.

38H-14.009 Employment in Violation of Law or Rules. As provided in section 450.151, F.S., upon discovery by the Division that an employer is in violation of any provision(s) of the Child Labor Law or these rules, the Division shall give written notice to the employer. Such Notice of Warning shall specify the provision or rule alleged to be violated, the facts alleged to constitute such violation, and the requirements and time limitations for remedial action. If the employer refuses or fails to comply with the requirements and time limitations for remedial action specified in the Notice of Warning, the Division may seek assessment of the following schedule of Civil Money Penalties:

Violation	1st Offense	2nd Offense	3rd and Subsequent Offenses
Child Labor Poster not posted conspicuously	Up to $500	Up to $1000	Up to $1500
Employment of minor in violation of age limitations	Up to $700	Up to $1500	Up to $2500
Proof of age or copy of Partial Waiver of Child Labor Law not on file	Up to $700	Up to $1200	Up to $2000
Employment of minor in violation of alcoholic beverage law	Up to $1000	Up to $1500	Up to $2500
Violation of work hours restrictions of the Child Labor Law or this Rule	Up to $700	Up to $1200	Up to $2500
Employment of minor in prohibited hazardous occupation	Up to $1200	Up to $1700	Up to $2500
Employment of minor in violation of any provision of the Child Labor Law or this Rule which results in injury or death to minor	Up to $500	Up to $2500	$2500
Any other violation of the Child Labor Law or this Rule	Up to $500	Up to $1500	Up to $2500

Specific Authority 450.121 FS. Law Implemented 450.141 FS.

History -- New _____.

38H-14.010 Administrative Hearings. Persons whose substantial interests are adversely affected by agency action, such as assessment of civil money penalties, revocation of, or denial of an application for a Permit to Hire, or a Partial Waiver shall be entitled to a hearing in accordance with Chapter 120, Florida Statutes, and with Rule 38A-5, Florida Administrative Code.
Specific Authority 450.121 FS. Law Implemented 450.001 - 450.161 FS. History -- New _____.

38H-14.011 Vocational Education. The Division shall enter into a non-financial agreement with the Department of Education (DOE) which will authorize DOE to grant Partial Waivers of compliance as provided in subsection 38H-14.007(3), and to regulate local school districts' vocational education and related work experience programs in accordance with subsection 450.021(4), and sections 450.061, and 450.161, F.S.
Specific Authority 450.121 FS. Law Implemented 450.095, 450.161 FS. History -- New _____.

38H-14.012 Forms, Poster, Federal Regulations and Bulletins.

(1) Forms. The forms referred to in this Rule are hereby adopted for use. Copies of the Rule and the forms may be obtained, free of charge, from the Division of Labor, Employment and Training, Child Labor Office, Post Office Box 5436, Tallahassee, FL 32314-5436, (904) 487-2536, FAX (904) 487-4928. Copies of any form or document required by the Division, the Child Labor Law or this Rule which are transmitted by fax are acceptable only if the hard copy is received by the Division within five (5) working days after

the fax copy.

(2) Poster. An employer shall comply with the requirements of subsection 450.045(2), F.S. by displaying, in a conspicuous place, the Child Labor Law poster which is available, free of charge, from the Child Labor Office at the address provided in subsection 38H-14.012(1).

(3) Federal Regulations and Bulletins. Employers may obtain copies of the federal regulations and Bulletins #101, and #102, from the Wage and Hour Division of the United States Department of Labor, or from the Child Labor Office at the address provided in subsection 38H-14.012(1).

Specific Authority 450.121 FS. Law Implemented 450.061 FS. History -- New _____.]]

NAME OF PERSON ORIGINATING PROPOSED RULE: James Mathews, Acting Director, Division of Labor, Employment, and Training, 1320 Executive Center Drive, Suite 300, Tallahassee, FL 32399-0667.

NAME OF SUPERVISOR OR PERSON WHO APPROVED THE PROPOSED RULE: James Mathews, Acting Director, Division of Labor, Employment, and Training.

DATE PROPOSED RULE APPROVED: April 20, 1993.

ATTACHMENT O

Case Number: WP_____
Purge Date _____

FLORIDA DEPARTMENT OF LABOR AND EMPLOYMENT SECURITY
DIVISION OF LABOR, EMPLOYMENT AND TRAINING

APPLICATION FOR WAIVER OF FLORIDA CHILD LABOR LAW

Please type or write legibly: do not abbreviate (except State).

Applicant is: (Check one) o Minor o Parent/Guardian o Business	Applicant Name
Minor's Birth Date (Mo/Day/Year) / / Copy of proof of age must be attached Minor's Age:	Address City State Zip
Minor's Social Security # --- ---	Business Federal Employer Identification Number
School Minor Attends: Address Telephone ( )	Telephone ( ) FAX No. ( ) *(Use this section only when applicant is a business.)*

A partial waiver is requested that would allow:

- o Work more than 15 hours a week (14-15 yr. olds)
- o Work during regular school hours
- o Other Be specific:
- o Work more than 30 hours a week (16-17 yr. olds)
- o Minor Child to work for Parent

A waiver is requested because of (You may check all applicable boxes; documentation must be provided for any box checked): o COURT ORDER o SCHOOL STATUS o FINANCIAL HARDSHIP o MEDICAL HARDSHIP o OTHER HARDSHIP o CUSTOMARY HOURS AND PRACTICES OF INDUSTRY o EMERGENCY EXTENSION OF WORK HOURS	If the applicant is a minor, please provide: _____ Name of Potential Employer or Company Name _____ Street Address of Potential Employer or Company _____ City State Zip Code _____ Potential Employer's Area Code Business Phone Number

The undersigned certify that the information presented is true and correct to the best of their knowledge.

_____ _____
Signature of Applicant Date

Return to : Child Labor Section, P.O. Box 5436, Tallahassee, FL. 32314-5436
Phone (904) 487-2536 Fax (904) 487-4928

APPLICATION WILL NOT BE ACCEPTED UNLESS PROOF OF AGE AND DOCUMENTATION FOR BOX CHECKED IS ATTACHED
FALSIFICATION OF INFORMATION WILL RESULT IN DENIAL OF WAIVER
FOR MORE INFORMATION CALL CHILD LABOR SECTION

LES FORM LET/CLL-104

Appendix B

Cover Letter
&
Survey Instruments

UNIVERSITY OF
FLORIDA

M.E. Rinker, Sr. School of Building Construction

Fine Arts C 101
Gainesville, FL 32611-2032
(904) 392-5965 TEL
(904) 392-4364 FAX
622-5965 SUNCOM

1 June 93

«First Name» «Last Name»
«Company»
«Street Address»
«City State»

Dear Mr. «Last Name»:

Construction craft training is one of the key elements in the effort to provide the high quality construction demanded in today's market. Formally trained craft workers have also been shown to be more productive and work more safely on the construction site. In the effort to understand the complexities of providing construction craft training, the State of Florida, Department of Education, has contracted with the School of Building Construction to survey all construction craft training providers.

Enclosed is a questionnaire that was designed to help understand some of the problems that you as a training provider encounter. This survey is also designed to identify the current levels of apprenticeship and the costs associated with providing this training. The results of this survey will be used to develop a computer simulation model of the craft training process that predicts the future levels of formally trained craft workers employed in the construction industry.

The returned questionnaire will be held in strictest confidence. I hereby guarantee the confidentiality of your responses. I will be the only individual that will work with the completed questionnaires. The survey results will only be reported as a summary of all craft training providers.

As a Journeyman Plumber, I know the value of completing a craft apprenticeship and I sincerely hope this project will benefit you as training providers. I hope you will take this opportunity to provide valuable input into this research project. If you have any questions, I can be reached at the School of Building Construction. Thank you for your time and effort.

Very Truly Yours,

Thomas H. George
Ph.D. Candidate

Florida Construction Industry Craft Training Provider Survey

Training Provider: _____

Location: _____

How is the training program administered?

_____ 1. Joint Apprenticeship Training Committee (JATC).
_____ 2. Individual Joint Apprenticeship Committee (IJ).
_____ 3. Group Non-Joint Apprenticeship Committee (GNJ).
_____ 4. Individual Non-Joint Apprenticeship Committee (INJ).
_____ 5. Not associated with a formal apprenticeship program.

Where is the program presented?

_____ 1. Apprenticeship training facility.
_____ 2. Local community college.
_____ 3. Contractor facilities.
_____ 4. Vocational/Technical education center.
_____ 5. Local high school
_____ 6. Other (specify) _____

How many hours per week are the students exposed to classroom training?

How many hours per week are the students exposed to <u>supervised</u> on-the-job training?

Who teaches the related course instruction in these programs?

_____ 1. Journeymen
_____ 2. Contractors
_____ 3. Manufactures and/or Suppliers
_____ 4. Educators
_____ 5. Local Building Inspectors
_____ 6. Other (specify) _____

Who supervises the apprentice's on-the-job instruction?

_____ 1. Journeymen
_____ 2. Contractors
_____ 3. Apprentice Instructors
_____ 4. Educators
_____ 5. Local Building Inspectors
_____ 6. Other (specify) _____

What are your required instructor qualifications? (check all that apply)

_____ 1. Journeyman's license in the particular trade.
_____ 2. Completion of an apprenticeship program & 2 years experience.
_____ 3. 2 year college degree.
_____ 4. 4 year college degree.
_____ 5. Teaching Certification
_____ 6. Other (specify) _____

Who provides your instructor continuing vocational education/training programs?

_____ 1. AFL-CIO
_____ 2. ABC
_____ 3. Manufactures and/or Suppliers
_____ 4. AGC
_____ 5. NAHB
_____ 6. None
_____ 7. Other (specify) _____

How often does this program require the instructor's participation in continuing education programs?

_____ 1. every year
_____ 2. every 2 years
_____ 4. every 3 years
_____ 5. every 4 years
_____ 6. None
_____ 7. Other (specify) _____

Should craft training instructors be certified as instructors in the particular craft?

_____ 1. Strongly Agree
_____ 2. Moderately Agree
_____ 3. Moderately Disagree
_____ 4. Strongly Disagree

What is the maximum yearly training capacity of this program? (i.e. maximum number of completions)

_____ 1. Boilermaker
_____ 2. Brick Mason & Stone Mason
_____ 3. Carpenter
_____ 4. Cement & Terrazzo Finisher
_____ 5. Electrician
_____ 6. Elevator Constructor
_____ 7. Equipment Operator
_____ 8. Insulator
_____ 9. Ironworker
_____ 10. Millwright
_____ 11. Painter
_____ 12. Plasterer, Lather & Drywall Finisher
_____ 13. Plumber
_____ 14. Pipe Fitter
_____ 15. Sprinkler Fitter
_____ 16. Roofer
_____ 17. Sheet Metal Worker
_____ 18. Refrigeration Mechanic
_____ 19. Tile Setter & Marble Finisher
_____ 20. Other (specify) _____

What qualifications must the students have to participate? (check all that apply)

_____ 1. Minimum 16 years of age.
_____ 2. High school diploma or equivalent.
_____ 3. Minimum scores on aptitude tests.
_____ 4. Other (specify) _____
_____ 5. High School Algebra.
_____ 6. Prior trade experience.

How are the students identified and selected for these programs? Check all that apply)

_____ 1. Local advertisements.
_____ 2. Contractor recommendations.
_____ 3. Other student recommendations.
_____ 4. Military Transition Service Center.
_____ 4. High school recruiting program.
_____ 5. Other (specify) _____

What is the estimated training program completion rate? (percent)

_____ 1. Boilermaker
_____ 2. Brick Mason & Stone Mason
_____ 3. Carpenter
_____ 4. Cement & Terrazzo Finisher
_____ 5. Electrician
_____ 6. Elevator Constructor
_____ 7. Equipment Operator
_____ 8. Insulator
_____ 9. Ironworker
_____ 10. Millwright
_____ 11. Painter
_____ 12. Plasterer, Lather & Drywall Finisher
_____ 13. Plumber
_____ 14. Pipe Fitter
_____ 15. Sprinkler Fitter
_____ 16. Roofer
_____ 17. Sheet Metal Worker
_____ 18. Refrigeration Mechanic
_____ 19. Tile Setter & Marble Finisher
_____ 20. Other (specify) _____

When does the highest rate of student dropout occur?

_____ 1. 0 to 6 months
_____ 2. 7 to 12 months
_____ 3. 13 to 18 months
_____ 4. 19 to 24 months
_____ 5. 25 to 30 months
_____ 6. Other (specify) _____

Do you feel a one year pre-apprenticeship program would help reduce the dropout rate?

_____ 1. Strongly Agree
_____ 2. Moderately Agree
_____ 3. Moderately Disagree
_____ 4. Strongly Disagree

What is the approximate square footage devoted to construction craft training?

_____ 1. Classroom instruction.
_____ 2. Shop instruction.
_____ 3. Administrative functions.

Are the classroom facilities adequate?

_____ 1. Fully Adequate
_____ 2. Moderately Adequate
_____ 3. Moderately Inadequate
_____ 4. Completely Inadequate

Are the shop facilities adequate?

_____ 1. Fully Adequate
_____ 2. Moderately Adequate
_____ 3. Moderately Inadequate
_____ 4. Completely Inadequate

Are the administrative facilities adequate?

_____ 1. Fully Adequate
_____ 2. Moderately Adequate
_____ 3. Moderately Inadequate
_____ 4. Completely Inadequate

What is the current student enrollment in each training program offered?

_____ 1. **Boilermaker**
- _____ a. first year
- _____ b. second year
- _____ c. third year

_____ 2. **Brick Mason & Stone Mason**
- _____ a. first year
- _____ b. second year
- _____ c. third year

_____ 3. **Carpenter**
- _____ a. first year
- _____ b. second year
- _____ c. third year
- _____ d. fourth year

_____ 4. **Cement & Terrazzo Finisher**
- _____ a. first year
- _____ b. second year
- _____ c. third year

_____ 5. **Electrician**
- _____ a. first year
- _____ b. second year
- _____ c. third year
- _____ d. fourth year
- _____ e. fifth year

_____ 6. **Elevator Constructor**
- _____ a. first year
- _____ b. second year
- _____ c. third year

_____ 7. **Equipment Operator**
- _____ a. first year
- _____ b. second year
- _____ c. third year

_____ 8. **Insulator**
- _____ a. first year
- _____ b. second year
- _____ c. third year
- _____ d. fourth year

_____ 9. **Ironworker**
- _____ a. first year
- _____ b. second year
- _____ c. third year

_____ 10. **Millwright**
- _____ a. first year
- _____ b. second year
- _____ c. third year
- _____ d. fourth year
- _____ e. fifth year

_____ 11. **Painter**
- _____ a. first year
- _____ b. second year
- _____ c. third year

_____ 12. **Plasterer, Lather & Drywall Finisher**
- _____ a. first year
- _____ b. second year
- _____ c. third year

_____ 13. **Plumber**
- _____ a. first year
- _____ b. second year
- _____ c. third year
- _____ d. fourth year
- _____ e. fifth year

_____ 14. **Pipe Fitter**
- _____ a. first year
- _____ b. second year
- _____ c. third year
- _____ d. fourth year
- _____ e. fifth year

_____ 15. **Sprinkler Fitter**
- _____ a. first year
- _____ b. second year
- _____ c. third year
- _____ d. fourth year
- _____ e. fifth year

_____ 16. **Roofer**
- _____ a. first year
- _____ b. second year
- _____ c. third year

_____ 17. **Sheet Metal Worker**
- _____ a. first year
- _____ b. second year
- _____ c. third year
- _____ d. fourth year

_____ 18. **Refrigeration Mechanic**
- _____ a. first year
- _____ b. second year
- _____ c. third year
- _____ d. fourth year

_____ 19. **Tile Setter & Marble Finisher**
- _____ a. first year
- _____ b. second year
- _____ c. third year

_____ 20. **Other** (specify) _____
- _____ a. first year
- _____ b. second year
- _____ c. third year
- _____ d. fourth year

Does this training program have a permanent or part-time office and administrative staff?

_____ 1. Permanent _____ 2. Part-time

Please identify the number of staff personnel.

_____ 1. Administrative _____ 3. Secretarial

_____ 2. Technical and/or instructors _____ 4. Other (specify) _____

Please identify the number of staff personnel who report to:

1. The apprenticeship committee.

_____ 1. Administrative _____ 3. Secretarial

_____ 2. Technical and/or instructors _____ 4. Other (specify) _____

2. The local education agency.

_____ 1. Administrative _____ 3. Secretarial

_____ 2. Technical and/or instructors _____ 4. Other (specify) _____

Does this program receive grant funding from: (check all that apply)

_____ 1. Industry Monetary Grants. _____ 4. Employer Assessments.

_____ 2. Industry Equipment Grants. _____ 5. JTPA Funds.

_____ 3. Public Education Funding. _____ 6. Other (specify) _____

Please identify the funding agency, the funding amount and the funding duration.

Please identify any specific grant funding criteria?

What is the approximate yearly budget for this training program?

_____ 1. Tools & equipment
_____ 2. Materials
_____ 3. Instructors salaries
_____ 4. Instructor training
_____ 5. Facilities overhead
_____ 6. Administrative overhead
_____ 7. Other (specify) _____
_____ 8. Total

What is the annual cost to the student?

What is the annual cost, per student, to the contractor?

What is the annual cost per student, if any, to the public education finance committee?

What is this training program's estimated expenditure to educate each student per year?

Is the construction industry providing enough craft training?

_____ 1. Completely adequate.
_____ 2. Moderately adequate.
_____ 3. Moderately inadequate.
_____ 4. Completely inadequate.

Does the location of your training program meet the student needs?

_____ 1. Completely adequate.
_____ 2. Moderately adequate.
_____ 3. Moderately inadequate.
_____ 4. Completely inadequate.

As a construction craft training provider, what is your primary need?

What are the biggest problems associated with providing construction craft training?

What is your recommended solution to solving these training problems.

Do you have any further comments you would like to share?

Would you like to receive a summary copy of the survey results?

____ Yes ____ No

Please provide an outline of the training curriculum offered.

Florida Community College Construction Training Provider Survey

Training Provider: _____

Location: _____

This Survey is only concerned with training programs for the following crafts:

1. Boilermaker
2. Brick Mason & Stone Mason
3. Carpenter
4. Cement & Terrazzo Finisher
5. Electrician
6. Elevator Constructor
7. Equipment Operator
8. Insulator
9. Ironworker
10. Millwright
11. Painter
12. Plasterer, Lather & Drywall Finisher
13. Plumber
14. Pipe Fitter
15. Sprinkler Fitter
16. Roofer
17. Sheet Metal Worker
18. Refrigeration Mechanic
19. Tile Setter & Marble Finisher

How is the training program administered?

_____ 1. Local Community College

_____ 2. Local Vocational/Technical Education Center

_____ 3. Local High School

_____ 4. This program is associated with one or more apprenticeship programs (please identify)

Where is the program presented?

_____ 1. Apprenticeship training facility.

_____ 2. Local community college.

_____ 3. Contractor facilities.

_____ 4. Vocational/Technical education center.

_____ 5. Local high school

_____ 6. Other (specify) _____

How many hours per week are the students exposed to classroom training?

How many hours per week are the students exposed to laboratory training?

How many hours per week are the students exposed to <u>supervised</u> on-the-job training?

Who supervises the students on-the-job instruction?

_____ 1. Journeymen
_____ 2. Contractors
_____ 3. Apprentice Instructors
_____ 4. Educators
_____ 5. Local Building Inspectors
_____ 6. Other (specify) _____

What are your required instructor qualifications? (check all that apply)

_____ 1. Journeyman's license in the particular trade
_____ 2. Completion of e an apprenticeship program & 2 years experience
_____ 3. Craft experience not at the Journeyman level
_____ 4. 2 year college degree
_____ 5. 4 year college degree
_____ 6. Teaching Certification
_____ 7. Other (specify) _____

Who provides your instructor continuing vocational education/training programs?

_____ 1. AFL-CIO
_____ 2. ABC
_____ 3. Manufactures and/or Suppliers
_____ 4. AGC
_____ 5. NAHB
_____ 6. None
_____ 7. Other (specify) _____

How often does this program require the instructor's participation in continuing education programs?

_____ 1. every year
_____ 2. every 2 years
_____ 4. every 3 years
_____ 5. every 4 years
_____ 6. None
_____ 7. Other (specify) _____

Should instructors be certified as technically competent in the particular craft?

_____ 1. Strongly Agree
_____ 2. Moderately Agree
_____ 3. Moderately Disagree
_____ 4. Strongly Disagree

What is the maximum yearly training output of this program? (no. of graduates)

_____ 1. Boilermaker
_____ 2. Brick Mason & Stone Mason
_____ 3. Carpenter
_____ 4. Cement & Terrazzo Finisher
_____ 5. Electrician
_____ 6. Elevator Constructor
_____ 7. Equipment Operator
_____ 8. Insulator
_____ 9. Ironworker
_____ 11. Painter
_____ 12. Plasterer, Lather & Drywall Finisher
_____ 13. Plumber
_____ 14. Pipe Fitter
_____ 15. Sprinkler Fitter
_____ 16. Roofer
_____ 17. Sheet Metal Worker
_____ 18. Refrigeration Mechanic
_____ 19. Tile Setter & Marble Finisher

_____ 10. Millwright _____ 20. Other (specify) _____

How are the students identified and recruited for these programs? Check all that apply)

_____ 1. Local advertisements. _____ 4. Military Transition Service Center.

_____ 2. Contractor recommendations. _____ 4. High school recruiting program.

_____ 3. Other student recommendations. _____ 5. Other (specify) _____

What is the estimated training program graduation rate? (percent)

_____ 1. Boilermaker _____ 11. Painter

_____ 2. Brick Mason & Stone Mason _____ 12. Plasterer, Lather & Drywall Finisher

_____ 3. Carpenter _____ 13. Plumber

_____ 4. Cement & Terrazzo Finisher _____ 14. Pipe Fitter

_____ 5. Electrician _____ 15. Sprinkler Fitter

_____ 6. Elevator Constructor _____ 16. Roofer

_____ 7. Equipment Operator _____ 17. Sheet Metal Worker

_____ 8. Insulator _____ 18. Refrigeration Mechanic

_____ 9. Ironworker _____ 19. Tile Setter & Marble Finisher

_____ 10. Millwright _____ 20. Other (specify) _____

When does the highest rate of student dropout occur?

_____ 1. 0 to 6 months _____ 3. 13 to 18 months _____ 5. 25 to 30 months

_____ 2. 7 to 12 months _____ 4. 19 to 24 months _____ 6. Other (specify) _____

Do you feel a one year pre-apprenticeship program would help reduce the dropout rate?

_____ 1. Strongly Agree _____ 3. Moderately Disagree

_____ 2. Moderately Agree _____ 4. Strongly Disagree

What is the approximate square footage devoted to construction craft training?

_____ 1. Classroom instruction.

_____ 2. Shop instruction.

_____ 3. Administrative functions.

Are the classroom facilities adequate?

_____ 1. Fully Adequate _____ 3. Moderately Inadequate

_____ 2. Moderately Adequate _____ 4. Completely Inadequate

Are the shop facilities adequate?

_____ 1. Fully Adequate _____ 3. Moderately Inadequate

_____ 2. Moderately Adequate _____ 4. Completely Inadequate

Are the administrative facilities adequate?

_____ 1. Fully Adequate _____ 3. Moderately Inadequate

_____ 2. Moderately Adequate _____ 4. Completely Inadequate

What is the current student enrollment in each training program offered?

_____ 1. **Boilermaker**
- _____ a. first year
- _____ b. second year
- _____ c. third year

_____ 2. **Brick Mason & Stone Mason**
- _____ a. first year
- _____ b. second year
- _____ c. third year

_____ 3. **Carpenter**
- _____ a. first year
- _____ b. second year
- _____ c. third year
- _____ d. fourth year

_____ 4. **Cement & Terrazzo Finisher**
- _____ a. first year
- _____ b. second year
- _____ c. third year

_____ 5. **Electrician**
- _____ a. first year
- _____ b. second year
- _____ c. third year
- _____ d. fourth year

_____ 6. **Elevator Constructor**
- _____ a. first year
- _____ b. second year
- _____ c. third year

_____ 7. **Equipment Operator**
- _____ a. first year
- _____ b. second year
- _____ c. third year

_____ 8. **Insulator**
- _____ a. first year
- _____ b. second year
- _____ c. third year
- _____ d. fourth year

_____ 9. **Ironworker**
- _____ a. first year
- _____ b. second year
- _____ c. third year

_____ 10. **Millwright**
- _____ a. first year
- _____ b. second year
- _____ c. third year

_____ 10. **Painter**
- _____ a. first year
- _____ b. second year
- _____ c. third year

_____ 11. **Plasterer, Lather & Drywall Finisher**
- _____ a. first year
- _____ b. second year
- _____ c. third year

_____ 12. **Plumber**
- _____ a. first year
- _____ b. second year
- _____ c. third year
- _____ d. fourth year

_____ 13. **Pipe Fitter**
- _____ a. first year
- _____ b. second year
- _____ c. third year
- _____ d. fourth year

_____ 14. **Sprinkler Fitter**
- _____ a. first year
- _____ b. second year
- _____ c. third year
- _____ d. fourth year

_____ 15. **Roofer**
- _____ a. first year
- _____ b. second year
- _____ c. third year

_____ 16. **Sheet Metal Worker**
- _____ a. first year
- _____ b. second year
- _____ c. third year
- _____ d. fourth year

_____ 17. **Refrigeration Mechanic**
- _____ a. first year
- _____ b. second year
- _____ c. third year
- _____ d. fourth year

_____ 18. **Tile Setter & Marble Finisher**
- _____ a. first year
- _____ b. second year
- _____ c. third year

_____ 19. **Other** (specify) _____
- _____ a. first year
- _____ b. second year
- _____ c. third year

____ d. fourth year ____ d. fourth year

Does this training program have a permanent or part-time office and administrative staff?

_____ 1. Permanent _____ 2. Part-time

Please identify the number of staff personnel.

_____ 1. Administrative _____ 3. Secretarial

_____ 2. Technical and/or instructors _____ 4. Other (specify) _____

Please identify the number of staff personnel who report to:

1. The apprenticeship or training committee (if applicable).

_____ 1. Administrative _____ 3. Secretarial

_____ 2. Technical and/or instructors _____ 4. Other (specify) _____

2. The local education agency.

_____ 1. Administrative _____ 3. Secretarial

_____ 2. Technical and/or instructors _____ 4. Other (specify) _____

Does this program receive grant funding from: (check all that apply)

_____ 1. Industry Monetary Grants. _____ 4. Employer Assessments.

_____ 2. Industry Equipment Grants. _____ 5. JTPA Funds.

_____ 3. Federal Education Funding. _____ 6. Other (specify) _____

Please identify the funding agency, the funding amount and the funding duration.

Please identify any specific grant funding criteria?

What is the approximate yearly budget for this training program?

_____ 1. Tools & equipment
_____ 2. Materials
_____ 3. Instructors salaries
_____ 4. Instructor training
_____ 5. Facilities overhead
_____ 6. Administrative overhead
_____ 7. Other (specify) _____
_____ 8. Total

What is the annual cost to the student?

What is the annual cost per student to the on-the-job training provider?

What is the annual cost per student, if any, to the public education finance committee?

What is this training program's estimated expenditure to educate each student per year?

Is the construction industry providing enough craft training?

_____ 1. Completely adequate.
_____ 2. Moderately adequate.
_____ 3. Moderately inadequate.
_____ 4. Completely inadequate.

Does the location of your training program meet the student needs?

_____ 1. Completely adequate.
_____ 2. Moderately adequate.
_____ 3. Moderately inadequate.
_____ 4. Completely inadequate.

As a construction craft training provider, what is your primary need?

What are the biggest problems associated with providing construction craft training?

What is your recommended solution to solving these training problems.

Do you have any further comments you would like to share?

Would you like to receive a summary copy of the survey results?

____ Yes ____ No

Please provide an outline of the training curriculum offered.

Appendix C

Survey Instrument
Statistical Analyses

1.0 Introduction

This Appendix is the results of the statistical analyses preformed on the data compiled from the survey instrument.

Question #1

How is the training program administered?

No statistical analyses were performed on this question.

Question #2

Where is program presented?

No statistical analyses were performed on this question.

Question #3

How many hours per week are the students exposed to classroom training?

The statistical analyses of question #3 and part of #4 follows.

The programs (PRGRM) type JATC are Joint Apprenticeship Training Committees.
The programs (PRGRM) type NJNT are Nonjoint Apprenticeship Training Committees.
The programs (PRGRM) type VOTC are publicly funded Community Colleges and Vocational Education Centers offering construction related courses.

Variable HRS is the number of classroom hours the student is exposed to.
Variable SUP is the number of supervised on-the-job hours the student is exposed to.

The following tables are the mean calculations.

Individual program calculations.

PRGRM	N Obs	Variable	N	Minimum	Maximum	Mean
JATC	19	HRS	18	3.7000000	9.0000000	5.7111111
		SUP	19	40.0000000	40.0000000	40.0000000
NJNT	24	HRS	23	2.0000000	12.0000000	5.6956522
		SUP	22	10.0000000	40.0000000	36.3636364
VOTC	18	HRS	18	6.0000000	30.0000000	20.1833333
		SUP	18	0	40.0000000	11.0555556

PRGRM	N Obs	Variable	Std Dev
JATC	19	HRS	1.1529445
		SUP	0
NJNT	24	HRS	1.7693035
		SUP	8.0447880
VOTC	18	HRS	9.3767077
		SUP	13.9556955

Industry wide calculations.

N Obs	Variable	N	Minimum	Maximum	Mean
61	HRS	59	2.0000000	30.0000000	10.1203390
	SUP	59	0	40.0000000	29.8135593

N Obs	Variable	Std Dev
61	HRS	8.5188792
	SUP	15.4913486

The following tables are the nonparametric statistical calculations to detect any differences between the Joint, Nonjoint and the Vo-tech programs.

N P A R 1 W A Y P R O C E D U R E

Wilcoxon Scores (Rank Sums) for Variable HRS
Classified by Variable PRGRM

PRGRM	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
JATC	18	392.500000	540.0	57.3476968	21.8055556
NJNT	23	517.000000	690.0	60.7439414	22.4782609
VOTC	18	860.500000	540.0	57.3476968	47.8055556

Average Scores were used for Ties

Kruskal-Wallis Test (Chi-Square Approximation)
CHISQ= 31.251 DF= 2 Prob > CHISQ= 0.0001

This Chi-Square value indicates there is a significant difference in the number of classroom hours the students are exposed to between the various programs.

N P A R 1 W A Y P R O C E D U R E

Wilcoxon Scores (Rank Sums) for Variable HRS
Classified by Variable PRGRM

PRGRM	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
JATC	18	372.0	378.0	33.4051898	20.6666667
NJNT	23	489.0	483.0	33.4051898	21.2608696

Average Scores were used for Ties

Wilcoxon 2-Sample Test (Normal Approximation)
(with Continuity Correction of .5)

S= 372.000 Z= -.164645 Prob > |Z| = 0.8692

T-Test approx. Significance = 0.8701

Kruskal-Wallis Test (Chi-Square Approximation)
CHISQ= 0.03226 DF= 1 Prob > CHISQ= 0.8575

This Chi-Square value indicates there is no significant difference in the number of classroom hours the students are exposed to between the Joint and Nonjoint programs.

N P A R 1 W A Y P R O C E D U R E

Wilcoxon Scores (Rank Sums) for Variable HRS
Classified by Variable PRGRM

PRGRM	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
NJNT	23	304.0	483.0	36.0738572	13.2173913
VOTC	18	557.0	378.0	36.0738572	30.9444444

Average Scores were used for Ties

Wilcoxon 2-Sample Test (Normal Approximation)
(with Continuity Correction of .5)

S= 557.000 Z= 4.94818 Prob > |Z| = 0.0001

T-Test approx. Significance = 0.0001

Kruskal-Wallis Test (Chi-Square Approximation)
CHISQ= 24.622 DF= 1 Prob > CHISQ= 0.0001

This Chi-Square value indicates there is a significant difference in the number of classroom hours the students are exposed to between the Nonjoint and Vo-tech programs.

N P A R 1 W A Y P R O C E D U R E

Wilcoxon Scores (Rank Sums) for Variable HRS
Classified by Variable PRGRM

PRGRM	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
JATC	18	191.500000	333.0	30.9409576	10.6388889
VOTC	18	474.500000	333.0	30.9409576	26.3611111

Average Scores were used for Ties

Wilcoxon 2-Sample Test (Normal Approximation)
(with Continuity Correction of .5)

S= 191.500 Z= -4.55707 Prob > |Z| = 0.0001

T-Test approx. Significance = 0.0001

Kruskal-Wallis Test (Chi-Square Approximation)
CHISQ= 20.914 DF= 1 Prob > CHISQ= 0.0001

This Chi-Square value indicates there is a significant difference in the number of classroom hours the students are exposed to between the Joint and Vo-tech programs.

Question #4

How many hours per week are the students exposed to <u>supervised</u> on-the-job training?

The statistical analyses of question #4 follows.

Variable HRS is the number of classroom hours the student is exposed to.
Variable SUP is the number of supervised on-the-job hours the student is exposed to.

The programs (PRGRM) type JATC are Joint Apprenticeship Training Committees.
The programs (PRGRM) type NJNT are Nonjoint Apprenticeship Training Committees.
The programs (PRGRM) type VOTC are publicly funded Community Colleges and Vocational Education Centers offering construction related courses.

The following tables are the nonparametric statistical calculations to detect any differences between the various programs.

N P A R 1 W A Y P R O C E D U R E

Wilcoxon Scores (Rank Sums) for Variable SUP
Classified by Variable PRGRM

PRGRM	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
JATC	19	769.500000	570.0	52.6396725	40.5000000
NJNT	22	774.500000	660.0	54.4776776	35.2045455
VOTC	18	226.000000	540.0	51.8721876	12.5555556

Average Scores were used for Ties

Kruskal-Wallis Test (Chi-Square Approximation)
CHISQ= 37.972 DF= 2 Prob > CHISQ= 0.0001

This Chi-Square value indicates there is a significant difference between the number of supervised on-the-job hours the students are exposed to.

N P A R 1 W A Y P R O C E D U R E

Wilcoxon Scores (Rank Sums) for Variable SUP
Classified by Variable PRGRM

PRGRM	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
JATC	19	446.500000	399.0	21.7439366	23.5000000
NJNT	22	414.500000	462.0	21.7439366	18.8409091

Average Scores were used for Ties

Wilcoxon 2-Sample Test (Normal Approximation)
(with Continuity Correction of .5)

S= 446.500 Z= 2.16152 Prob > |Z| = 0.0307

T-Test approx. Significance = 0.0367

Kruskal-Wallis Test (Chi-Square Approximation)
CHISQ= 4.7721 DF= 1 Prob > CHISQ= 0.0289

This Chi-Square value indicates there is a significant difference in the number of supervised on-the-job hours are exposed to between the Joint and Nonjoint programs

N P A R 1 W A Y P R O C E D U R E

Wilcoxon Scores (Rank Sums) for Variable SUP
Classified by Variable PRGRM

PRGRM	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
NJNT	22	613.0	451.0	34.5262442	27.8636364
VOTC	18	207.0	369.0	34.5262442	11.5000000

Average Scores were used for Ties

Wilcoxon 2-Sample Test (Normal Approximation)
(with Continuity Correction of .5)

S= 207.000 Z= -4.67760 Prob > |Z| = 0.0001

T-Test approx. Significance = 0.0001

Kruskal-Wallis Test (Chi-Square Approximation)
CHISQ= 22.016 DF= 1 Prob > CHISQ= 0.0001

This Chi-Square value indicates there is a significant difference in the number of supervised on-the-job hours the students are exposed to between the Nonjoint and the Vo-tech programs.

N P A R 1 W A Y P R O C E D U R E

Wilcoxon Scores (Rank Sums) for Variable SUP
Classified by Variable PRGRM

PRGRM	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
JATC	19	513.0	361.0	29.4830460	27.0000000
VOTC	18	190.0	342.0	29.4830460	10.5555556

Average Scores were used for Ties

Wilcoxon 2-Sample Test (Normal Approximation)
(with Continuity Correction of .5)

S= 190.000 Z= -5.13855 Prob > |Z| = 0.0001

T-Test approx. Significance = 0.0001

Kruskal-Wallis Test (Chi-Square Approximation)
CHISQ= 26.579 DF= 1 Prob > CHISQ= 0.0001

This Chi-Square value indicates there is a significant difference between the number of on-the-job hours the student is exposed to between the Joint and Vo-tech programs.

Question #5

Who teaches the related course instruction in these programs?

No statistical analyses were performed on this question.

Question #6

Who supervises the apprentice's on-the-job instruction?

No statistical analyses were performed on this question.

Question #7

What are the required instructor qualifications?

No statistical analyses were performed on this question.

Question #8

Who provides your instructor continuing vocational education/training programs?

No statistical analyses were performed on this question.

Question #9

How often does this program require the instructor's participation in continuing education programs?

No statistical analyses were performed on this question.

Question #10

Should craft training instructors be certified as instructors in the particular craft?

No statistical analyses were performed on this question.

Question #11

What is the maximum yearly training capacity of this program?

The statistical analyses of question #11 follows.

The following tables are the training capacity mean calculations for the various programs and for the industry as a whole.

The programs (PRGRM) type JATC are Joint Apprenticeship Training Committees.
The programs (PRGRM) type NJNT are Nonjoint Apprenticeship Training Committees.
The programs (PRGRM) type VOTC are publicly funded Community Colleges and Vocational Education Centers offering construction related courses.

Individual program calculations.

Analysis Variable : Capacity

PRGRM	N Obs	N	Minimum	Maximum	Mean
JATC	25	20	3.0000000	70.0000000	25.4000000
NJNT	54	49	3.0000000	120.0000000	22.8571429
VOTC	40	39	3.0000000	54.0000000	16.1794872

PRGRM	N Obs	Std Dev
JATC	25	21.0997630
NJNT	54	30.8814939
VOTC	40	12.5925454

Industry wide calculations.

Analysis Variable : Capacity

N Obs	N	Minimum	Maximum	Mean	Std Dev
119	108	3.0000000	120.0000000	20.9166667	24.0175656

The following table is the nonparametric statistical calculations to detect any differences between the Joint, Nonjoint and the Vo-tech programs.

N P A R 1 W A Y P R O C E D U R E

Wilcoxon Scores (Rank Sums) for Variable CAPC
Classified by Variable PRGRM

PRGRM	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
JATC	20	1219.50000	1090.00000	125.914529	60.9750000
NJNT	49	2440.00000	2670.50000	161.377714	49.7959184
VOTC	39	2226.50000	2125.50000	155.695608	57.0897436

Average Scores were used for Ties

Kruskal-Wallis Test (Chi-Square Approximation)
CHISQ= 2.2452 DF= 2 Prob > CHISQ= 0.3254

This Chi-Square value indicates there is no significant difference between the training capacity of the programs.

Question #12

What qualifications must the students have to participate?

No statistical analyses were performed on this question.

Question #13

How are the students identified and selected for these programs?

No statistical analyses were performed on this question.

Question #14

What is the estimated program completion (graduation) rate?

The statistical analyses of question #14 follows.

The following tables are the program completion rate and drop out rate mean calculations, first by program type and then by industry total.

The variable PRCNT is the completion rate in percent.
The variable DROP is the drop out time frame in months.

The programs (PRGRM) type JATC are Joint Apprenticeship Training Committees.
The programs (PRGRM) type NJNT are Nonjoint Apprenticeship Training Committees.
The programs (PRGRM) type VOTC are publicly funded Community Colleges and Vocational Education Centers offering construction related courses.

Individual program calculations.

PRGRM	N Obs	Variable	N	Minimum	Maximum
JATC	25	PRCNT	25	0.2500000	1.0000000
		DROP	25	6.0000000	12.0000000
NJNT	53	PRCNT	52	0	0.9000000
		DROP	53	6.0000000	24.0000000
VOTC	39	PRCNT	39	0.1000000	0.9800000
		DROP	39	6.0000000	12.0000000

PRGRM	N Obs	Variable	Mean	Std Dev
JATC	25	PRCNT	0.6360000	0.2153099
		DROP	7.6800000	2.7495454
NJNT	53	PRCNT	0.5107692	0.2502771
		DROP	9.2830189	5.4644915
VOTC	39	PRCNT	0.5289744	0.2615822
		DROP	7.3846154	2.5609968

Industry wide calculations.

N Obs	Variable	N	Minimum	Maximum	Mean
117	PRCNT	116	0	1.0000000	0.5438793
	DROP	117	6.0000000	24.0000000	8.3076923

N Obs	Variable	Std Dev
117	PRCNT	0.2499592
	DROP	4.2313720

The following table is the nonparametric statistical calculations to detect any differences between the Joint, Nonjoint and the Vo-tech programs.

N P A R 1 W A Y P R O C E D U R E

Wilcoxon Scores (Rank Sums) for Variable PRCNT
Classified by Variable PRGRM

PRGRM	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
JATC	25	1672.50000	1437.50000	144.774296	66.9000000
NJNT	50	2745.00000	2875.00000	173.620676	54.9000000
VOTC	39	2137.50000	2242.50000	165.992853	54.8076923

Average Scores were used for Ties

Kruskal-Wallis Test (Chi-Square Approximation)
CHISQ= 2.6350 DF= 2 Prob > CHISQ= 0.2678

This Chi-Square value indicates there is no significant difference in the completion rate between the programs.

N P A R 1 W A Y P R O C E D U R E

Wilcoxon Scores (Rank Sums) for Variable PRCNT
Classified by Variable CRAFT

CRAFT	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
EL	27	1407.00000	1552.50000	148.753763	52.111111
SM	4	258.50000	230.00000	64.380270	64.625000
MI	1	114.00000	57.50000	32.626138	114.000000
SF	4	259.50000	230.00000	64.380270	64.875000
CA	18	1075.00000	1035.00000	127.584619	59.722222
PF	4	269.00000	230.00000	64.380270	67.250000
RM	28	1678.00000	1610.00000	150.610307	59.928571
PA	3	181.50000	172.50000	56.007807	60.500000
IW	3	144.50000	172.50000	56.007807	48.166667
EQ	2	69.00000	115.00000	45.935713	34.500000
PB	13	832.50000	747.50000	111.213835	64.038462
GL	1	62.50000	57.50000	32.626138	62.500000
IN	1	4.50000	57.50000	32.626138	4.500000
BM	4	174.50000	230.00000	64.380270	43.625000
TS	1	25.00000	57.50000	32.626138	25.000000

Average Scores were used for Ties

Kruskal-Wallis Test (Chi-Square Approximation)
CHISQ= 10.796 DF= 14 Prob > CHISQ= 0.7020

This Chi-Square value indicates there is no significant difference between the completion rate between the various crafts within the industry.

Question #15

When does the highest rate of student dropout occur?

The statistical analyses of question #15 follows.

The student dropout rate means were calculated and presented in Question #15. This table is the nonparametric statistical calculations to detect any differences between the various programs.

The programs (PRGRM) type JATC are Joint Apprenticeship Training Committees.
The programs (PRGRM) type NJNT are Nonjoint Apprenticeship Training Committees.
The programs (PRGRM) type VOTC are publicly funded Community Colleges and Vocational Education Centers offering construction related courses.

N P A R 1 W A Y P R O C E D U R E

Wilcoxon Scores (Rank Sums) for Variable PRCNT
Classified by Variable PRGRM

PRGRM	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
JATC	25	1755.00000	1462.50000	148.513161	70.2000000
NJNT	52	2831.50000	3042.00000	179.624636	54.4519231
VOTC	39	2199.50000	2281.50000	170.628632	56.3974359

Average Scores were used for Ties

Kruskal-Wallis Test (Chi-Square Approximation)
CHISQ= 3.9540 DF= 2 Prob > CHISQ= 0.1385

This Chi-Square value indicates there is no significant difference in the drop out rate between the various programs.

Question #16

Do you feel a one year pre-apprenticeship program would help reduce the dropout rate?

No statistical analyses were performed on this question.

Question #17

What is the approximate square footage devoted to construction craft training?

1. **Classroom instruction.**
2. **Shop instruction.**
3. **Administrative functions.**

The statistical analysis of question #17 follows.

The following table are the square footage mean calculations for the various programs.

The variable CLASS is the square footage devoted to classroom instruction,
The variable SHOP is the square footage devoted to shop instruction.
The variable ADMIN is the square footage devoted to administrative duties.

The programs (PRGRM) type JATC are Joint Apprenticeship Training Committees.
The programs (PRGRM) type NJNT are Nonjoint Apprenticeship Training Committees.
The programs (PRGRM) type VOTC are publicly funded Community Colleges and Vocational Education Centers offering construction related courses.

PRGRM	N Obs	Variable	N	Minimum	Maximum	Mean
JATC	19	CLASS	16	300.0000000	20000.00	4456.75
		SHOP	14	240.0000000	16000.00	6302.86
		ADMIN	15	240.0000000	2200.00	882.6666667
NJNT	24	CLASS	12	200.0000000	6000.00	1230.00
		SHOP	13	150.0000000	15000.00	2634.62
		ADMIN	8	50.0000000	5000.00	1037.50
VOTC	19	CLASS	10	450.0000000	4000.00	1610.60
		SHOP	10	1500.00	16900.00	7030.20
		ADMIN	5	100.0000000	1200.00	514.8000000

PRGRM	N Obs	Variable	Std Dev
JATC	19	CLASS	5127.85
		SHOP	5411.05
		ADMIN	619.3944816
NJNT	24	CLASS	1567.82
		SHOP	3790.30
		ADMIN	1666.64
VOTC	19	CLASS	1229.04
		SHOP	6067.06
		ADMIN	418.3242761

Question #18

Are the Classroom facilities adequate?

No statistical analyses were performed on this question.

Question #19

Are the shop facilities adequate?

No statistical analyses were performed on this question.

Question #20

Are the administrative facilities adequate?

No statistical analyses were performed on this question.

Question #21

What is the current student enrollment in each training program offered?

The data for this question was developed through research at the Florida Departments of Labor and Education, not from responses to the survey instrument.

Question #22

Does this training program have a permanent or part-time office and administrative staff?

No statistical analyses were performed on this question.

Question #23

Please identify the number of staff personnel.

No statistical analyses were performed on this question.

Question #24

Please identify the number of staff personnel who report to:

1. **The apprenticeship committee.**

2. **The local education agency.**

The statistical analysis for Questions #23 and #24 follows.

The following tables are the staff personnel mean calculations, first for the various programs and then for the industry as a whole.

The variable ADM is the number of administrative personnel.
The variable TECH is the number of technical and/or instruction personnel.
The variable SEC is the number of secretarial personnel.
The variable OTH is the number of "other" personnel.
The variable AADM is the number of administrative personnel who report to the apprenticeship committee.
The variable ATECH is the number of technical and/or instruction personnel who report to the apprenticeship committee.
The variable ASEC is the number of secretarial personnel who report to the apprenticeship committee.
The variable AOTH is the number of "other" personnel who report to the apprenticeship committee.
The variable EADM is the number of administrative personnel who report to the local education agency.
The variable ETECH is the number of technical and/or instruction personnel who report to the local education agency.
The variable ESEC is the number of secretarial personnel who report to the local education agency.
The variable EOTH is the number of "other" personnel who report to the local education agency.

The programs (PRGRM) type JATC are Joint Apprenticeship Training Committees.
The programs (PRGRM) type NJNT are Nonjoint Apprenticeship Training Committees.
The programs (PRGRM) type VOTC are publicly funded Community Colleges and Vocational Education Centers offering construction related courses.

Individual program calculations.

PRGRM	N Obs	Variable	N	Minimum	Maximum	Mean
JATC	19	ADM	18	0.5000000	10.0000000	1.5833333
		TECH	13	0.5000000	13.0000000	4.5769231
		SEC	11	1.0000000	2.0000000	1.0909091
		OTH	4	0	8.0000000	3.5000000
		AADM	18	0.5000000	5.0000000	1.3055556
		ATECH	10	0.5000000	13.0000000	4.9500000
		ASEC	6	1.0000000	1.0000000	1.0000000
		AOTH	1	0	0	0
		EADM	11	0.5000000	5.0000000	1.4090909
		ETECH	8	0.5000000	13.0000000	4.3125000
		ESEC	1	0	0	0
		EOTH	1	0	0	0

PRGRM	N Obs	Variable	N	Minimum	Maximum	Mean
NJNT	24	ADM	19	1.0000000	8.0000000	1.7894737
		TECH	17	1.0000000	27.0000000	8.7647059
		SEC	14	0.5000000	2.0000000	1.0357143
		OTH	7	1.0000000	10.0000000	3.0000000
		AADM	16	1.0000000	6.0000000	1.4375000
		ATECH	16	1.0000000	27.0000000	7.9375000
		ASEC	9	0.5000000	1.0000000	0.9444444
		AOTH	8	1.0000000	10.0000000	2.6250000
		EADM	11	1.0000000	3.0000000	1.2727273
		ETECH	8	1.0000000	26.0000000	6.6250000
		ESEC	4	0.5000000	1.0000000	0.8750000
		EOTH	3	1.0000000	2.0000000	1.3333333
VOTC	18	ADM	7	1.0000000	3.0000000	1.5714286
		TECH	16	1.0000000	25.0000000	4.4375000
		SEC	8	1.0000000	12.0000000	2.8750000
		OTH	1	1.0000000	1.0000000	1.0000000
		AADM	4	1.0000000	2.0000000	1.2500000
		ATECH	7	1.0000000	40.0000000	8.0000000
		ASEC	1	0	0	0
		AOTH	2	1.0000000	8.0000000	4.5000000
		EADM	11	1.0000000	3.0000000	1.2727273
		ETECH	14	1.0000000	40.0000000	5.4285714
		ESEC	6	1.0000000	4.0000000	1.5000000
		EOTH	1	8.0000000	8.0000000	8.0000000

PRGRM	N Obs	Variable	Std Dev
JATC	19	ADM	2.1299682
		TECH	3.6620017
		SEC	0.3015113
		OTH	3.6968455
		AADM	0.9872554
		ATECH	4.0855436
		ASEC	0
		AOTH	.
		EADM	1.2413336
		ETECH	4.2672967
		ESEC	.
		EOTH	.
NJNT	24	ADM	1.6525720
		TECH	8.4891800
		SEC	0.3078640
		OTH	3.2659863
		AADM	1.3149778
		ATECH	9.1028842
		ASEC	0.1666667
		AOTH	3.1594529
		EADM	0.6466698
		ETECH	8.3484387
		ESEC	0.2500000
		EOTH	0.5773503
VOTC	18	ADM	0.7867958
		TECH	6.1315441
		SEC	3.8335921
		OTH	.
		AADM	0.5000000
		ATECH	14.2594998
		ASEC	.
		AOTH	4.9497475
		EADM	0.6466698
		ETECH	10.2260172
		ESEC	1.2247449
		EOTH	.

Industry wide calculations.

N Obs	Variable	N	Minimum	Maximum	Mean
61	ADM	44	0.5000000	10.0000000	1.6704545
	TECH	46	0.5000000	27.0000000	6.0760870
	SEC	33	0.5000000	12.0000000	1.5000000
	OTH	12	0	10.0000000	3.0000000
	AADM	38	0.5000000	6.0000000	1.3552632
	ATECH	33	0.5000000	40.0000000	7.0454545
	ASEC	16	0	1.0000000	0.9062500
	AOTH	11	0	10.0000000	2.7272727
	EADM	33	0.5000000	5.0000000	1.3181818
	ETECH	30	0.5000000	40.0000000	5.4500000
	ESEC	11	0	4.0000000	1.1363636
	EOTH	5	0	8.0000000	2.4000000

N Obs	Variable	Std Dev
61	ADM	1.7419021
	TECH	6.7872162
	SEC	1.9764235
	OTH	3.1622777
	AADM	1.0837117
	ATECH	9.1449812
	ASEC	0.2719528
	AOTH	3.2891005
	EADM	0.8643836
	ETECH	8.2966030
	ESEC	1.0022702
	EOTH	3.2093613

Question #25

Does this program receive grant funding from:

No statistical analyses were performed on this question.

Question #26

Please identify the funding agency, the funding amount and the funding duration.

No statistical analyses were performed on this question.

Question #27

Please identify any specific funding criteria.

No statistical analyses were performed on this question.

Question #28

What is the approximate yearly budget for this training program?

No statistical analyses were performed on this question.

Question #29

What is the annual cost to the student?

The statistical analyses of Questions #29 and parts of #30, #31 and #32 follow.

The following tables are cost data mean calculations, first for the various programs and then for the industry as a whole.

The variable STUD is the cost to the student.
The variable CONT is the cost to the contractor per student.
The variable EDUC is the cost to the public education finance committee per student.
The variable COST is the estimated expenditure per student.

The programs (PRGRM) type JATC are Joint Apprenticeship Training Committees.
The programs (PRGRM) type NJNT are Nonjoint Apprenticeship Training Committees.
The programs (PRGRM) type VOTC are publicly funded Community Colleges and Vocational Education Centers offering construction related courses.

Individual program calculations.

PRGRM	N Obs	Variable	N	Minimum	Maximum	Mean
JATC	19	STUD	14	0	200.0000000	67.8571429
		CONT	0	.	.	.
		EDUC	7	900.0000000	7500.00	3176.57
		COST	14	1157.00	6000.00	2381.21
NJNT	24	STUD	14	0	125.0000000	66.4285714
		CONT	19	0	950.0000000	313.6842105
		EDUC	20	3912.00	3912.00	3912.00
		COST	12	60.0000000	2800.00	992.92
VOTC	19	STUD	15	88.0000000	1000.00	505.0666667
		CONT	3	125.0000000	480.0000000	301.6666667
		EDUC	19	3500.00	3912.00	3884.42
		COST	6	1682.00	4000.00	3072.00

PRGRM	N Obs	Variable	Std Dev
JATC	19	STUD	58.5962156
		CONT	.
		EDUC	2399.37
		COST	1245.19
NJNT	24	STUD	45.5001509
		CONT	196.2413629
		EDUC	0
		COST	938.3610914
VOTC	19	STUD	278.6942684
		CONT	177.5058684
		EDUC	96.5621940
		COST	868.1612753

Industry wide calculations.

N Obs	Variable	N	Minimum	Maximum	Mean
62	STUD	43	0	1000.00	219.9069767
	CONT	22	0	950.0000000	312.0454545
	EDUC	46	900.0000000	7500.00	3788.70
	COST	32	60.0000000	6000.00	1990.13

N Obs	Variable	Std Dev
62	STUD	268.6883319
	CONT	189.8097989
	EDUC	916.6470512
	COST	1328.45

The following tables are the nonparametric statistical calculations to determine and differences between the programs.

N P A R 1 W A Y P R O C E D U R E

Wilcoxon Scores (Rank Sums) for Variable STUD
Classified by Variable PRGRM

PRGRM	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
JATC	14	208.000000	308.0	38.5030453	14.8571429
NJNT	14	212.500000	308.0	38.5030453	15.1785714
VOTC	15	525.500000	330.0	39.1612647	35.0333333

Average Scores were used for Ties

Kruskal-Wallis Test (Chi-Square Approximation)
CHISQ= 24.926 DF= 2 Prob > CHISQ= 0.0001

This Chi-Square value indicates there is a significant difference in the cost to the student between the various programs.

N P A R 1 W A Y P R O C E D U R E

Wilcoxon Scores (Rank Sums) for Variable STUD
Classified by Variable PRGRM

PRGRM	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
JATC	14	200.0	203.0	21.6204636	14.2857143
NJNT	14	206.0	203.0	21.6204636	14.7142857

Average Scores were used for Ties

Wilcoxon 2-Sample Test (Normal Approximation)
(with Continuity Correction of .5)

S= 200.000 Z= -.115631 Prob > |Z| = 0.9079

T-Test approx. Significance = 0.9088

Kruskal-Wallis Test (Chi-Square Approximation)
CHISQ= 0.01925 DF= 1 Prob > CHISQ= 0.8896

N P A R 1 W A Y P R O C E D U R E

Wilcoxon Scores (Rank Sums) for Variable STUD
Classified by Variable PRGRM

PRGRM	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
JATC	14	113.0	210.0	22.8874683	8.0714286
VOTC	15	322.0	225.0	22.8874683	21.4666667

Average Scores were used for Ties

Wilcoxon 2-Sample Test (Normal Approximation)
(with Continuity Correction of .5)

S= 113.000 Z= -4.21628 Prob > |Z| = 0.0001

T-Test approx. Significance = 0.0002

Kruskal-Wallis Test (Chi-Square Approximation)
CHISQ= 17.962 DF= 1 Prob > CHISQ= 0.0001

This Chi-Square value indicates there is a significant difference between the cost to the student between the Joint and Vo-tech programs.

N P A R 1 W A Y P R O C E D U R E

Wilcoxon Scores (Rank Sums) for Variable STUD
Classified by Variable PRGRM

PRGRM	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
NJNT	14	111.500000	210.0	22.8733394	7.9642857
VOTC	15	323.500000	225.0	22.8733394	21.5666667

Average Scores were used for Ties

Wilcoxon 2-Sample Test (Normal Approximation)
(with Continuity Correction of .5)

S= 111.500 Z= -4.28446 Prob > |Z| = 0.0001

T-Test approx. Significance = 0.0002

Kruskal-Wallis Test (Chi-Square Approximation)
CHISQ= 18.544 DF= 1 Prob > CHISQ= 0.0001

This Chi-Square value indicates there is a significant difference in the cost to the student between the Nonjoint and Vo-tech programs.

Question #30

What is the annual cost, per student, to the contractor?

The statistical analysis for question #30 follows.

The means were calculated above.

The programs (PRGRM) type JATC are Joint Apprenticeship Training Committees.
The programs (PRGRM) type NJNT are Nonjoint Apprenticeship Training Committees.
The programs (PRGRM) type VOTC are publicly funded Community Colleges and Vocational Education Centers offering construction related courses.

This table is the nonparametric statistical analysis to determine if there is any cost difference between the programs.

N P A R 1 W A Y P R O C E D U R E

Wilcoxon Scores (Rank Sums) for Variable CONT
Classified by Variable PRGRM

PRGRM	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
NJNT	19	218.0	218.500000	10.4345517	11.4736842
VOTC	3	35.0	34.500000	10.4345517	11.6666667

Average Scores were used for Ties

Wilcoxon 2-Sample Test (Normal Approximation)
(with Continuity Correction of .5)

S= 35.0000 Z= 0 Prob > |Z| = 0.9999

T-Test approx. Significance = 0.9999

Kruskal-Wallis Test (Chi-Square Approximation)
CHISQ= 0.00230 DF= 1 Prob > CHISQ= 0.9618

This Chi-Square value indicates there is no significant difference in cost to the contractor between the Nonjoint and Vo-tech programs.

Question #31

What is the annual cost per student, if any, to the public education finance committee?

The statistical analysis for this question follows.

The means were calculated above.

The programs (PRGRM) type JATC are Joint Apprenticeship Training Committees.
The programs (PRGRM) type NJNT are Nonjoint Apprenticeship Training Committees.
The programs (PRGRM) type VOTC are publicly funded Community Colleges and Vocational Education Centers offering construction related courses.

This table is the nonparametric statistical calculations to determine any differences between the programs.

N P A R 1 W A Y P R O C E D U R E

Wilcoxon Scores (Rank Sums) for Variable EDUC
Classified by Variable PRGRM

PRGRM	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
JATC	7	128.500000	164.500000	19.1374510	18.3571429
NJNT	20	510.000000	470.000000	26.4121916	25.5000000
VOTC	19	442.500000	446.500000	26.0338149	23.2894737

Average Scores were used for Ties

Kruskal-Wallis Test (Chi-Square Approximation)
CHISQ= 4.3102 DF= 2 Prob > CHISQ= 0.1159

This Chi-Square value indicates there is no significant difference in cost to the public education finance committee between the various programs.

Question #32

What is this program's estimated expenditure to educate each student per year?

The statistical analysis of question #32 follows.

The means were calculated above.

The programs (PRGRM) type JATC are Joint Apprenticeship Training Committees.
The programs (PRGRM) type NJNT are Nonjoint Apprenticeship Training Committees.
The programs (PRGRM) type VOTC are publicly funded Community Colleges and Vocational Education Centers offering construction related courses.

This table is the nonparametric statistical calculations to determine any differences between the programs.

N P A R 1 W A Y P R O C E D U R E

Wilcoxon Scores (Rank Sums) for Variable COST
Classified by Variable PRGRM

PRGRM	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
JATC	14	254.500000	231.0	26.3055863	18.1785714
NJNT	12	128.500000	198.0	25.6716236	10.7083333
VOTC	6	145.000000	99.0	20.6971246	24.1666667

Average Scores were used for Ties

Kruskal-Wallis Test (Chi-Square Approximation)
CHISQ= 9.0432 DF= 2 Prob > CHISQ= 0.0109

This Chi-Square value indicates there is a significant difference in the per student expenditure between the various programs.

N P A R 1 W A Y P R O C E D U R E

Wilcoxon Scores (Rank Sums) for Variable COST
Classified by Variable PRGRM

PRGRM	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
JATC	14	126.500000	147.0	12.1061098	9.0357143
VOTC	6	83.500000	63.0	12.1061098	13.9166667

Average Scores were used for Ties

Wilcoxon 2-Sample Test (Normal Approximation)
(with Continuity Correction of .5)

S= 83.5000 Z= 1.65206 Prob > |Z| = 0.0985

T-Test approx. Significance = 0.1150

Kruskal-Wallis Test (Chi-Square Approximation)
CHISQ= 2.8675 DF= 1 Prob > CHISQ= 0.0904

This Chi-Square value indicates there is no significant difference in the per student expenditure between the Joint and Vo-tech programs.

N P A R 1 W A Y P R O C E D U R E

Wilcoxon Scores (Rank Sums) for Variable COST
Classified by Variable PRGRM

PRGRM	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
JATC	14	233.0	189.0	19.4322492	16.6428571
NJNT	12	118.0	162.0	19.4322492	9.8333333

Average Scores were used for Ties

Wilcoxon 2-Sample Test (Normal Approximation)
(with Continuity Correction of .5)

S= 118.000 Z= -2.23855 Prob > |Z| = 0.0252

T-Test approx. Significance = 0.0343

Kruskal-Wallis Test (Chi-Square Approximation)
CHISQ= 5.1270 DF= 1 Prob > CHISQ= 0.0236

This Chi-Square value indicates there is a significant difference in per student expenditure between the Joint and Nonjoint programs.

N P A R 1 W A Y P R O C E D U R E

Wilcoxon Scores (Rank Sums) for Variable COST
Classified by Variable PRGRM

PRGRM	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
NJNT	12	88.5000000	114.0	10.6715675	7.3750000
VOTC	6	82.5000000	57.0	10.6715675	13.7500000

Average Scores were used for Ties

Wilcoxon 2-Sample Test (Normal Approximation)
(with Continuity Correction of .5)

S= 82.5000 Z= 2.34267 Prob > |Z| = 0.0191

T-Test approx. Significance = 0.0316

Kruskal-Wallis Test (Chi-Square Approximation)
CHISQ= 5.7098 DF= 1 Prob > CHISQ= 0.0169

This Chi-Square value indicates there is a significant difference between the per student expenditure between Nonjoint and Vo-tech programs.

Question #33

Is the construction industry providing enough craft training?

No statistical analyses were performed on this question.

Question #34

Does the location of your training program meet the student needs?

No statistical analyses were performed on this question.

Question #35

As a construction craft training provider, what is your primary need?

No statistical analyses were performed on this question.

Question #36

What are the biggest problems associated with providing construction craft training?

No statistical analyses were performed on this question.

Question #37

What is your recommended solution to solving these training problems

No statistical analyses were performed on this question.

Question #38

Do you have any further comments you would like to share?

No statistical analyses were performed on this question.

Appendix D

Sample Apprenticeship Curriculum

LESSON OUTLINE

NATIONAL ELECTRICAL COURSE
FOR
APPRENTICE INSIDE WIREMEN

FIRST YEAR

Lesson Number	Test Period	Code	Lesson Title	New	Revised/ Combined	Relocated From Year
1-01	1	O	How to Study This Course			
1-02		O	IBEW/NECA Apprenticeship			
1-03		O	Your Apprenticeship			
1-04		O	History of the IBEW			
1-05		O	NECA			
1-06		O	Your Job and Its Future			2-1
1-07		O	Motivation and Leadership			2-3
1-08		O	National Program	N		
1-09		O	Put Safety First	N		
1-10	2	J	Tools			
1-11		J	The Workplace			
1-12		J	Safety With Ladders			
1-13		J	Fastening Devices			
1-14		J	Electrical Shock			
1-15		J	Knot Tying	N		
1-16	3	J	Working Overhead			3-5
1-17		J	Hoisting Overload Loads			3-6
1-18		J	Wire Connectors		R	2-31
1-19		J	Wire and Insulation		R	
1-20		J	Sizes of Building Wire			
1-21	4	M	Working With Fractions	N		
1-22		M	Introduction to Trigonometry			
1-23		J	90° Stubs		R	
1-24		J	Kicks and Offsets		R	
1-25		J	Saddles		R	
1-26	5	M	Prefixes and Powers of 10		R	2-21
1-27		M	The Metric System and Metrication		R/C	4-21
1-28		T	Electron Theory, Sources and Effects		R/C	
1-29		M	Solving Simple Equations			
1-30		T	Electric Units and Ohm's Law*		R/C	
1-31		M	Square Root			
1-32		T	Power*			
1-33		T	Electrical and Electronic Devices	N		
1-34	6	T	Resistance in Series Circuits*		R	
1-35		T	Current in Series Circuits*		R	
1-36		T	Voltage in Series Circuits*		R	
1-37		J	Danger-High Voltage	N		
1-38		M	Ratio and Proportion			
1-39		T	Voltage Divider Circuits*			
1-40		T	Power in Series Circuits*			

Lesson Number	Test Period	Code	Lesson Title	New	Revised/ Combined	Relocated From Year
1-41	7	T	Voltage in Parallel Circuits*			
1-42		T	Resistance in Parallel Circuits*			
1-43		T	Current in Parallel Circuits*			
1-44		T	Current Divider Circuits*			
1-45		T	Power in Parallel Circuits*			
1-46	8	T	Resistance in Combination Circuits*			
1-47		T	Current in Combination Circuits*			
1-48		T	Voltage in Combination Circuits*			
1-49		T	Power in Combination Circuits*			
1-50		T	Voltage Polarity and Voltage Drop*		R/C	
1-51	9	T	Magnetism and Electromagnetism		R/C	
1-52		T	Principles of Generation			
1-53		T	Superposition*			
1-54		T	Applications of DC Theory			
1-55	10	J	Aluminum Conductors			
1-56		J	Basic Circuits			
1-57		J	Overcurrent Protection Devices			
1-58		J	Ground Fault Interrupters	N		
1-59		J	The Three Wire System*			
1-60		J	Transformer Ratios*			
1-61	11	C	Introduction to the Code		R	
1-62		C	Article 110		R	
1-63		C	Code Definitions		R	
1-64		C	Conductor Materials		R	
1-65		C	Conductor Insulations		R	
1-66	12	B	Drawing and Sketching	N		
1-67		B	Views	N		
1-68		B	Scales	N		
1-69		B	Plans and Specifications	N		
1-70		B	Symbology I	N		
1-71		B	Symbology II	N		
1-72		B	Residential I	N		
1-73		B	Residential II	N		

CODES FOR LESSONS IN THE FIRST YEAR

O	-	Orientation	T	-	Theory
J	-	Job Information	C	-	Code
M	-	Mathematics	B	-	Blueprint Reading

LESSON OUTLINE

NATIONAL ELECTRICAL COURSE
FOR
APPRENTICE INSIDE WIREMEN

SECOND YEAR

Lesson Number	Test Period	Code	Lesson Title	New	Revised/ Combined	Relocated From Year
2-01	1	O	Drug Abuse			
2-02		O	IBEW Constitution			
2-03		O	Local Union By-Laws			
2-04		O	Parliamentary Procedure			
2-05		O	The COMET Program	N		
2-06		O	Blueprint for the 90's	N		
2-07	2	CO	Code Skills Evaluation		R	
2-08		CO	Orientation		R	
2-09		CO	Getting Acquainted		R	
2-10		CO	Plan-Build-Use		R	
2-11		CO	Numbering and Outline		R	
2-12		CO	Clues		R	
2-13		CO	Using Exceptions		R	
2-14		CO	"PLAN" Chapters		R	
2-15		CO	"BUILD" Chapters		R	
2-16		CO	"USE" Chapters		R	
2-17		CO	Special Chapters		R	
2-18	3	T	DC Theory Review			
2-19		T	DC and AC*			
2-20		T	The AC Generator			
2-21		T	Circuit Calculations			
2-22		T	The DC Generator			
2-23		T	Three Phase AC			
2-24		T	AC Circuits Resistive*			
2-25	4	T	Inductance*			
2-26		T	Inductive Reactance*			
2-27		T	Inductors in Series and Parallel*			
2-28		T	Capacitance*			
2-29		T	Capacitive Reactance*			
2-30		T	Capacitors in Series and Parallel*			
2-31		T	Characteristics of AC Circuits			
2-32	5	T	Series RL Circuits*			
2-33		T	Parallel RL Circuits*			
2-34		T	Series RC Circuits*			
2-35		T	Parallel RC Circuits*			
2-36	6	T	LC Circuits*			
2-37		T	Series LCR Circuits*			
2-38		T	Parallel LCR Circuits*			
2-39		T	Series-Parallel LCR Circuit Comb.			
2-40		T	Combination LCR Circuits*			

Lesson Number	Test Period	Code	Lesson Title	New	Revised/ Combined	Relocated From Year
2-41	7	J	Transformers-Introduction		R	
2-42		J	Transformers-Connections		R	
2-43		J	Transformers-Installation		R	
2-44		J	Transformers-Distribution Systems		R	
2-45	8	J	Electrical Test Instruments			
2-46		J	DC Meters*			
2-47		J	Capacitor Types and Ratings			
2-48		J	Rectifiers*			
2-49		J	AC Meters			
2-50	9	J	Ratchet Type Benders		R	
2-51		J	Segment Bending		R	
2-52		J	Concentric Bends		R	
2-53		J	Wiring Methods I	N		
2-54		J	Wiring Methods II	N		
2-55	10	J	Short Circuit Calculations		R	
2-56		J	Electrical Component Protection		R	
2-57		C	Sizing Building Wire		R	
2-58		C	Conductor Ampacity		R	
2-59		C	Conduit Wiring Methods		R	
2-60	11	C	Cable Assemblies		R	
2-61		C	Boxes and Fittings		R	
2-62		C	Range Loads			5-22
2-63		C	Residential Loads			5-23
2-64		C	Multifamily Dwelling Loads			5-24
2-65	12	B	Review	N		
2-66		B	Residential Circuiting	N		
2-67		B	Cost Awareness	N		
2-68		B	Commercial Specifications	N		
2-69		B	Commercial Prints I	N		
2-70		B	Commercial Prints II	N		
2-71		B	Commercial Prints III	N		

CODES FOR LESSONS IN THE SECOND YEAR

O - Orientation
T - Theory
C - Code
CO - Applied Codeology
J - Job Information
B - Blueprint Reading

LESSON OUTLINE

NATIONAL ELECTRICAL COURSE
FOR
APPRENTICE INSIDE WIREMEN

THIRD YEAR

Lesson Number	Test Period	Code	Lesson Title	New	Revised/ Combined	Relocated From Year
3-01	1	O	American Labor History			
3-02		T	AC Theory Review			4-9
3-03		T	Kirchhoff's Laws*			4-10
3-04		T	Thevenin's and Norton's Theorems*			4-11
3-05	2	E	Semiconductor Diode*			4-18
3-06		E	Zener Diode*			4-19
3-07		E	Single Phase Power Supplies*			4-20
3-08	3	E	Transducers*			4-26
3-09		E	Transistors*			4-27
3-10		E	Switching and Biasing Techniques*			4-28
3-11	4	E	SCRs (Silicon Controlled Rect.)*			4-29
3-12		E	SCR Applications*			4-30
3-13		E	Triacs and Diacs*			4-31
3-14		E	The UJT (Unijunction Transistor)*			4-35
3-15		E	Amplifiers I*			4-36
3-16		E	Amplifiers II*			4-37
3-17	5	E	Multistage Amplifiers*			4-38
3-18		E	JFETs and MOSFETs*			4-40
3-19		E	ICs and OP AMPs*			4-41
3-20		E	IC Timers			4-42
3-21		E	Electronic Applications			4-49
3-22	6	G	Introduction to Grounding		R	
3-23		G	Article 250		R	
3-24		G	Grounding for Safety		R	
3-25		G	Electrical Theory and Grounding		R	
3-26		G	Faults		R	
3-27		G	Grounding Electrode System		R	
3-28		G	Grounding Electrode Conductor		R	
3-29		G	System and Circuit Grounding		R	

Lesson Number	Test Period	Code	Lesson Title	New	Revised/ Combined	Relocated From Year
3-30	7	G	Grounded Conductor		R	
3-31		G	Main Bonding Jumper		R	
3-32		G	Equipment Grounding Conductor		R	
3-33		G	Equipment and Enclosure Bonding		R	
3-34		G	Equipment Grounding		R	
3-35	8	G	Grounded Circuit Conductor		R	
3-36		G	Ground-Fault Protection		R	
3-37		G	System & Circuit Gnd./1kV and Over		R	
3-38		G	Separately Derived Systems		R	
3-39		G	Two Buildings/One Service		R	
3-40		G	Calculating Ground Fault Currents		R	
3-41	9	J	Introduction to Earth Testing			5-45
3-42		J	Earth Testing-Principles and Methods			5-46
3-43		T	Transformers-Theory 3 Ø Connections			
3-44		T	Transformers-3 Ø Connections			
3-45		C	Transformer Overcurrent Protection I			5-26
3-46		C	Transformer Overcurrent Protection II			5-27
3-47	10	C	Services I		R	
3-48		C	Branch Circuits I		R	
3-49		C	General Lighting		R	
3-50		C	Branch Circuits II		R	
3-51		C	Feeders-Outside Branch Circuits/Fdrs.		R	
3-52	11	C	General		R	
3-53		C	Wiring Methods		R	
3-54		C	Overcurrent Protection		R	
3-55		C	Fuses		R	
3-56		C	Circuit Breakers		R	
3-57	12	B	Review and Introduction	N		
3-58		B	Industrial Specifications	N		
3-59		B	Industrial Prints I	N		
3-60		B	Industrial Prints II	N		
3-61		B	Industrial Prints III	N		

CODES FOR LESSONS IN THE THIRD YEAR

O - Orientation
E - Electronics
J - Job Information
B - Blueprint Reading
T - Theory
G - Electrical Grounding
C - Code

LESSON OUTLINE

NATIONAL ELECTRICAL COURSE
FOR
APPRENTICE INSIDE WIREMEN

FOURTH YEAR

Lesson Number	Test Period	Code	Lesson Title	New	Revised/ Combined	Relocated From Year
4-01	1	O	Pride In Your Industry	N		
4-02		J	Ground Fault Circuit Interrupters	N▼		
4-03		J	Introduction To Earth Testing			5-45▼
4-04		J	Earth Testing-Principles & Methods			5-46▼
4-05		C	Cable Tray Fills			5-28
4-06		C	Ampacity of Conductors Cable Trays			5-29
4-07	2	C	Transformer Overcurrent Prot. - I			5-26▼
4-08		C	Transformer Overcurrent Prot. - II			5-27▼
4-09		C	Motor Branch Circuits			5-17
4-10		C	Motor Branch Circuit Protection			5-18
4-11		C	Motor Overcurrent Protection			5-19
4-12		C	Sizing Motor Disconnect			5-20
4-13	3	C	Cords, Cables and Fixture Wire		R	
4-14		C	Lighting and Appliances		R	
4-15		C	Services II		R	
4-16		C	Wiring Materials		R	
4-17		C	Hazardous Locations		R	
4-18	4	C	Special Occupancies		R	
4-19		C	Electrical Heating		R	
4-20		C	Electrical Equipment		R	
4-21		C	Special Equipment		R	
4-22		C	Swimming Pools and Fountains		R	
4-23		C	Motors		R	
4-24	5	B	Review and Introduction	N▼		
4-25		B	Industrial Specifications	N▼		
4-26		B	Industrial Prints I	N▼		
4-27		B	Industrial Prints II	N▼		
4-28		B	Industrial Prints III	N▼		
4-29	6	T	AC Theory Review			▼
4-30		T	Power Harmonics	N		
4-31		T	Power Quality	N		
4-32		T	Kirchhoff's Laws*			▼
4-33		T	Thevenin's & Norton's Theorems*			▼

▼ NOTE - THESE LESSONS WILL BE IN THE 4TH YEAR CURRICULUM IN THE 1993-1994 PRINTING ONLY. THE 4TH YEAR CURRICULUM WILL BE REVISED IN 1994-1995 TO INCLUDE MOTORS, MOTOR CONTROLS, DIGITAL ELECTRONICS AND AC/DC DRIVES.

Lesson Number	Test Period	Code	Lesson Title	New	Revised/ Combined	Relocated From Year
4-34	7	E	Semiconductor Diode*			▼
4-35		E	Zener Diode*			▼
4-36		E	Single Phase Power Supplies*			▼
4-37	8	E	Transducers*			▼
4-38		E	Transistors*			▼
4-39		E	Switching and Biasing Techniques*			▼
4-40	9	E	SCRs (Silicon Controlled Rect.)*			▼
4-41		E	SCR Applications*			▼
4-42		E	Triacs and Diacs*			▼
4-43		E	The UJT (Unijunction Transistor)*			▼
4-44		E	Amplifiers I*			▼
4-45		E	Amplifiers II*			▼
4-46	10	E	Multistage Amplifiers*			▼
4-47		E	JFET & MOSFET*			▼
4-48		E	ICs and OP Amps*			▼
4-49		E	IC Timers			▼
4-50		E	Electronic Applications			▼
4-51	11	DE	Digital Logic Elements*‡			
4-52		DE	Digital Switching Circuits*‡			
4-53		DE	Digital Control*‡			
4-54		E	Fiber Optics			
4-55		E	Optoelectronic Devices*			
4-56	12	MC	Wound-Rotor Motor Controls			
4-57		MC	Synchronous Motor Controls			
4-58		MC	Clutches and Drives			
4-59		MC	Motor Control Applications			
4-60		MC	AC Motor Variable Speed Controls			

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CODES FOR LESSONS IN THE FOURTH

J	-	Job Information	T	-	Theory
E	-	Electronics	C	-	Code
DE	-	Digital Electronics	B	-	Blueprint Reading
MC	-	Motor Control			

LESSON OUTLINE

NATIONAL ELECTRICAL COURSE
FOR
APPRENTICE INSIDE WIREMEN

FIFTH YEAR

Lesson Number	Test Period	Code	Lesson Title	New	Revised/ Combined	Relocated From Year
5-01	1	O	NEBF			
5-02		O	After Apprenticeship			
5-03		O	The Comet Program/ Recruiting & Organizing	N		
5-04		O	Blueprint for the 90's	N		
5-05		O	Soon To Be An Instructor	N		
5-06		O	National Program	N		
5-07		O	Sexual Harassment	N		
5-08	2	L	Basic Fire Alarms		R	
5-09		L	Advanced Technology Systems	N		
5-10		L	Initiating Dev. & Indicating Appl.		R/C	
5-11		L	Fire Alarm Installation		R	
5-12		L	Start-Up and Checkout Procedures		R	
5-13		L	Maintenance and Troubleshooting		R	
5-14	3	P	Principles of Process/Process Control			4-51
5-15		P	Process Time Lags			4-52
5-16		P	Basic Manual and Feedback Control			4-53
5-17		P	Proportional Control Action			4-54
5-18	4	P	Review of Proportional Control			
5-19		P	Proportional + Integral Control			
5-20		P	Action			
5-21		P	Derivative Control Action			
			Sensors and Transmission Systems			
5-22	5	TC	Basic Telephone Wiring	N		
5-23		TC	Telephone Systems Installation	N		
5-24		TC	Teledata Systems	N		
5-25	6	J	High Voltage Testing Safety			
5-26		J	Introduction to High Voltage Testing			
5-27		J	Preparing for High Voltage Testing			
5-28		J	Insulation Quality Testing			
5-29		J	Acceptance and Maintenance Testing			
5-30		J	Insulation Test. Using a Megohmmeter			

Lesson Number	Test Period	Code	Lesson Title	New	Revised/ Combined	Relocated From Year
5-31	7	AC/R	AC/R - Introduction		R	2-41
5-32		AC/R	AC/R - Heat, Temp. & Pressure			2-42
5-33		AC/R	Refrigerants & Ozone Depletion			3-63
5-34		AC/R	Tools			3-64
5-35	8	AC/R	Piping			3-65
5-36		AC/R	Vapor-Compression Refrig. Systems			4-23
5-37		AC/R	Refrigeration Loads			4-24
5-38		AC/R	Introduction to Air Conditioning			4-25
5-39	9	J	Introduction to Cable Faults			
5-40		J	Locating Cbl. Faults-Terminal Meth.			
5-41		J	Locating Cbl. Faults-Tracing Method			
5-42		J	Locating Cbl. Faults-Magnetic Detc.			
5-43		J	Uninterruptable Power Sources			
5-44	10	L	Basic Security Systems			
5-45		L	Alarm Sensors			
5-46		L	Alarm Indicating Devices			
5-47		L	System Installation and Start-Up			
5-48	11	PLC	Basic I/O Hardware			
5-49		PLC	Processors and Memory			
5-50		PLC	Numbering Systems and Memory			
5-51		PLC	Ladder Diag. and Relay Type Inst.			
5-52		PLC	Programming Devices			
5-53		PLC	Small Programmable Controllers			
5-54	12	PLC	Latching and Master Control Relays			
5-55		PLC	Programming Timers			
5-56		PLC	Programming Counters			
5-57		PLC	Data Manipulation and Arithmetic			
5-58		PLC	Shift Registers and Sequencers			
5-59		PLC	Start-Up and Troubleshooting			

CODES FOR LESSONS IN THE FIFTH YEAR

O - Orientation
P - Process Control
J - Job Information
PLC - Programmable Logic Controllers
L - Low Voltage
TC - Telecommunications
AC/R - Air Conditioning/Refrigeration

APPRENTICESHIP TRAINING PROGRAM

CLASSROOM CURRICULUM

RESIDENTIAL AND COMMERCIAL ELECTRIC WIRING

DOT - 824.261.101

FLORIDA CIP - 0646.030200

FIRST YEAR, FIRST SEMESTER

AREA OF INSTRUCTION	CLASSROOM HOURS

1.0 OCCUPATIONAL SAFETY — **20**

- 1.1 Federal Hazard Standards (OSHA)
- 1.2 Qualify in CPR
- 1.3 Qualify in First Aid

2.0 INTRODUCTION — **10**

- 2.1 Introduction to the trade
- 2.2 Describe the development of electrical theory
- 2.3 Identify and describe the basic tools of the trade
- 2.4 Describe basic atomic theory as it applies to circuit analysis

3.0 BASIC MATH FOR ELECTRICIANS — **15**

- 3.1 Solve job-related problems by adding, subtracting, multiplying, and dividing correctly
- 3.2 Demonstrate a basic understanding of the theoretical and practical applications of fractions
- 3.3 Demonstrate a basic understanding of algebra as it applies to the solution of job-related problems
- 3.4 Demonstrate the ability to use a hand held calculator to solve problems involving electrical calculations
- 3.5 Demonstrate the ability to solve job-related problems involving percentages
- 3.6 Demonstrate the ability to perform unit conversions
- 3.7 Demonstrate the ability to solve job-related word problems
- 3.8 Demonstrate a basic understanding of trigonometric functions related to electric wiring
- 3.9 Relate electricity to the nature of matter

4.0 BASIC ELECTRICAL CIRCUITS & THEORY (DC CIRCUTS) — **30**

- 4.1 Define and describe basic electrical laws (Ohm's Law and Kirchoff's Law)
- 4.2 Identify, define, and analyze series, series-parallel, and parallel circuits
- 4.3 Relate Ohm's Law to DC circuitry
- 4.4 Demonstrate the ability to draw each type circuit and to calculate the circuit values

FIRST YEAR, SECOND SEMESTER

AREA OF INSTRUCTION	CLASSROOM HOURS
5.0 POWER, & MAGNETISM	**20**
5.1 Define power and energy	
5.2 Define magnetic properties of circuits and devices	
5.3 Define the principles of electromagnetism	
5.4 Describe the development, theory, and application of magnetism	
5.5 Demonstrate the ability to solve practical electrical problems as applied to branch circuits	
5.6. Describe the differences among fossil fuel, hydroelectric, and nuclear power	
5.7 Describe the transmission of electrical power across country and distribution techniques in the city	
6.0 NATIONAL ELECTRICAL CODE (NEC)	**25**
6.1 Identify and demonstrate a familiarization of the National Electrical Code (NEC)	
6.2 Explain the application of the NEC to conductors and insulation installation	
6.3 Identify various practical applications of the NEC	
7.0 CONDUCTORS, INSULATION, CABLE, & CONDUITS	**30**
7.1 Demonstrate the ability to measure conductance and resistance of conductors and insulators	
7.2 Explain the structure and sizing of electrical conductors	
7.3 Identify and define the properties and application of different insulations used for construction wiring	
7.4 Describe the proper techniques for bending IMT, PVC, and rigid conduit	
7.5 Describe the proper procedures for the laying out of off-set, saddles, back-to-back, stub-up, and kick bends	
7.6 Identify and describe various electrical devices (switches, receptacles, etc.)	
7.7 Identify and describe various boxes and fittings and the NEC requirements for sizing and use of boxes	

SECOND YEAR, FIRST SEMESTER

AREA OF INSTRUCTION	CLASSROOM HOURS
1.0 OCCUPATIONAL SAFETY	**5**
1.1 Review of Federal Hazard Standards (OSHA)	
1.4 Identify common safety hazards	
1.5 Identify the various types of fire extinguishers and describe the proper methods of operating each	
8.0 BLUEPRINT READING	**15**
8.1 Identify and define the various electrical symbols used in trade blueprints	
8.2 Demonstrate the ability to read and interpret trade blueprints	
8.3 Identify and define various components of construction drawings: schedules and specifications	
9.0 AC CIRCUITS	**55**
9.1 Explain the general distribution of AC	
9.2 Explain the principles and specific electrical characteristics of AC	
9.3 Explain the difference in Ohm's Law as it applies to AC	
9.4 Explain the basic transformer theory	
9.5 Define the basic formula for calculating values in step-up and step-down transformers	
9.6 Identify the most common instruments and meters used in the electrical trade	
9.7 Identify physical and electrical characteristics of capacitors and inductors	
9.8 Describe the proper procedures for analyzing and measuring inductive resistance (RL) and reactive capacitance (RC) time constants	
9.9 Describe motor theory and operation	
9.10 Describe generator theory and operation	
9.11 Describe the proper procedures to construct a parallel and series RL circuit	
9.12 Describe the proper procedures to construct a parallel and series RC circuit	
9.13 Describe the proper procedures to construct a parallel and series inductive reactance capacitance (RLC) circuit	
9.14 Describe the proper procedures to setup and utilize a watt-hour meter	

SECOND YEAR, SECOND SEMESTER

AREA OF INSTRUCTION	CLASSROOM HOURS

9.0 AC CIRCUITS (CONTINUED) — **40**

- 9.15 Describe the proper procedures to measure voltage and current in circuits with transformers
- 9.16 Describe the proper procedures to construct and analyze AC capacitive circuits
- 9.17 Describe the proper procedures to construct and analyze AC inductive circuits
- 9.18 Describe the proper procedures to setup and operate impedance bridges for AC circuits
- 9.19 Apply the principles of transformers to AC circuits
- 9.20 Describe the proper procedures to install capacitors in series in AC circuits
- 9.21 Identify and define a time constant curve
- 9.22 Describe the proper procedures to install inductors is series in AC circuits
- 9.23 Describe the proper procedures to construct and analyze power and control transformers

10.0 GENERAL ELECTRICAL SKILLS — **35**

- 10.1 Explain the application and operating characteristics of overcurrent devices such as circuit breakers and fuses
- 10.2 Identify and explain the uses of different classes of fuses
- 10.3 Demonstrate a basic understanding of circuit breakers and their maintenance
- 10.4 Describe the methods and materials used for underground ducting
- 10.5 Identify and describe NEC requirements, safety guidelines, and procedures for installation and wiring using underfloor raceways
- 10.6 Identify and describe cable tray and cable tray systems
- 10.7 Identify and describe procedures for installation and NEC requirements for cable tray and cable tray systems
- 10.8 Identify the types of wireways and surface metal raceways and describe the procedures for their installation
- 10.9 Identify and explain the operating functions of panelboards, subpanels, and load centers
- 10.10 Define the theory of grounding
- 10.11 Distinguish between system grounding and equipment grounding
- 10.12 Identify the material characteristics and describe the installation of AC and DC system grounding conductors
- 10.13 Identify the types of metallic sheathed cables and describe the general requirements for their installation
- 10.14 Identify and describe the application and the installation of special wires and cables
- 10.15 Describe how to make up cable and obtain strain relief

THIRD YEAR, FIRST SEMESTER

AREA OF INSTRUCTION	CLASSROOM HOURS

1.0 OCCUPATIONAL SAFETY **20**

- 1.1 Review of Federal Hazard Standards (OSHA)
- 1.2 Renew CPR certification
- 1.3 Renew First Aid certification
- 1.6 Identify the different classifications, divisions, and groups used to describe hazardous locations
- 1.7 Identify and describe the electrical safety practices and procedures used while working with circuits or equipment in low voltage, high voltage, and hazardous locations

11.0 RESIDENTIAL WIRING **55**

- 11.1 Explain the criteria used for selecting a specified lighting system for a given demand
- 11.2 Explain the basis for calculating loads for different types of residential circuits
- 11.3 Explain the operating characteristics of electric resistance heat
- 11.4 Identify the controls used to regulate electric resistance heat
- 11.5 Identify tools and material to complete a job
- 11.6 Select wire appropriate for job requirements
- 11.7 Identify residential wiring requirements based on a floor plan
- 11.8 Identify residential wiring installation specifications
- 11.9 Draw a residential wiring plan
- 11.10 Describe the proper procedures to install conductors and cable
- 11.11 Describe the proper procedures to install standard outlets and switch boxes
- 11.12 Describe the proper procedures to install cards on major appliances (whips)
- 11.13 Describe the proper procedures to install switches, receptacles, and dimmers
- 11.14 Describe the proper procedures to install a single-pole switched lighting circuit
- 11.15 Describe the proper procedures to install a three-way switched lighting circuit
- 11.16 Describe the proper procedures to install a four-way combination circuit
- 11.17 Describe the proper procedures to connect a recessed lighting fixture
- 11.18 Describe the proper procedures to connect a fluorescent lighting fixture
- 11.19 Describe the proper procedures to connect a surface lighting fixture
- 11.20 Describe the proper procedures to install a duplex receptacle outlet circuit
- 11.21 Describe the proper procedures to install a split-circuit duplex receptacle outlet circuit
- 11.22 Describe the proper procedures to install a special purpose receptacle outlet circuit
- 11.23 Describe the proper procedures to install a space heating circuit
- 11.24 Describe the proper procedures to install a low-voltage signal system
- 11.25 Describe the proper procedures to wire a heat pump circuit
- 11.26 Describe the proper procedures to wire a forced air heating circuit
- 11.27 Describe the proper procedures to install a service entrance main panel
- 11.28 Describe the proper procedures to install a service entrance meter base
- 11.29 Describe the proper procedures to install a remote control lighting circuit
- 11.30 Demonstrate the ability to calculate job installation costs

THIRD YEAR, SECOND SEMESTER

AREA OF INSTRUCTION	CLASSROOM HOURS
12.0 ELECTRIC MOTORS	**25**
12.1 Explain how electrical power is converted to mechanical power	
12.2 Identify the types of DC motors	
12.3 Describe the principles of operation of DC motors	
12.4 Identify and describe the various types of motor starting controllers	
12.5 Describe the construction and operation of AC motors	
12.6 Demonstrate the ability to select correctly sized conductors for motor circuits	
12.7 Describe the application and selection of overload protective devices	
12.8 Identify the terminal board including the symbols and circuits attached to the terminal	
12.9 Identify different wiring combinations including star and delta windings and terminations	
13.0 COMMERCIAL WIRING	**50**
13.1 Identify and explain the sequence of steps in a commercial project	
13.2 Demonstrate the ability to interpret a commercial wiring floor plan	
13.3 Identify commercial wiring specifications	
13.4 Draw a commercial electrical floor plan	
13.5 Describe the proper procedures to install flexible, thin-wall, rigid, and plastic conduit	
13.6 Describe the proper procedures to install a wire mold	
13.7 Describe the proper procedures to install a duct system	
13.8 Describe the proper procedures to install a commercial lighting circuit	
13.9 Describe the proper procedures to select and install power transformers to the limitations or job	
13.10 Describe the proper procedures to install wiring in hazardous areas	
13.11 Describe the proper procedures to install a commercial three-phase receptacle circuit	
13.12 Demonstrate the ability to calculate commercial service entrance requirements	
13.13 Describe the proper procedures to install a commercial service entrance	

FOURTH YEAR, FIRST SEMESTER

AREA OF INSTRUCTION	CLASSROOM HOURS
1.0 OCCUPATIONAL SAFETY	**2.5**
1.1 Review of Federal Hazard Standards (OSHA)	
14.0 EMERGENCY, SPECIAL, AND STANDBY SYSTEMS	**27.5**
14.1 Describe the characteristics of emergency lighting systems	
14.2 Describe the proper procedures to install an emergency lighting system	
14.3 Describe the proper procedures to install an emergency alarm system	
14.4 Describe the proper procedures to install a communications system	
14.5 Describe the proper procedures to install a life system	
14.6 Describe the proper procedures to install an energy-management system	
14.7 Describe the proper procedures to install a swimming pool electrical system	
14.8 Describe the proper procedures to install a mobile home park service	
15.0 SPECIALIZED ELECTRICAL SKILLS	**45**
15.1 Explain the theory of transformers to include current flow, transfer losses, cooling, and transformer ratios	
15.2 Identify different types of transformers and transformer connection designs	
15.3 Demonstrate the ability to read and interpret one-line diagrams, ladder diagrams, and schematics	
15.4 Explain the characteristics of solid state devices	
15.5 Demonstrate the ability to measure voltage across a resistor and inductor at varying frequencies and determine the values of resistance and inductance in a series RL circuit	

FOURTH YEAR, SECOND SEMESTER

AREA OF INSTRUCTION	CLASSROOM HOURS

15.0 SPECIALIZED ELECTRICAL SKILLS (CONTINUED) 55

15.6 Demonstrate the ability to measure current and voltage in sold state control circuits
15.7 Explain the purpose, characteristics, and installation of digital and analog meters
15.8 Explain meter loading of circuits
15.9 Explain switchboard meters
15.10 Demonstrate a basic understanding of the construction of high voltage cables and splices
15.11 Describe the safe procedures for removing damaged lightning arresters
15.12 Describe the safe procedures for testing and pulling high voltage cable

16.0 LEADERSHIP SKILLS 12.5

16.1 Describe the proper methods for evaluating personnel
16.2 Demonstrate knowledge of interpersonal skills
16.3 Describe the proper methods of preparing work schedules
16.4 Identify appropriate responses to criticism from employer, supervisor, or other persons
16.5 Define the proper attitude expected of a journeyperson in the electrical trade
16.6 Identify and explain various methods for organizing work and solving management problems

17.0 EMPLOYABILITY 5

17.1 Conduct a job search
17.2 Secure information about a job
17.3 Identify common documents which may be required when applying for a job
17.4 Complete a job form correctly
17.5 Demonstrate competence in job interview techniques
17.6 Demonstrate knowledge of how to make job changes appropriately
17.7 Identify acceptable work habits
17.8 Identify acceptable employee health habits

18.0 ENTREPRENEURSHIP 2.5

18.1 Define entrepreneurship
18.2 Describe the importance of entrepreneurship to the American economy
18.3 List the advantages and disadvantages of business ownership
18.4 Identify the risks involved in ownership of a business
18.5 Identify the personal characteristics of a successful entrepreneur
18.6 Identify the business skills necessary to operate a small business effectively

ELECTRICAL I CURRICULUM

BOOKS: Electricity 1
Practical Problems in Math for Electrician--Delmar
Electrical Wiring Residential—Delmar
NEC Code Book

	HOURS
Orientation	3
*Diagnostic Testing	3
Direct Current Fundamentals Units 1 - 8	48
Math Whole Number Common Fractions Decimals	12
OSHA Construction Safety	6
Electrical Wiring Residential Units 1 - 28 Related Shop Related Code	48
Math Percentages & Averages Equations	12
Testing, Quizzes, Mid-term, Final	12
Audio Visuals & Guest Speakers Greenlee Demonstration - Conduit Bending 3M - Connectors Square "D" - Ground Fault	12
TOTAL HOURS	156

*Apprentices not scoring 10.0 grade level or higher are required to enroll in a remedial math course as directed by the Committee and retest to 10.0 grade level or higher within thirty (30) days of orientation.

ELECTRICAL II CURRICULUM

BOOKS: Electrical Wiring - Commercial - Delmar
Practical Problems in Math for Electricians - Delmar
NEC Code Book
Electricity II - Delmar

	HOURS
Review first year	6
OSHA First Aid	9
Diagnostic Testing	3
Testing, Quizzes, Mid-term, Final	12
Audio Visuals & Guest Speakers	12
Math:	27
Plain Geometry - Part III Trigonometry - Part IV Algebra - Part II	
Alternating Current Fundamentals	30
Units 1-8, 10 Resistance, Inductance, Capacitance, Series & Parallel circuits, AC Power & Power Factor	
Three Phase System:	12
Study & Calculation of Wye & Delta Systems Study & Calculation of three phase power transformers	
Shop Related:	12
Magnetic Starter Study parts - draw diagrams Conduit, fittings, boxes, conductors NEC Conduit fill, box fill Conductor insulations - motors Conduit bending demonstration	
Blueprint: Commercial	24
Study basic set of commercial blueprints Use NEC code articles 220	
Review of first and second terms	9
TOTAL HOURS	156

ELECTRICAL III CURRICULUM

BOOKS: NEC Code Book
Electricity 3 - Delmar
Electrical Wiring - Industrial - Delmar
Electric Motor Control - Delmar

	HOURS
Review Second Year	6
Diagnostic Testing	3
Testing, Quizzes, Mid-term, Final	12
Audio Visuals and Guest Speakers	9
Alternating Current Fundamentals Units 13-16, 19 Transformers Three Phase Motors Single Phase Motors	30
National Electric Code Blueprint Reading Units 1-2 Single Family Dwellings Art. 436 N.E.C.	30
Electrical Motor Control (Classroom & Shop) Review Basic Control Circuits Magnetic Line Voltage Starters Relays & Contactors - Lighting Relays Circuit Layout - Connections - Symbols Wiring Diagrams - Reversing Starters	66
TOTAL HOURS	156

ELECTRICAL IV CURRICULUM

BOOKS: NEC Code Book
Designing Electrical Systems Based on 1984 NEC - American Tech. Publishers

	HOURS
Review Third Year	6
Math Review	6
Blueprint Reading Commercial Locations - Industrial Locations Hazardous Locations - Tables on Conductors Multi-Family Dwellings	36
Special Systems Fire Alarm - Signal - Safety	6
Motor Controls Motor Protection - Motor Circuits - Reduced Voltage Starters	12
Transformers Connections - Formulas - Ratios	6
Guest Speakers	9
Special Installations O.H. Pole Line - Underground Utilities Mobile Homes Pools, Theater, Run Way Lighting	9
Special Equipment U.F. Duct, Cellular Floor Duct M.I. Cable, A.I.S. Cable, Buss Ways	6
National Electric Code Preparation for Block Exam & Code Tables	36
Material Take Off and Purchasing	6
Job Management Human Relations	3
Testing	15
TOTAL HOURS	156

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