
CHAPTER 4

CONCRETE TRAINING AND QUALIFICATION PROGRAM

4.1 PURPOSE

The purpose of this section is to describe the *Concrete Training and Qualification Program*. This program is designed to establish a qualification program for persons responsible for the manufacture, testing, placement, and inspection of concrete material on Florida Department of Transportation (Department) highway construction projects. This procedure shall list the details of the qualification program including the associated training courses.

4.2 AUTHORITY

Code of Federal Regulations, Quality Assurance Procedures for Construction, 23 CFR 637

Sections 20.23(4)(a) and 334.048(3) Florida Statutes (F.S.)

Sections 346, 400, FDOT Standard Specifications for Road and Bridge Construction

4.3 REFERENCE

Chapters 8 and 9, Topic No. 675-000-000, Materials Manual

4.4 BACKGROUND

The Department has required American Concrete Institute (ACI) Concrete Field Testing Technician Grade I certification for several years. Due to the requirement by the FHWA that, "All sampling and testing data to be used in the acceptance decision or the Independent Assurance program shall be executed by qualified sampling and testing personnel", ACI Concrete Field Testing Technician Grade I is no longer sufficient by itself. The Department's Concrete Technical

experts have determined that concrete qualifications be divided into three levels with areas of specialization.

In addition, two courses have been included to ensure familiarity with current specifications.

4.5 QUALIFICATIONS AND TRAINING COURSES

There are five concrete qualifications and two "stand-alone" concrete training courses:

- (1) Concrete Field Technician Level I Qualification
- (2) Concrete Field Inspector Level II Qualification
- (3) Concrete Laboratory Technician Level I Qualification
- (4) Concrete Laboratory Technician Level II Qualification
- (5) Concrete Batch Plant Operator Qualification
- (6) FDOT Concrete Laboratory Specification Course and Examination
- (7) FDOT Concrete Field Inspector Specification Course and Examination

So that present ACI Concrete Field Testing Technician Grade I Certified Technicians can qualify as Concrete Field Technician Level I, a course on Florida specifications with an examination has been developed. These courses along with the criteria for becoming qualified are described in detail in the following text.

Certain qualifications in the FDOT Concrete Field Technician Level I program require ACI certification. In these instances, it will be the responsibility of the technician seeking qualification to submit an ***Application for Qualification, form No. (375-020-38)*** to the CTQP administrator along with the ACI certification (wallet card) number. The date of qualification will be the date the administrator receives notification that all requirements have been met.

4.5.1 Concrete Field Technician Level I Qualification Requirements

The objective of this qualification is to assure that job site concrete tests including quality control, verification, and resolution tests for concrete construction, used as part of the acceptance program, are performed in accordance with the contract documents.

All trainees seeking Concrete Field Technician Level I qualification must:

- (1) Hold a current ACI Concrete Field Testing Technician Grade I certification
- (2) Pass the *FDOT Concrete Field Inspector Specification Examination*.

After a trainee has successfully completed all of the qualification requirements, the trainee's qualification date shall be added to the CTQP database. The date of qualification shall be the date the last qualification requirement was satisfied. The CTQP qualification shall expire in (5) five years (60) months from the date the last qualification was met.

In order to be adequately prepared for and prior to taking the Concrete Field Technician courses, applicants are encouraged to take and pass the following Department self study courses: Portland Cement Concrete Testing and Construction Math.

4.5.1.1 ACI Concrete Field Testing Technician Grade I Certification Course

This two or three day training program includes a class session, written examination (usually one hour), and proficiency examination (usually four hours). Test Methods to be covered in this course are included in ***Attachment 4-6***.

This course uses the standard ACI written examination. Expect the grading and mailing of the examination results by ACI to take two to four weeks. For the most up-to-date requirements, please contact ACI.

4.5.1.2 ACI Concrete Field Testing Technician Grade I Certification Training Course Prerequisites

There are no prerequisites for this course; however, applicants are encouraged to take and pass the Department's Portland Cement Concrete Testing and the Construction Math Self-Study examinations.

4.5.1.3 ACI Concrete Field Testing Technician Grade I Certification Course Written Examination

A written examination (usually one hour) is administered at the end of the course (usually multiple choice). The examination is electronically graded by ACI. Expect the grading and mailing of the examination results by ACI to take two to four weeks.

4.5.1.4 ACI Concrete Field Testing Technician Grade I Certification Course Proficiency Examination

A proficiency examination (usually four hours) is administered at the end of the course. Each trainee will be expected to correctly demonstrate skill in performing the proficiency tests. Usually, a trainee will be given two chances to pass each test. Failing any proficiency test twice will constitute failure of the proficiency examination. Anyone failing the proficiency examination may reapply for a future proficiency examination; however, a new application must be completed and the appropriate fee paid.

4.5.2 Concrete Field Inspector Level II Qualification Requirements

The objective of this qualification is to assure that all concrete related tests and inspections in the field including quality control, quality assurance, verification, and dispute resolution tests for concrete construction used as part of the acceptance program are performed in accordance with the contract documents.

All trainees seeking a Concrete Field Inspector Level II qualification must:

(1) Hold a current ACI Concrete Transportation Construction Inspector Certification (CTCI) and ACI Concrete Field Testing Technician Grade 1. ACI education and experience requirements for CTCI certification are listed in **Attachment 4-7**.

OR

Hold a current ACI Associate Concrete Transportation Construction Inspector Certification (CTCI) certification and ACI Concrete Field Testing Technician. ACI education and experience requirements for Associate CTCI certification are listed in **Attachment 4-7a**.

(2) Pass the FDOT Concrete Field Inspector Specification Examination.

After a trainee has successfully completed all of the qualification requirements, the trainee's qualification date shall be added to the CTQP database. The date of qualification shall be the date the last qualification requirement was satisfied. The CTQP qualification shall expire in 5 years (60 months) or on the date of expiration of the ACI CTCL or Associate CTCL, whichever is earlier.

4.5.2.1 ACI Concrete Transportation Construction Inspector Training Course

This is a three-day course which includes a half-day written examination. The written examination is usually offered three to four weeks after the course is completed. Topics usually covered on this examination are included in **Attachment 4-8**. For the most up-to-date requirements, please contact ACI.

4.5.2.1.1 ACI Associate Concrete Transportation Construction Inspector Training Course

This is a two-day course which includes a written examination. Topics usually covered on this examination are included in **Attachment 4-8a** for the most up-to-date requirements, please contact ACI.

4.5.2.2 ACI Concrete Transportation Construction Inspector Certification Training Course Prerequisites

There are no prerequisites for this course.

4.5.2.2.1 ACI Associate Concrete Transportation Construction Inspector Certification Training Course Prerequisites

Prerequisites for this course include FDOT Concrete Field Technician Level I Qualification

4.5.2.3 ACI Concrete Transportation Construction Inspector Certification Training Course Written Examination

A written examination (usually four hours, multiple choice) is offered three-four weeks after the course. Expect grading and mailing of the examination results by ACI to take two to four weeks.

4.5.2.3.1 ACI Associate Concrete Transportation Construction Inspector Certification Training Course Written Examination

A written examination (usually ninety minutes) is administered at the end of the course (usually multiple choices). A plan reading examination (usually thirty minutes) is also administered at the end of the course. The examinations are electronically graded by ACI. Expect grading and mailing of the examination results by ACI to take two to four weeks.

4.5.3 Concrete Laboratory Technician Level I Qualification Requirements

The objective of this qualification is to assure that all laboratory strength tests that are used for quality control, quality assurance, verification, dispute resolution, and acceptance of concrete are performed in accordance with the **Standard Test Methods**, project specifications and other contract documents.

All trainees seeking to become a qualified Concrete Laboratory Technician Level I must:

(1) Hold a current ACI Concrete Strength Testing Technician Certification

OR

(2) Hold a current ACI Concrete Laboratory Testing Technician Level 1 Certification

After a trainee has successfully met the qualification requirements, the trainee's qualification date shall be added to the CTQP database. The CTQP qualification shall expire in (5) five years (60 months) or on the date of expiration of the earliest required ACI certification, whichever is earlier.

4.5.3.1 ACI Concrete Strength Testing Technician Certification Course

This course is a one and one half day training class with a written examination (usually one hour). In addition, the candidate must pass a proficiency examination (usually two to four hours). Test Methods to be covered in this course are included in ***Attachment 4-9***.

4.5.3.2 ACI Concrete Strength Testing Technician Certification Course Prerequisites

There are no prerequisites for this course. Applicants are encouraged to take and pass the Department's Portland Cement Concrete Testing and Construction Math Self-Study examinations prior to the Concrete Strength Testing Technician Certification Course.

4.5.3.3 ACI Concrete Strength Testing Technician Certification Course Written Examination

A written examination is administered at the end of the course (usually multiple choices). The examinations are electronically graded by ACI. Expect grading and mailing of the examination results by ACI to take two to four weeks.

4.5.3.4 ACI Concrete Strength Testing Technician Proficiency Examination

A proficiency examination (usually four hours) is administered at the end of the course. Each trainee will be expected to correctly demonstrate skills in conducting the tests mentioned previously. Usually, each trainee will be given two chances to pass each test. Failing any proficiency test twice, will constitute failure of the proficiency examination. Anyone failing the proficiency examination may reapply for a future proficiency examination; however, a new application must be completed and the appropriate fee paid.

4.5.3.5 ACI Concrete Laboratory Testing Technician Level 1 Certification Course

This course is a one and one half day training class with a written examination (usually one hour). In addition, the candidate must pass a proficiency examination (usually two hours).

Test Methods to be covered in this course are included in ***Attachment 4-10***.

4.5.3.6 ACI Concrete Laboratory Testing Technician Level 1 Certification Course Prerequisites

There are no prerequisites for this course. Applicants are encouraged to take and pass the Department's Portland Cement Concrete Testing and Construction Math Self-Study examinations prior to the course.

4.5.3.7 ACI Concrete Laboratory Testing Technician Level 1 Certification Course Written Examination

A written examination is administered at the end of the course (usually multiple choices). The examinations are electronically graded by ACI. Expect grading and mailing of the examination results by ACI to take two to four weeks.

4.5.3.8 ACI Concrete Laboratory Testing Technician Level 1 Certification Course Proficiency Examination

A proficiency examination (usually four hours) is administered at the end of the course.

Each trainee will be expected to correctly demonstrate skills in conducting the laboratory tests mentioned previously. Usually, each trainee will be given two chances to pass each test. Failing any test twice, will constitute failure of the proficiency examination. Anyone failing the proficiency examination may reapply for a future proficiency examination; however, a new application must be completed and the appropriate fee paid.

4.5.4 Concrete Laboratory Technician Level II Qualification Requirements

The objective of this qualification is to assure that all laboratory test results that are used for quality control, quality assurance, verification, dispute resolution and acceptance of concrete are performed in accordance with **Standard Test Methods**, project specifications and other contract documents.

All applicants seeking Concrete Laboratory Technician Level II qualification must:

- (1) Hold a current ACI Concrete Laboratory Testing Technician Level I Certification
- (2) Hold a current ACI Concrete Laboratory Testing Technician Level II Certification
- (3) Pass the FDOT Concrete Laboratory Specification Examination. See **Section 4.5.6** for more details about this examination.
- (4) Have one year experience in laboratory, sampling and testing aggregate for concrete and testing concrete.
- (5) Successful completion of the ACI performance examination.

After a trainee has successfully met all of the qualification requirements, the trainee's qualification date shall be added to the CTQP database. The date of qualification shall be the date the last qualification requirement was satisfied. The CTQP qualification shall expire in (5) five years (60 months) or the earliest expiration date of one of the required ACI Certification(s).

4.5.4.1 ACI Concrete Laboratory Testing Technician Level II Course

This is a three-day ACI course called ACI Concrete Laboratory Testing Technician Level II. The course includes a written examination (usually two hours) and a proficiency examination (usually four hours). ***Standard Test Methods*** to be presented are listed in ***Attachment 4-11***. For the most up-to-date requirements please contact ACI.

Also included are the calculations for testing, calibration procedures for the testing devices/equipment and reporting of data using standard report forms. This instruction includes the use of random number tables.

4.5.4.2 ACI Concrete Laboratory Testing Technician Level II Course Prerequisites

Check the ACI website for current ACI Course prerequisites.

4.5.4.3 ACI Concrete Laboratory Testing Technician Level II Course Written Examination

A written examination (usually two hours, multiple choice) is administered at the end of the course (usually multiple choice). The examination is electronically graded by ACI. Expect grading and mailing of the examination results by ACI to take two to four weeks.

4.5.4.4 ACI Concrete Laboratory Testing Technician Level II Proficiency Examination

A proficiency examination (usually four hours) is given at the end of the course. Each trainee taking the proficiency examination will be expected to correctly demonstrate skills in conducting the aggregate tests mentioned above. Anyone failing the proficiency examination may reapply for a future proficiency examination; however, a new application must be completed and appropriate fee paid.

4.5.5 Concrete Batch Plant Operator Qualification Requirements

The objective of this qualification is to assure that concrete design mixes are prepared in accordance with ***Standard Specifications***.

All trainees seeking Concrete Batch Plant Operator qualification must:

- (1) Pass the Concrete Batch Plant Operator's written examination.
- (2) Have 90 days work experience in Batch Plant operations including the batching of fresh concrete, proportioning concrete mix designs, determining the moisture content of aggregates and calculating the water to cementitious material ratios.

It is recommended that all applicants seeking qualification as a Concrete Batch Plant Operator take the Portland Cement Concrete Testing self-study course and pass the examination. This is a recommendation, not a requirement. After a trainee has successfully met all of these qualification requirements, the trainee's qualification date will be added to the training database. The qualification date shall be the date the last qualification requirement was satisfied. The qualification expiration date shall be 5 years (60 months) from the date the written examination was passed.

4.5.5.1 Concrete Batch Plant Operator Qualification Course

At the present time, a course is available.

4.5.5.2 Concrete Batch Plant Operator Examination

A written examination (usually two hours, multiple choice) is required for this qualification. The examinations (usually 50-70 multiple choice questions) are electronically graded by the CTQP. Expect grading and posting of the examination results to take a minimum of two weeks.

4.5.6 FDOT Concrete Laboratory Technician Specification Course and Examination

This is a one day course with a one hour written examination, which covers ***Florida Department of Transportation Standard Specifications for Road and Bridge Construction, Sections 346 and 347 and Section 9.2*** of the ***Materials Manual, “Concrete Production Facilities Guidelines”***. The examination is usually multiple choices. Taking the course is not a prerequisite to taking and passing the examination. Taking the course and passing the examination does not by itself confer a qualification. There are additional requirements that must be met to receive a qualification.

4.5.7 FDOT Concrete Field Inspector Specification Course and Examination

This is a two and a half day course with a two and a half hour open book written examination, which covers ***Florida Department of Transportation Standard Specifications for Road and Bridge Construction Section 346, 347, 400 and 415***. The examination is usually multiple choice. Taking the course is not a prerequisite to taking and passing the examination. Taking the course and passing the examination does not by itself confer qualification. There are additional requirements that must be met to receive at qualification.

4.6 QUALIFICATION REQUIREMENTS BY JOB FUNCTION AND IMPLEMENTATION SCHEDULE

Job functions for each concrete qualification are contained in ***Attachment 4-12***.

4.7 REQUALIFICATION

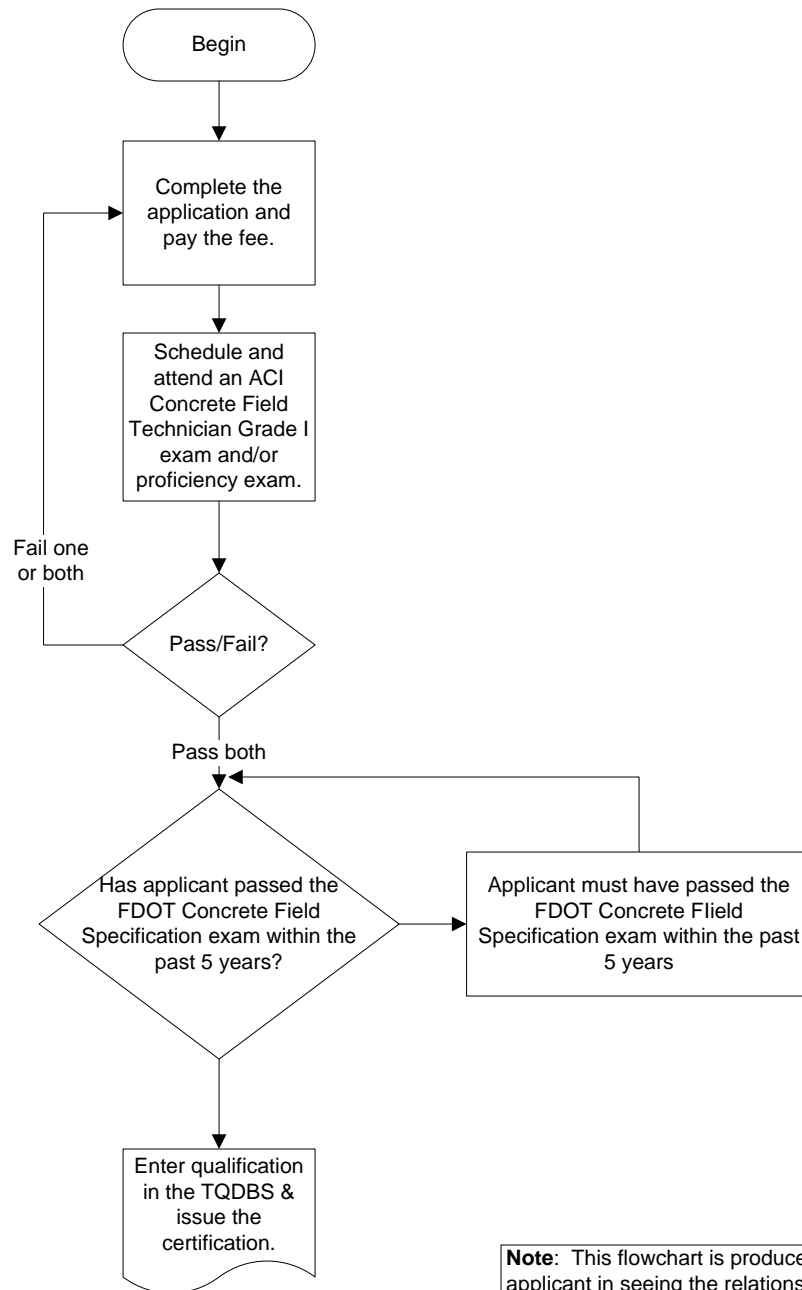
The requirements for requalification are the same as those for initial qualification.

Due to constant changes in specifications, materials, and processes, certifications of qualification are issued for no more than 60 months. When the CTQP qualification includes a requirement to maintain an ACI certification, the CTQP qualification shall coincide with the ACI certification. It is the applicant's responsibility to maintain any CTQP qualification. Qualified technicians are required to submit an application for requalification. A requalification fee will be required.

The Department does not have a requalification notification program in effect. It is the responsibility for every qualified person to apply for requalification. Any technician who fails to apply for requalification or to satisfy the requirements for requalification shall become disqualified one calendar day after the last day of the qualification period. A previously qualified person, who lets their qualification expire, must reapply for qualification.

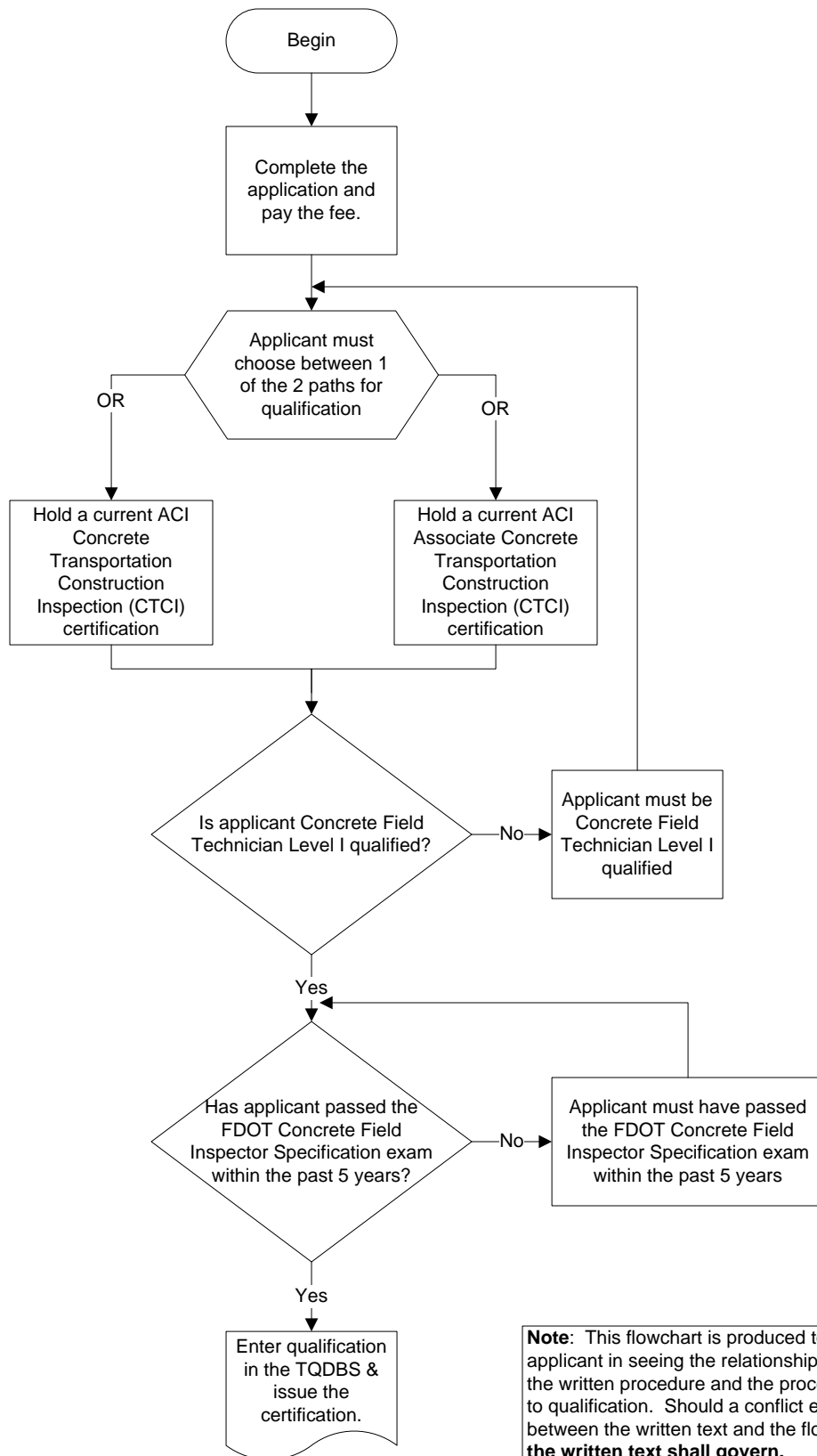
Certain qualifications in the FDOT Concrete Field Inspector Specification program require ACI certification or other certifications. In these instances, it will be the responsibility of the technician seeking qualification to submit an ***Application for Qualification, Form No. 375-020-38*** to the CTQP administrator along with the ACI certification (wallet card) number. The date of qualification will be the date the administrator receives notification that all requirements have been met.

CONCRETE FIELD TECHNICIAN LEVEL I QUALIFICATION FLOWCHART

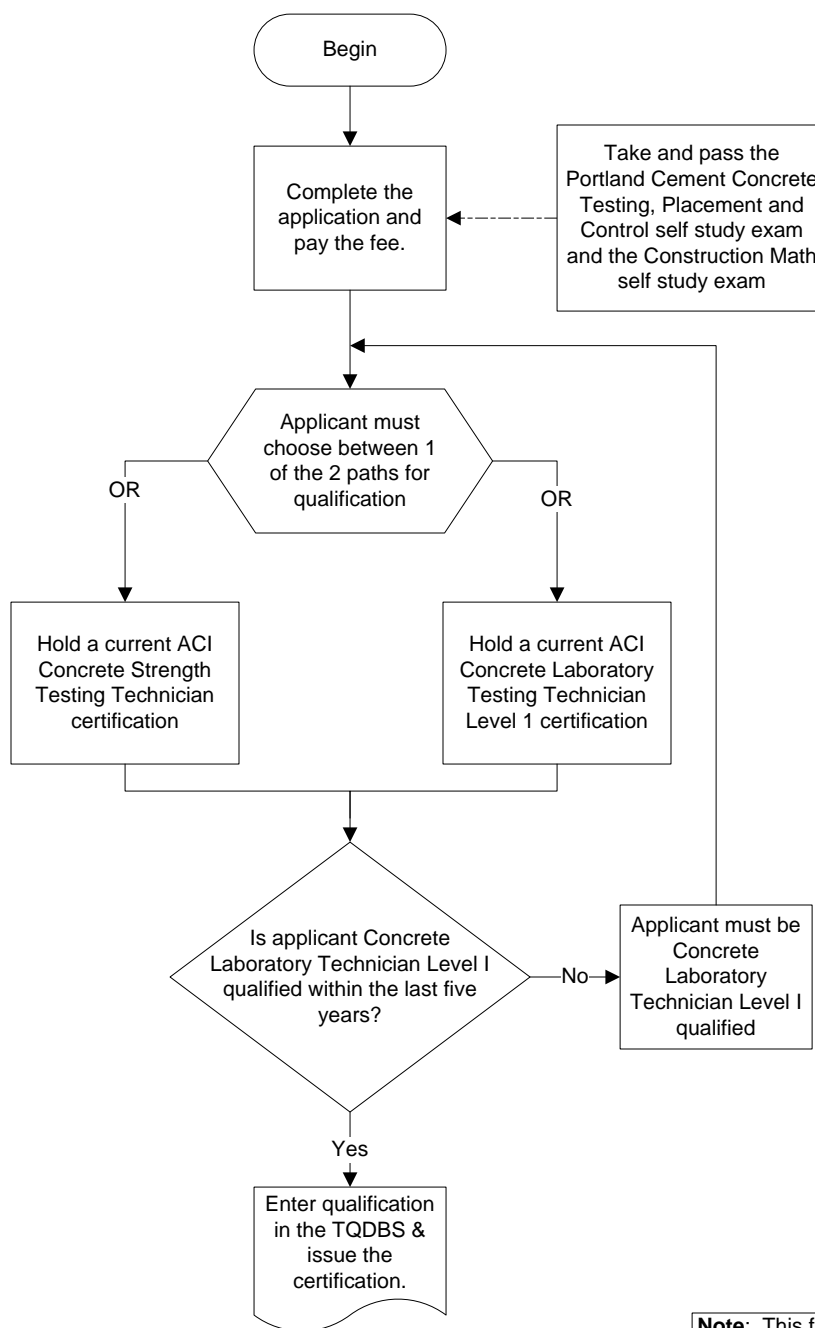


Note: This flowchart is produced to aid the applicant in seeing the relationship between the written procedure and the process leading to qualification. Should a conflict exist between the written text and the flowchart, **the written text shall govern.**

CONCRETE FIELD INSPECTOR LEVEL II QUALIFICATION FLOWCHART

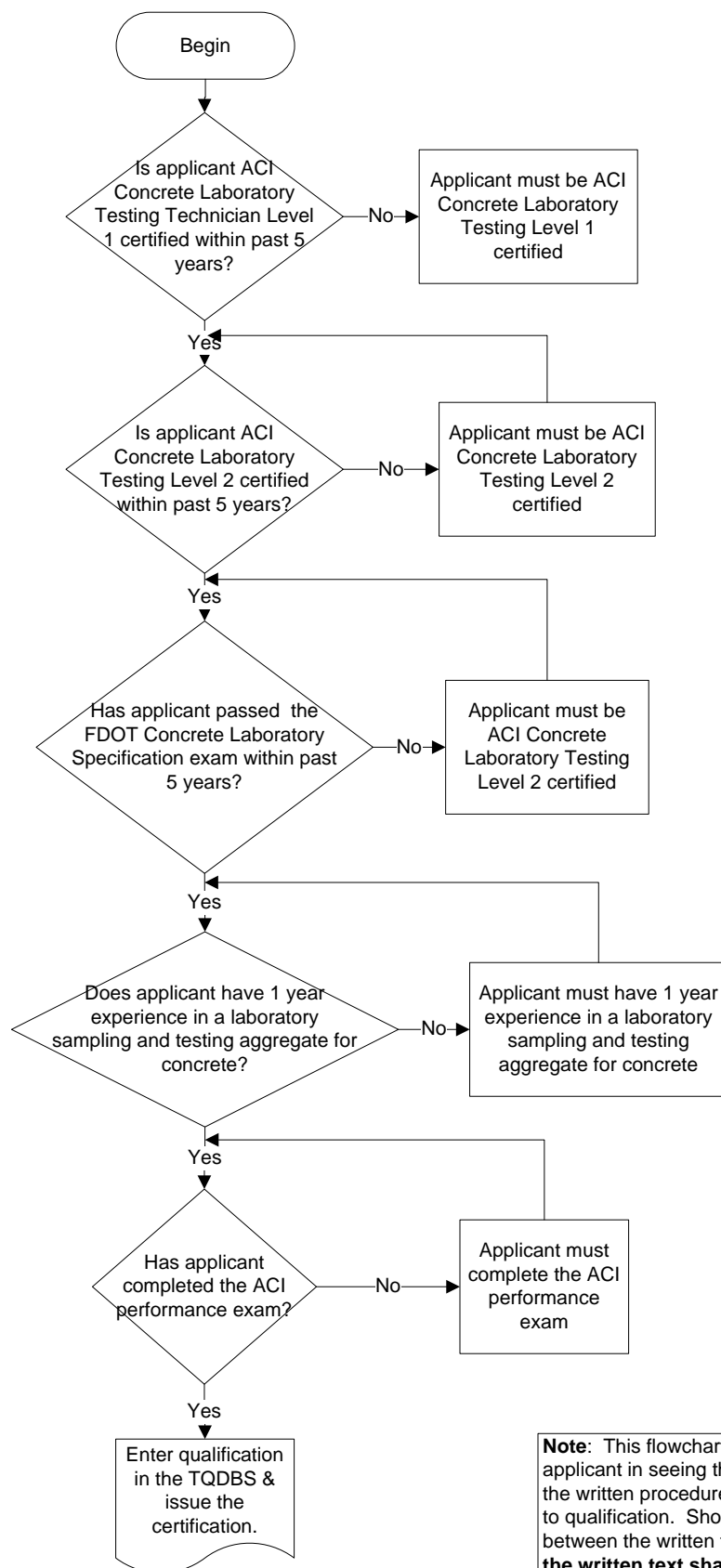


CONCRETE LABORATORY TECHNICIAN LEVEL I QUALIFICATION FLOWCHART

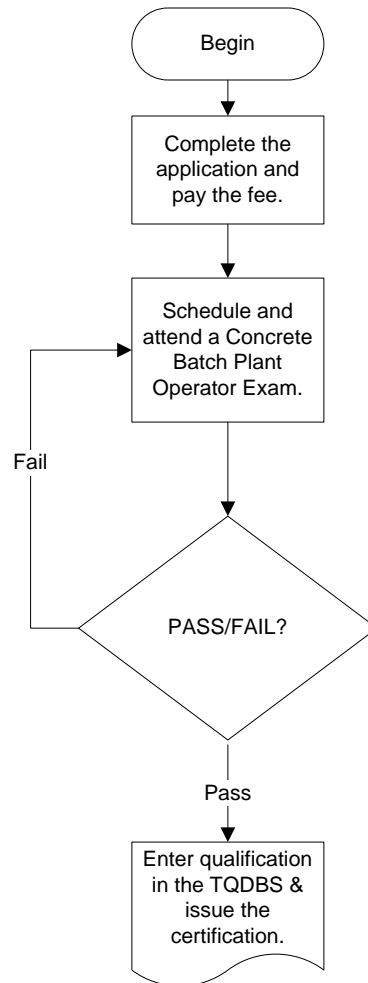


Note: This flowchart is produced to aid the applicant in seeing the relationship between the written procedure and the process leading to qualification. Should a conflict exist between the written text and the flowchart, **the written text shall govern.**

CONCRETE LABORATORY TECHNICIAN LEVEL II QUALIFICATION FLOWCHART



CONCRETE BATCH PLANT OPERATOR QUALIFICATION FLOWCHART



Note: This flowchart is produced to aid the applicant in seeing the relationship between the written procedure and the process leading to qualification. Should a conflict exist between the written text and the flowchart, **the written text shall govern.**

Attachment 4-6

ACI CONCRETE FIELD TESTING TECHNICIAN GRADE I CERTIFIED TRAINING COURSE

Test Methods to be covered in this course are:

- | | | |
|-----|------------|--|
| (1) | ASTM C1064 | Temperature of Freshly Mixed Portland Cement Concrete |
| (2) | ASTM C172 | Sampling Freshly Mixed Concrete |
| (3) | ASTM C143 | Slump of Hydraulic Concrete |
| (4) | ASTM C138 | Density, Yield and Air Content (Gravimetric) of Concrete |
| (5) | ASTM C231 | Air Content of Freshly Mixed Concrete by Pressure Method |
| (6) | ASTM C176 | Air Content of Freshly Mixed Concrete of Volumetric Method |
| (7) | ASTM C31 | Method of Curing Concrete Specimens in the Field |

Attachment 4-7

ACI CONCRETE FIELD TRANSPORTATION CONSTRUCTION INSPECTOR (CTCI) EDUCATION AND EXPERIENCE REQUIREMENTS

ACI Certification for CTI requires that one of the following criteria be met:

- (a) Must have a minimum of two years (60 credit hours) of college or technical school plus two years of work experience in transportation concrete inspection and/or field testing of concrete. A copy of the diploma or transcript is required.

- OR -

- (b) High school graduate or equivalent plus a minimum of three years work experience in transportation concrete inspection and/or field testing of concrete. A copy of the diploma or equivalent is required.

- OR -

- (c) Five years experience in transportation concrete inspection and/or field testing of concrete.

The work experience required above for each criteria must include:

- a. Decision-making responsibility and authority.
- b. Verification of compliance with plans, specifications and codes.
- c. Evaluation of concrete construction in the field
- d. Documentation and reporting of inspection results.
- e. Proficiency in appropriate areas of concrete construction inspection.

Note: These requirements are subject to change. Consult the ACI webpage (<http://www.concrete.org/general/home.asp>) for the latest CTCI qualification requirements.

Attachment 4-7a

ACI ASSOCIATE CONCRETE FIELD TRANSPORTATION CONSTRUCTION INSPECTOR (CTCI) EDUCATION AND EXPERIENCE REQUIREMENTS

ACI Certification for Associate CTI requires that the following criteria be met:

- (a) Current ACI Concrete Field Testing Technician Grade I and;
- (b) Successful completion of respective written examinations and inspection and plans reading.

Note: These requirements are subject to change. Consult the ACI webpage (<http://www.concrete.org/general/home.asp>) for the latest CTCI qualification requirements.

Attachment 4-8

ACI CONCRETE TRANSPORTATION CONSTRUCTION INSPECTOR (CTCI) TRAINING COURSE

Topics usually covered in this course and on the examination include:

- (1) Concrete Documents
- (2) Materials
- (3) Pre-Placement, Placement and Post Placement of Concrete
- (4) Soil Cement
- (5) Pavement and Roller Compacted Concrete
- (6) Piles and Drilled Shafts
- (7) Bridge Decks
- (8) Plans Reading
- (9) Concrete Form Work

Attachment 4-8a

ACI ASSOCIATE CONCRETE TRANSPORTATION CONSTRUCTION INSPECTOR (CTCI) TRAINING COURSE

Topics usually covered in this course and on the examination include:

- (1) Concrete Documents
- (2) Materials
- (3) Pre-Placement, Placement and Post Placement of Concrete
- (4) Concrete Form Work
- (5) CRSI Manual of Standard Practice (MSP)
- (6) Plans Reading

Attachment 4-9

ACI CONCRETE STRENGTH TESTING TECHNICIAN CERTIFICATION COURSE

- | | | |
|-----|------------|---|
| (1) | ASTM C617 | Capping Cylindrical Concrete Specimens |
| (2) | ASTM C1231 | Use of Unbonded Caps in Determination of Compressive Strength or Hardened Concrete Cylinders. |
| (3) | ASTM C39 | Compressive Strength of Cylindrical Concrete Specimens |
| (4) | ASTM C78 | Flexural Strength of Concrete (Using Simple Beam with Third-Point Loading) |

NOTE: This ACI Certification is for 6 years (72 months).

Attachment 4-10

ACI CONCRETE LABORATORY TESTING TECHNICIAN LEVEL 1 TRAINING COURSE

This program requires a working knowledge of the following AAHSTO and/or ASTM Standards:

C 617 – Capping Cylindrical Concrete Specimens

C1231 – Unbounded Caps for Concrete Cylinders

C39 – Compressive Strength of Cylindrical Concrete Specimens

C 78 – Flexural Strength of Concrete (Using Simple Method with Third-Point Loading)

T 2 / D 75 – Sampling of Aggregates

T 248 / C 702 – Reducing Samples of Aggregate to Testing Size

T 11 / C 117 – Materials Finer than 75- μm (No. 200) Sieve in Mineral Aggregates by Washing

T 27 / C 136 – Sieve Analysis of Fine and Coarse Aggregate

T 85 / C 127 – Specific Gravity and Absorption of Coarse Aggregate

T 84 / C 128 – Specific Gravity and Absorption of Fine Aggregate

T 255 / C 566 – Total Moisture Content of Aggregate by Drying

T 21 / C 40* - Organic Impurities in Fine Aggregate for Concrete

* Written exam only

Attachment 4-11

ACI CONCRETE LABORATORY TESTING TECHNICIAN LEVEL 2 TRAINING COURSE

The program requires a working knowledge of the following ACI and ASTM Standards:

ACI 214* – Evaluation of Strength Test Results of Concrete

ACI 211.1* – Selecting Proportion for Concrete

C 192 – Making and Curing Concrete Test Specimens in the Laboratory

[This standard also requires the knowledge and ability to perform ASTM C 143 (Slump), C 173 and C 231 (Air Content), C 138 (Unit Weight), and C 1064 (Temperature).]

C 470* – Molds for Forming Concrete Test Cylinders Vertically

C 496* – Splitting Tensile Strength of Cylindrical Concrete Specimens

C49* – Obtaining and Testing Drilled Cores and Sawed Beams of Concrete

*Written exam only

Attachment 4-12

CTQP QUALIFICATION BY JOB FUNCTION

CONCRETE

NOTE: ACI Concrete Certifications are a critical part of maintaining your CTQP qualifications.

Concrete Field Technician – Level I:

This is the QC Technician who must be qualified to perform acceptance tests such as slump, temperature, air content and making/curing concrete cylinders.

Technicians who test concrete material properties or perform Independent Assurance (IA) reviews must also possess this qualification.

Concrete Field Technician – Level II:

This is the contractor's representative who must be responsible for the quality of the concrete being placed on major bridge projects. These responsibilities are not limited to substructure or superstructure.

The Department's lead inspector on a concrete bridge structure must have this qualification.

The ACI CTCL certification, or the ACI Associate CTCL certification along with Pile Driving Inspector Qualification and/or Drilled Shaft qualification, will be required on complete bridge jobs (where do you need to note this in the job documents?).

Concrete Laboratory Technician – Level I:

This is the Concrete Strength Testing Technician who must be qualified to break samples and record concrete strength for material acceptance.

Any person who tests concrete for material quality compliance or performs Independent Assurance (IA) must also possess this qualification.

Managers of Quality Control at the concrete production facilities must have this qualification.

Attachment 4-12 - continued

Concrete Laboratory Technician – Level II:

This is a mix designer for concrete mix submittals.

The Department representative responsible for verifying the concrete mix design must have this qualification.

Concrete Batch Plant Operator:

This is a concrete producer employee who is identified in the Quality Control Plan as the individual who batches the concrete for the contractor.

Department employees may obtain this qualification for professional knowledge but it is not required for FDOT personnel.

Managers of Quality Control at the concrete production facilities must have this qualification.