

CHAPTER 8

STRUCTURES TRAINING AND QUALIFICATION PROGRAM

8.1 PURPOSE

The purpose of this chapter is to address all structures related training and qualification programs that pertain to the construction of structures. Five programs are covered in this chapter: (1) Grouting Technician Training and Qualification, (2) Post-Tensioning (PT) Technician Training and Qualification, (3) Bridge Coating Inspector Training, (4) Lead Paint Removal Training and (5) Critical Structures Construction Issues Training.

The purpose of the ***Grouting Technician Training and Qualification Program*** is to improve the quality of grouting for post-tensioning steel by making grouting technicians aware of the significance of proper grouting and how important it is for the long-term durability of bridges; to ensure that job site grouting personnel fully understand grouting technology including methods, materials, and equipment; and to provide assurance to the Department, as the owner of the facility, that grouting is performed and inspected under the supervision of qualified personnel and in accordance with all contract documents.

The purpose of the ***Post-Tensioning Technician Training and Qualification Program*** is to ensure that the quality of post-tensioning (PT) of steel strands and tendons continues to be consistently high by making PT Technicians aware of the significance of proper post-tensioning procedures and how important they are for assuring the full structural strength as well as the long-term durability of bridges; to ensure that job site PT supervisors and inspectors fully understand PT technology including methods, materials, and equipment; and to provide assurance to the Department, as the owner of the facility, that PT is performed and inspected under the supervision of qualified personnel and in accordance with all contract documents.

Coating Inspector Training provides inspectors in charge of quality assurance for bridge painting projects with detailed information about the key concerns affecting the quality of bridge coating/painting operations.

Lead Paint Removal Training provides Project Administrators and other managerial level Construction, Engineering and Inspection (CEI) staff including Construction Project

Managers, with comprehensive training in the complex field of disposal of the hazardous waste produced during lead and other hazardous coating removal operations.

Critical Structures Construction Issues training, as presented in a self study course of the same name, is intended to: heighten awareness of widely misunderstood or overlooked specifications, procedures and other issues; to present specifications and procedures that were implemented for the first time in recent years; and to introduce new or upcoming specification and procedure changes that will significantly impact Contractor and CEI efforts in the future.

8.2 AUTHORITY

Section 334.044(2), Florida Statutes (F.S.)

Florida Department of Transportation Standard Specifications for Road and Bridge Construction, Sections 462 (old B460) and 938

8.3 BACKGROUND

In the summer of 1999, the Department discovered that post-tensioning steel had failed at the Niles Channel Bridge in the Florida Keys. Deficient grouting of the post-tensioning steel contributed to the failure. In 2000, a routine inspection of the Mid-bay Bridge near Destin, Florida, revealed numerous post-tensioning steel defects including a failed tendon and advanced corrosion at many anchorages. Deficient grouting of post-tensioning steel was a major cause of the defects. Similar problems have been found at the Skyway Bridge in Tampa, Florida, and grouting problems were a contributing factor there as well. Subsequent to the discovery of the aforementioned grouting problems, inspection of all post-tensioned bridges has revealed many instances of deficient grouting; however, most of these have not shown significant deterioration to date.

In order to prevent future grouting deficiencies, the Department has strengthened design and construction specifications. However, the quality of workmanship during the actual placement of grout is also a very important factor in achieving a quality operation and; therefore, the training and qualifications of those performing and inspecting the grouting is critical. It is for this reason that formal training and qualification of grouting technicians is required by this procedure.

Bridge post-tensioning steel is a critical structural element that provides a bridge with the capacity to carry the dead load, vehicular, and other live loads it is designed to resist during its service life. If PT is installed improperly, the load carrying capacity of the

bridge could be reduced dramatically which could lead to the need for major repairs or even collapse. Because PT has such a critical structural function, it is of the utmost importance that its installation is entrusted only to highly qualified technicians and this is the reason that formal training and qualification of PT Technicians is required by this procedure.

8.4 GROUTING TECHNICIAN TRAINING AND QUALIFICATION PROGRAM

This program offers two levels of qualification. The first, Level I, is for the individual that is in charge of the inspection of the Contractor's grouting operation or that is a member of the crew of Contractor workers that performs grouting. The second, Level II, is for the individual that is the foreman in charge of the grouting operation for a Contractor. These individuals are required to be CTQP Qualified Grouting Technicians and **Section 8.4** of this chapter sets forth all CTQP qualification requirements. Refer to **Attachment 8-1, Qualification by Job Function – Grouting**, for grouting technician qualifications.

8.4.1 CTQP Qualified Grouting Technician Requirements

The purpose of this qualification program is to ensure that grouting technicians as job site grouting supervisors and lead inspectors fully understand grouting technology; to increase awareness of the importance of grouting as it relates to the long-term durability of bridges; and to provide assurance to the Department, as the facility owner, that grouting is performed under the supervision of qualified personnel and in accordance with contract documents. Only CTQP qualified grouting technicians will be permitted to function as the Contractor employee directly in charge of the grouting crew and operation and only CTQP qualified grouting technicians will be permitted to function as the CEI representative (lead or senior inspector) in direct charge of inspection of the grouting operation. There are two levels of qualification and in order to be eligible for qualification, applicants must satisfy the experience and training requirements herein.

8.4.1.1 Level I Qualified Grouting Technician

Level I Qualified Grouting Technicians are only authorized to perform inspections of grouting operations or work as a member of a Contractor's grouting crew and are not authorized to supervise a Contractor's grouting crew and grouting operation. Qualification will expire at the end of five (5) years and applicants must take a re-qualification course and examination in order to be re-qualified for an additional five (5) years.

8.4.1.1.1 Experience

No experience is required in order to be eligible for qualification.

8.4.1.1.2 Grouting Training

In order to be eligible for qualification, applicants must attend an FDOT accredited Grouting Technician Training Course or re-qualification course and must receive a passing grade on the final examination for the course. A copy of an official certificate issued by the training course provider that confirms a passing examination grade must be submitted to CTQP along with the application for qualification.

For a list of accredited grouting training courses, consult the Department's Office of Construction website, Structures page.

8.4.1.2 Level II Qualified Grouting Technician

Level II, Qualified Grouting Technician status is for Contractor employees and authorizes them to supervise Contractor grouting crews and grouting operations. Qualification will expire at the end of five (5) years and applicants must take a re-qualification course and examination in order to be re-qualified for an additional five (5) years.

8.4.1.2.1 Work Experience

In order to be eligible for qualification, applicants must have two thousand (2000) hours of certified experience in grouting of post-tensioning steel. This experience can include time spent as an inspector, as a construction worker or as a construction foreman/supervisor directly involved in the grouting of post-tensioning steel. The two thousand (2000) hours must be computed by adding up the actual time spent directly involved in grouting operations. Counting total time spent on a project that happened to have some grouting is not correct except when grouting is underway continuously during the entire duration of the project. Provide a signed and dated copy of **Attachment 8-2, Work Experience Certification**, to the CTQP Administrator.

8.4.1.2.2 Grouting Training

In order to be eligible for level II qualification, applicants must attend an FDOT accredited Grouting Technician Training Course or re-qualification course and must receive a passing grade on the final examination for the

course. A copy of an official certificate issued by the training course provider that confirms a passing examination grade must be submitted to the CTQP Administrator along with the application for qualification.

For a list of accredited grouting training courses, consult the Department's Office of Construction website, Structures page.

8.5 POST-TENSIONING TECHNICIAN TRAINING AND QUALIFICATION PROGRAM

8.5.1 General

The purpose of this qualification program is to ensure that PT Technicians such as job site PT Supervisors and lead inspectors fully understand PT technology; to increase awareness of the importance of PT as it relates to assuring full structural capacity and long-term durability of bridges; and to provide assurance to the Department, as the facility owner, that PT is performed under the supervision of qualified personnel and in accordance with contract documents. Only CTQP qualified PT Technicians will be permitted to function as the Contractor employee directly in charge of the PT crew and operation and only CTQP qualified PT Technicians will be permitted to function as the CEI representative (lead or senior inspector) in direct charge of inspection of the PT operation. There are two levels of qualification and in order to be eligible for qualification, applicants must satisfy the experience and training requirements covered in **Sections 8.5.2 and 8.5.3** herein. Refer to **Attachment 8-1, Qualification by Job Function – Post-tensioning**, for Post-tensioning technician qualifications.

8.5.2 Level I, Qualified PT Technician Requirements

Level I, Qualified PT Technicians are only authorized to perform inspections of PT operations or work as a member of a Contractor's PT crew and are not authorized to supervise a Contractor's PT crew and PT operation. Qualification will expire at the end of five years and applicants must take a re-qualification course and examination in order to be re-qualified for an additional five (5) years.

8.5.2.1 Experience

No experience is required in order to be eligible for qualification.

8.5.2.2 PT Training

In order to be eligible for qualification, applicants must attend an FDOT accredited PT Technician Training Course or re-qualification course and must receive a passing grade on the final examination for the course. A copy of an official certificate issued by the training course provider that confirms a passing examination grade must be submitted to CTQP along with the application for qualification.

For a list of accredited PT training courses, consult the Department's Office of Construction website, Structures page.

8.5.3 Level II, Qualified PT Technician Requirements

Level II, Qualified PT Technician status is for Contractor employees and authorizes them to supervise Contractor PT crews and PT operations. They are also authorized to perform inspection of PT operations. Qualification will expire at the end of five years and applicants must take a re-qualification course and examination in order to be re-qualified for an additional five years.

8.5.3.1 Work Experience

In order to be eligible for qualification, applicants must have two thousand (2000) hours of certified experience in PT of steel strand. This experience can include time spent as an inspector and/or as a construction worker directly involved in the PT of steel strand. The two thousand (2000) hours must be computed by adding up the actual time spent directly involved in PT operations. Counting total time spent on a project that happened to have some PT is not correct except when PT is underway continuously during the entire duration of the project. Provide a signed and dated copy of **Attachment 8-2, Work Experience Certification**, to the CTQP Administrator.

8.5.3.2 PT Training

In order to be eligible for level II qualification, applicants must attend an FDOT accredited PT Technician Training Course or re-qualification course and must receive a passing grade on the final examination for the course. A copy of an official certificate issued by the training course provider that confirms a passing examination grade must be submitted to the CTQP Administrator along with the application for qualification.

For a list of accredited PT training courses, consult the Department's Office of Construction website, Structures page.

8.6 GROUTING AND POST-TENSIONING TRAINING COURSE ACCREDITATION

In order for a course to be accredited by the Department it must provide at least sixteen hours of combined classroom and laboratory demonstration instruction, provide a comprehensive hard copy manual for each student, and require a final examination. Requalification courses must be at least four (4) hours if offered as a classroom course with an in person instructor or they may be offered as a computer based course by the accredited provider.

The Department must approve the course content and final examination and observe an actual presentation of the material prior to approving accreditation. Course providers that seek accreditation must contact the Department's State Construction Structures Engineer in the Office of Construction, to arrange for Department review of their course.

8.7 DEPARTMENT RESPONSIBILITIES

In addition to those found at the end of **Chapter 1**, the following responsibilities are unique to the Grouting and Post-tensioning Technician Training and Qualification Programs. Responsibilities for these qualification programs are distributed among the Office of Construction, Districts, and CTQP Administrator's Office.

8.7.1 Office of Construction

- (1) Accredit grouting and post-tensioning training courses and providers.

8.7.2 Districts / District Construction Training Administrators

- (1) Provide a CTQP application to Department employees that request it for the Qualified Grouting Technician program and Qualified Post-tensioning Technician Program.

8.7.3 CTQP Administrator's Office

- (1) Process applications that request Level I and Level II, Grouting and Post-tensioning Technician qualifications. Verify that the application is filled out correctly and completely and verify that the applicant has passed an

accredited Grouting or Post-tensioning Technician Training Course. Also, verify that the **Work Experience Certification (Attachment 8-2)** is attached to the application and filled out properly. Confer the qualification if all paperwork is in order.

- (2) Maintain a database of Level I and Level II, Qualified Grouting and Post-tensioning Technicians.

8.8 BRIDGE COATING INSPECTOR TRAINING ***(Not Part of the CTQP Qualification Program)***

8.8.1 General

The purpose of this training course is to prepare inspectors in charge, or lead inspectors, on bridge coating/painting projects to effectively perform their quality assurance/control responsibilities. For all bridge coating projects, the lead Inspector must have successfully completed the Bridge Coating Inspector Training Course. Lead Coating Inspectors must present their completion certificate to the appropriate FDOT official (Construction Project Manager, Resident Engineer, etc.) prior to the start of a bridge coating project to prove that they have received the required training. Successful completion of the Bridge Coating Inspector Training Course does not require inspectors to also be CTQP qualified as a coating inspector; therefore, inspectors that successfully complete the course **must not** apply to the CTQP administrator for qualification.

8.8.2 Bridge Coating Inspector Training Course

Lead coating inspectors must successfully complete the Society for Protective Coatings (SSPC) course entitled "**Bridge Coating Inspection**" which is designated as SSPC course "BCI". This is a three (3) day course and includes an examination that must be passed in order for SSPC to issue a successful completion certificate. Consult the SSPC website (<http://www.sspc.org/training/default.html>) for when and where BCI courses are offered. Instructions for how to register for the course are also provided on this website.

8.9 LEAD PAINT REMOVAL TRAINING ***(Not Part of the CTQP Qualification Program)***

8.9.1 General

The purpose of this training course is to provide Senior Project Engineers and Project Administrators as well as other managerial level CEI staff including Construction Project Managers, with comprehensive training in the complex field of hazardous waste disposal for lead based paint and other hazardous coating removal operations. The Senior Project Engineer or Project Administrator in charge of a project with removal of coatings that are hazardous waste must have successfully completed this course prior to the start of coating removal operations. Senior Project Engineers and Project Administrators must present their course completion certificate to the appropriate Department official (Construction Project Manager, Resident Engineer, etc.) prior to the start of a coating removal project to prove that they have received the required training. This course is also recommended for FDOT Construction Project Managers overseeing coating removal projects. Successful completion of this course **does not** require personnel to also be CTQP qualified; therefore, personnel that successfully complete the course **must not** apply to the CTQP administrator for qualification.

8.9.2 Training Course

Senior Project Engineers or Project Administrators must successfully complete the Society for Protective Coatings (SSPC) course entitled "**Lead Paint Removal**" which is designated as SSPC course "C-3". This course includes an examination that must be passed in order for SSPC to issue a successful completion certificate. Consult the SSPC website (<http://www.sspc.org/training/default.html>) for when and where C-3 courses are offered. Instructions for how to register for the course are also provided on this website.

8.10 CRITICAL STRUCTURES CONSTRUCTION ISSUES – SELF STUDY COURSE *(Not Part of the CTQP Qualification Program)*

8.10.1 General

The purpose of this critical issues course is to: heighten awareness of widely misunderstood or overlooked specifications, procedures and other issues; to present specifications and procedures that were implemented for the first time in recent years; and to introduce new or upcoming specification and procedure changes that will significantly impact Contractor and CEI efforts in the future. Course topics are selected by Office of Construction Engineers based on information gathered during annual field reviews of active projects in addition to

feedback from Resident Engineers, Senior Project Engineers, Project Administrators and other field personnel related to: changes to contract documents, noncompliance with contract documents, and damaged or defective structural elements. This course is updated on an as needed basis and the updates are posted on a permanent webpage of the Office of Construction and the internet link to it is as follows:

<http://www.dot.state.fl.us/construction/structures/StructuresTraining/CriticalBridgeIssueCourseUpdates.shtm>

8.10.2 Personnel that are Required to Complete this Course and the Deadlines for Completion

Completion of this course is mandatory for the following Department and Consultant Construction Engineering and Inspection (CEI) personnel involved in structures related construction: Resident Engineers, Construction Project Managers, Senior Project Engineers (SPE), Project Administrators (PA), Senior or Lead Inspectors and Inspectors. After the complete course is taken the first time, it shall be retaken every three years thereafter. Those that are required to take this course will be notified by e-mail when there are updates to the course. Review of these updates is required and they can be viewed through the internet link shown in **Section 8.10.1** above. For those taking the course after June 30, 2010, the updates shall be reviewed prior to signing the Certification of Course Completion form. For the personnel listed above that are employed on or before January 1, 2010, the course must be completed on or before June 30, 2010 which is 6 months after the January 1, 2010 course implementation date. Personnel that are employed after January 1, 2010 must complete the course not later than 6 months after the start of employment.

Department employees will receive TRESS credit for taking the course and the official course number is BT-06-0073. The employee should verify that the information has been entered after an appropriate amount of time has passed to allow for entry.

Registered Professional Engineers that successfully complete the course can use the course for Professional Development Hours (PDHs) towards renewal of their Engineering license. The official Board of Professional Engineers credit number is 0003754 and is worth a maximum of 2 PDHs once per three (3) year period.

8.10.3 Certification of Course Completion

After fully completing the entire course, each student must fill out a Certification of Course Completion Form (see the last page of the course for a copy of the form) which must be signed by the student. The executed certification form shall be sent to the Resident Engineer, or Assistant Operations Center Manager for Construction, for permanent filing and a copy shall be retained by the student. The certification shall not be sent to the CTQP Administrator since this course is not part of the CTQP program and is not required for any CTQP qualification.

8.10.4 District Construction Training Administrator (DCTA), Resident Engineer and State Construction Training Administrator (SCTA) Responsibilities

The DCTA shall have the following responsibilities regarding administration of the Critical Structures Construction Issues – Self Study Course:

- Input the data received from the Resident Engineer/Assistant Operations Center Manager into the electronic Student Tracker Data Base and for FDOT employees, enter the required information into the TRESS system.

The Resident Engineer/Assistant Operations Center Manager for Construction shall have the following responsibilities regarding the course:

- Identify all individuals that are required to take the course in the residency and verify that these individuals are aware of the requirements of this procedure.
- Confirm that all individuals taking the course have sent an executed certification form to the Resident Engineer/Assistant Operations Center Manager within the allotted time established for completion and take appropriate action when these requirements are not in compliance.
- Keep all executed certification forms on file and transmit the required data for input into the Student Tracker Data Base to the DCTA.

The SCTA shall have the following responsibilities regarding administration of the Critical Structures Construction Issues – Self Study Course:

- Establish and manage a Student Tracker Data Base that identifies all individuals that have taken the course and establish and maintain a webpage displaying pertinent information. The Student Tracker shall include the date

that the individual took the course and the date that for retaking the course as well as other relevant data needed to identify and contact the individual including: name, e-mail address, telephone number, employer, etc.

- Send e-mail notifications to all individuals in the student tracker data base when new updates of the course are posted on the Update Webpage. The State Construction Structures Engineer shall notify the SCTA when new update postings are required.

Attachment 8-1

Qualification by Job Function

Grouting

Level I Grouting Technician:

The lead or Senior Inspector in charge of inspecting a Contractor's grouting operations must have this qualification.

Some members of a Contractor's grouting work crew must have this qualification. For details, refer to the latest version of the FDOT ***Standard Specifications for Road and Bridge Construction, Article 105-5.8.7.***

Level II Grouting Technician:

The foreman in charge of grouting operations for a Contractor as well as being in charge of the crew of Contractor employees that performs grouting of post-tensioning steel must have this qualification.

A Level II Technician may also perform inspection of a Contractor's grouting operations if that technician's duties are exclusively inspection related and not production related.

Post Tensioning (PT)

Level I Post Tensioning Technician:

This is the Technician that is the Lead or Senior Inspector in charge of inspecting a Contractor's PT operations.

This is the Technician that is a member of the crew of Contractor employees that performs post-tensioning. For details, refer to the latest version of the FDOT ***Standard Specifications for Road and Bridge Construction, Article 105-5.8.7.***

Level II Post Tensioning Technician:

This is the Technician that is the foreman in charge of PT operations for a

Contractor as well as being in charge of the crew of Contractor employees that perform post-tensioning.

A Level II Technician may also perform inspection of a Contractor's PT operations if that Technician's duties are exclusively inspection related and not production related.