FAA Standard

FAA-STD-028C

028C

CONTRACT TRAINING PROGRAMS

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Preface

This standard presents the procedures that an FAA contractor should follow in the development or delivery of training for the FAA. This standard focuses on a systematic training development process. With this standard we hope to promote a clear dialog between the contractor and the government, to ensure quality design, development and delivery of FAA training and to encourage stabilization of requirements.

The contract, specifications document and Statement of Work (SOW) are the official documents that state the requirements. The Data Item Descriptions (DIDs) presented in this standard should be modified as applicable to the specific contract and incorporated in the Statement of Work (SOW) or the specifications document.

The contractor is to comply with the contract DIDs and specifications. Where contract specifications are unclear or when there is no specific additional guidance, the procedures in this standard must be adhered to. A contractor is encouraged to surface a query with the government representative of an approach that may be less costly, and or a more effective use of resources and efforts while providing quality systematic training products. Suggested approaches, modifications or adaptations that will streamline or enhance the training or development in a more cost effective state of the art manner are welcome and desired.

FAA STD-028C has been revised and reorganized to conform with the technology currently used in the development of FAA training.

Each instructional approach is described in a chapter titled "Training Approaches," while the process to be used and the deliverables that are connected to an approach are in specific DIDs. For example, if Computer-Based Instruction (CBI) is the appropriate approach for training, the process for developing it and the deliverables that the contractor will design and deliver are identified in the DID for CBI.

FAA Standard 028C has been developed in collaboration with Garry Long, AFZ-100, Sandy Scott, AMA-430, Bob Welp, ATX-100, and Cathie Mott, AHD-200.

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CHAPTER 1—INTRODUCTION

1-1. Purpose.
This Standard establishes procedures for contractor-developed and/or delivered training through the application of the principles and procedures of a systematic training development process. Deliverables shall be developed as specified in the Data Item Descriptions (DIDs) or specifications that are part of the contract and shall be delivered in accordance with the contract. Anything that is not clearly specified in the contract, specifications or SOW should be queried for clarification of the government. This Standard shall be applied to all training procurements when there is limited clarifying information in the contract, specifications or statement of work (SOW).

With this standard we hope to promote clear dialog between the contractor and the government. A contractor is encouraged to surface a query with the government representative of an approach that may be less costly, or more effective use of resources and efforts while providing quality systematic training products.

1-2. Distribution.
This Standard is distributed to the branch level in FAA Headquarters, the FAA Academy, regions, and centers, all FAA training organizations with limited distribution to all field offices and facilities. It is designed to be applicable to all training design, development or delivery procurements.

1-3. Background.
Faced with increased responsibilities for monitoring, reviewing, and approving contractor training deliverables, communications of requirements and expectations is critical. The individual training divisions and/or the office procuring the training are responsible to monitor, review, and accept contractor training deliverables.

1-4. Systematic Development Process.
The application of a systematic development process, continuous validation activities, and the use of a job-centered training approach are the FAA's greatest assurances that quality training deliverables will be submitted by a contractor to the FAA. The deliverables required by the Data Item Descriptions (DIDs) presented in the contract and this Standard further assures the FAA that a contractor is using a systematic training development process.

1-5. Description.
This Standard has been developed to accomplish the following:

a. Strengthen the specifications stated in the DIDs.

b. Ensure traceability between job tasks, training objectives and materials.

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c. Develop a more rigorous review and approval process to ensure accountability.

d. Provide DIDs for development of a variety of training delivery approaches.

e. Ensure consistency between this Standard and the agency's policy for training.

f. Emphasize selection of the most effective training approach.

g. Promote clear communications of requirements and expectations of both the contractor and the government.

h. Provide a vehicle to define and stabilize requirements.

1-6. Definitions/Acronyms.
Definitions for the terms used in this Standard are provided in the glossary, located in Appendix 2. A list of acronyms used in this Standard is located in Appendix 3.

1-7. Requests for Information.
Requests for further information or clarification about this Standard should be directed to the Office of Human Resources, Federal Aviation Administration, AHT-200, 800 Independence Avenue, S.W., Washington, D.C. 20591.

1-8. Application of this Standard.
Questions concerning the application of this Standard to a specific contract shall be directed to the appropriate FAA Contracting Officer (CO) or designated representative, who oversees the contractual details of the contract. The FAA reserves the right to provide any supplemental guidance as deemed necessary.

1-9. Congressional Requirements:
Public law establishes general requirements and limitations on the funding of employee training. FAA policy further explains these requirements. All training shall meet the requirements of FAA policy as delineated in the Human Resource Personnel Manual (HRPM).

The following basic requirements shall apply to all contractor-developed training.

- *Job relatedness*. Training is based on a needs assessment that has determined that the training is needed to improve individual, occupational, or organizational performance and to accomplish official duties in support of the mission of the agency.
- *Stress*. The training will not contain content or methodology likely to produce high levels of emotional response or psychological stress in the training participants other than task-related stress equivalent to what may be encountered in performing work.
- *Prior notification*. All employees will receive prior notification of the content and methods to be used in the training.

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- *Written end-of-course evaluations.* All employees will be given the opportunity to complete written end-of-course evaluations. A FAA training official will collect and maintain all evaluations.

- *Religious methods or content.* The training will not contain methods associated with religious, quasi-religious, or "new age" belief systems.

- *Values and lifestyle.* The training focuses on workplace knowledge, skills, and abilities. It does not include materials that could be viewed as attempts to change or influence an individual's personal values or lifestyle outside the workplace.

- *HIV and AIDS.* The training will not include content related to Human Immunodeficiency Virus/Acquired Immune Deficiency Syndrome (HIV/AIDS) other than that necessary to make employees more aware of the medical ramifications and the workplace rights of HIV-positive employees.

End of Chapter.

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CHAPTER 2—GENERAL INFORMATION

2-1. Purpose.
The purpose of this chapter is to provide guidance regarding administrative aspects of all training.

2-2. Applicable DIDs.
DID-1, Personnel Qualifications Report

2-3. Environmental Occupational Safety and Health (EOSH).
All training developed or revised by a contractor shall meet or exceed the appropriate Occupational Safety and Health Administration (OSHA) regulation (see OSHA 29CFR1910). OSHA safety regulations shall be integrated into course content, as appropriate.

All instruction developed for the FAA by a contractor using this standard shall emphasize each person's accident prevention responsibilities, both as an individual and as a representative of the FAA. Safety precautions related to training on the operations, maintenance and/or troubleshooting of equipment must be a prominent part of the training.

2-4. Copyrighted Material.
All material required by this standard shall be free from all encumbrances which prohibit or limit their reproduction or use by the FAA for training purposes. These encumbrances include, but are not limited to, copyrighted materials, registered documentation, and software. All material developed for the FAA shall be the sole property of the FAA and shall not be used by the contractor for any purpose other than that in the contract. At final delivery, the contractor shall provide written verification that the above requirements have been met.

2-5. Development of Training Materials.
When training materials are developed, they must meet the requirements in this standard, which includes:

a. A systems approach to training development shall be used.

b. All validation requirements shall be met.

c. Traceability shall be maintained through all deliverables. Training outcomes and terminal objectives in the course design guide (CDG) shall be traceable to tasks selected for training in the task analysis. Terminal and enabling objectives in the CDG shall be traceable to the training materials.

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2-5. Development of Training Materials (continued).

d. Training materials may have flexibility in terms of form, but must be clear, understandable, and useable. The content must be complete, accurate, and effective in meeting stated outcomes and must be approved by the FAA representative prior to use.

e. Formats for training materials, if different from this standard, shall be approved by the FAA Training Technical Advisor (TTA), prior to use. Examples of current forms, such as lesson plans, class schedules, course design guides, etc., will be furnished by the FAA.

2-6. Roles of FAA Personnel.

The FAA personnel typically involved in contractor-developed training and their roles are described below.

- *Contracting Officer*. The FAA Contracting Officer provides contractual approval of deliverables and authorizes modifications to the contract.

- *Contracting Officer's Technical Representative (COTR)*. The COTR is appointed by the Contracting Officer and provides technical oversight of the contract for the Contracting Officer.

- *Technical Training Advisor (TTA)*. For each service, a TTA will be designated by the line of business and provides for review and approval of course materials.

- *Instructional Systems Design (ISD) Specialist or Instructional Systems Specialist (ISS)*. This FAA specialist provides guidance on the application of ISD processes and procedures in accordance with this Standard and other applicable training orders.

- *Subject Matter Expert (SME)*. Person(s) responsible for assessing the technical accuracy of the training materials and appropriateness of the training materials for the target population.

- *National Training Office*. For all services, the Technical Training Advisor (TTA) submits comments to the national training office for approval; the national training office forwards the comments and/or approval to the Project/Program Office.

2-7. Personnel Qualifications Report.

DID-1, Personnel Qualifications Report, provides the qualifications of the training staff and their skills to be addressed in the report of all contractor personnel assigned to training development and delivery tasks. A resume is required for each person identified in the report and shall accompany the report.

Continued on next page.

2-7. Personnel Qualifications Report (continued).

The FAA reserves the right to accept the individuals listed or request other more qualified personnel based on the resumes submitted. Further qualifying information may be submitted for consideration.

Each individual must bring special skills to the tasks of designing, developing, and delivering effective training. The titles of personnel are:

- Instructional Systems Design (ISD) Project Manager
- Instructional Designer
- Subject Matter Expert
- Instructional developer
- Instructional technologist
- Support staff, as required, such as graphic artist, programmer, etc.
- Instructor.

If there is a change in any training personnel, the contractor must resubmit the changed portion of the Personnel Qualifications Report (PQR). The FAA reserves the right to approve proposed personnel changes for training development and delivery based on qualifications. For planned changes, the contractor shall submit the PQR thirty days prior to the Post-Award Training Conference. For smaller contracts the PQR shall be submitted within ten days of contract award, unless otherwise specified in the contract. A PQR shall be submitted immediately for unexpected short notice changes.

2-8. Training/Course Schedule.

For classroom delivery, training shall be scheduled for eight hours per day for five workdays per week, unless otherwise specified. Federal holidays shall <u>not</u> be class days and shall <u>not</u> be absorbed in the overall course length. The FAA will establish class start and stop times and class days.

To meet urgent installation and fielding requirements, the FAA may direct a contractor to conduct a second shift or an accelerated training schedule. If so directed, the contractor shall conduct training to accomplish all instructional activities while maximizing use of the system or equipment.

The course schedule provides an overview of the course chronology. The course schedule is submitted concurrently with the CDG, and shows the major course segments as specified in the CDG. The course schedule is updated throughout the development process and is submitted to the FAA as required.

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2-8. Training/Course Schedule. (continued)

Course schedules shall be prepared in accordance with the appropriate DID for the approach selected for training delivery. Schedules are required for the following training delivery approaches:

- Classroom Training
- Interactive Video Teletraining (IVT)
- Laboratory Training, where appropriate.

2-9. Student-to-Instructor Ratio.

The student-instructor ratio shall be established by the FAA.

2-10. Student Reporting.

Only personnel designated by the FAA shall attend or participate in training programs procured under the provisions of this standard. The FAA is responsible for notifying students to report for training. The specific reporting procedure will depend on the training approach selected for training delivery:

a. *Classroom and Simulation/Laboratory Training.* For classroom training delivered by a contractor, the student shall be directed by the FAA to report to a designated individual at the training facility. The names of students authorized to attend the training course shall be provided to the contractor prior to the first day of the course. If a student who is authorized to attend the training course fails to arrive on the first day of the course or any day thereafter, the contractor shall immediately notify the FAA.

b. *Interactive Video Teletraining.* For IVT delivered by a contractor, the student shall be directed by the FAA to report to a designated training facility. The names of students authorized to attend the training course shall be provided to the contractor prior to the first day of the course. If a student who is authorized to attend the training course fails to arrive on the first day of the course or any day thereafter, the contractor shall immediately notify the FAA.

2-11. Training Equipment and Materials Required for Training.

Any contract for the development and/or delivery of training shall state whether training equipment is contractor-furnished or Government-furnished. Any system furnished for training development and/or delivery shall include all software, special tools, test equipment, simulators, and support equipment required to provide the end product or service (for example, an Airport Surveillance Radar System furnished for training shall include everything from the antenna to the air traffic controllers' displays).

The system or equipment shall duplicate the actual function of the operating environment.

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2-12. Government-Furnished Training Equipment and Materials.

If required, the FAA shall deliver Government-furnished equipment (GFE) and materials to be used for the development and/or delivery of training. The equipment will be delivered in an operable and usable condition. Access to FAA systems/equipment for purposes of developing and testing training materials shall be coordinated through the program office.

If training is to be conducted at an FAA field site, the system or equipment to be used in the training course at the FAA site shall be made available to the contractor. Training equipment shall be maintained in an operable and usable condition during the training course except for planned disassembly and fault isolation training exercises. The contractor shall notify the FAA TTA immediately by telephone if the equipment is inoperable and/or unusable.

The FAA will make available to the contractor as GFE the FAA Computer Managed Instruction (CMI) platform, which must be used for CBI training.

2-13. Contractor-Furnished Training Equipment and Materials.

Any special tools, test equipment, and support equipment (e.g., computers, workstations) necessary to develop and/or conduct training, but not furnished as part of a standard installation, shall be provided by the contractor. The contractor shall maintain all equipment in an operable and usable condition during training development and/or delivery of the course, except for planned disassembly and fault isolation training exercises.

All contractor-furnished equipment and materials, other than those specified in this standard, shall be developed and approved in accordance with the Acquisition Management System process, to include FAA-approved requirements documentation and system specifications.

The contractor shall notify the FAA TTA immediately by telephone if the equipment is inoperable and/or unusable. If contractor-furnished equipment for development and/or delivery of training is to be returned to stock for subsequent delivery to the FAA, the contractor shall adhere to applicable configuration management requirements.

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2-14. Contractor-Furnished Training Site(s) and Facilities.

Any training sites and/or facilities that are furnished by a contractor are subject to inspection and approval by the FAA Contracting Officer, or designee, either before or during the contract period. The following site/facility conditions will be appraised and must be approved:

- Space
- Lighting
- Noise
- Heating and cooling
- Safety of environment
- Cleanliness and sanitation
- Furniture.

Training aids such as chalkboards, overhead projectors, viewgraphs, etc., as identified in training documentation, shall be provided by the contractor.

The contractor shall correct any known deficiencies identified before the start of training. If training is already in progress, the deficiencies shall be corrected within 10 days, or within the time period specified by the FAA Contracting Officer.

The contractor shall not be responsible for housing, dining facilities, or transportation. However, for training courses conducted at other than FAA facilities, the contractor shall provide directions to the training facility and a list of housing, dining, and transportation facilities available in the vicinity of the training facility. This information shall be provided to the FAA Contracting Officer's Technical Representative (COTR) at least six weeks prior to the scheduled first class of the course.

End of Chapter.

CHAPTER 3—OVERVIEW OF SYSTEMATIC TRAINING DEVELOPMENT

3-1. Purpose.

This Chapter provides an overview of the events that occur during a contractor's systematic development and delivery of training for the FAA.

3-2. Phases in the Development Process.

After a training contract has been awarded to a contractor, the contractor applies a systematic development process to develop the training. The five phases of the development process are: analysis, design, development, delivery, and evaluation. Only the first four phases of the process are addressed in this standard. Phase 5, Evaluation, is an FAA function and is not addressed in this document.

Each of the phases of the development process has critical activities and deliverables associated with it. The deliverables provide evidence of the contractor's application of the systematic development process. The major activities and deliverables that are associated with the first four phases of the process are shown in Figure 3-1.

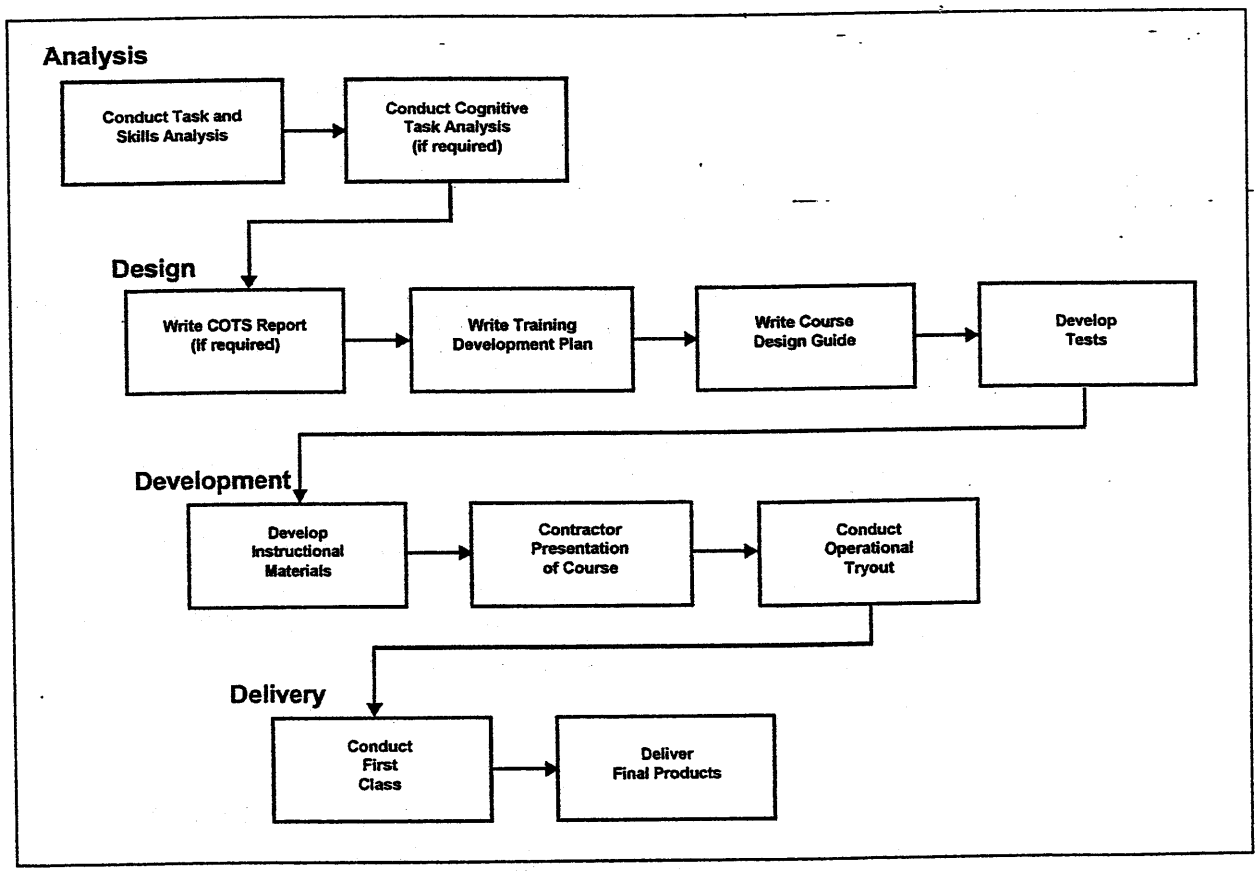

Figure 3-1. Phases in the Systematic Development Process and Major Activities/Deliverables in Each Phase.

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3-3. Role of Validation.
Validation of training materials is performed by FAA and is an on-going process throughout the development process. It begins with the task analysis, where tasks, skills, and the required extent of knowledge are validated. The process continues throughout the development of all instructional materials, including delivery of the first course conduct; see Figure 3-2.

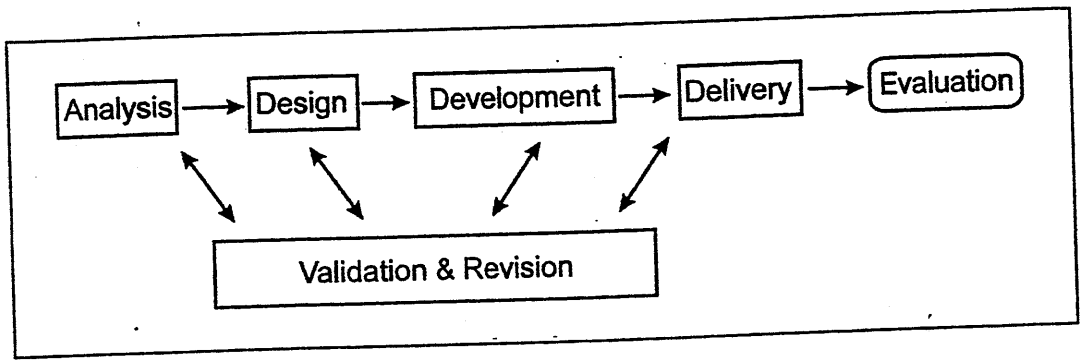

Figure 3-2. Phases in Development Process and Their Relation to Validation.

3-4. Review and Approval Process.
The contractor shall apply a quality assurance process to all training deliverables.

a. *Draft to FAA.* For each training deliverable specified in a contract, the contractor submits a *draft* to the FAA for review.

b. *Draft revised.* Following the FAA review, the contractor incorporates the FAA's comments into the deliverable and submits it as a *revised draft*. The contractor shall include methods for recognizing changes to the previous draft in revised deliverables. If the contractor does not agree or does not understand the comments, the contractor shall call a technical interchange meeting (TIM) or obtain clarification prior to making changes and resubmitting the deliverable(s).

c. *Revised draft approval.* The FAA's approval of the *revised draft* signifies an acceptance of the deliverable for subsequent development and validation activities; it authorizes the contractor to proceed with development of the next deliverable(s). The approved revised draft TDP and CBI storyboards may be submitted as a final, presuming all revisions have been made.

d. *Deliverables.* The TASA and the CDG will be kept current and accurate throughout the training development process. The latest TASA and CDG will be delivered to the FAA 30 days prior to the First Course Conduct. All final deliverables will be submitted after the First Course Conduct.

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3-5. Deliverable Specifications.

Deliverables shall be submitted on electronic media and/or paper documents as specified in the statement of work.

All deliverables submitted by the contractor shall be technically accurate and free of errors in punctuation, spelling, and grammar. All instructional materials, unless otherwise specified, shall be identified with numbers/labels that are consistent with the identification system of the FAA organization for which the training is developed.

3-6. FAA/Contractor Conferences.

There are three types of conferences that will be held during the course of a contract for training development and/or delivery: a post-award training conference, technical interchange meetings, and in-progress reviews. The contractor shall prepare agendas for the technical interchange meetings and in-progress reviews. The requirements for these meetings will be further clarified in the contractual agreement.

a. *Post-Award Training Conference*. A post-award conference shall be convened by the FAA Contracting Officer, or one designated by the CO, who shall serve as chairperson. The conference shall:

1. Establish a liaison between the contractor, FAA Contracting Officer, FAA Technical Officer, FAA TTA, and other FAA personnel specified in the contract and charged with the responsibility for contract administration.

2. Permit inspection of the contractor's facility and establish a working relationship with contractor personnel.

3. Discuss the proposed course development methods and the requirements associated with each deliverable required from the contractor.

4. Discuss the contractor's plan for accomplishing the training.

5. Discuss the contractor's Personnel Qualification Report.

b. *Technical Interchange Meetings (TIMs)*. TIMs are checkpoints and opportunities to share information between the contractor and the Government. TIMs may occur at any point in the training development process.

c. *In-Progress Reviews (IPRs)*. IPRs are formal presentations by the contractor to the Government concerning the progress that has been made on the training development or delivery effort to date. The frequency and scheduling of IPRs will be stated in the contract.

End of Chapter.

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CHAPTER 4—ANALYSIS

4-1. Purpose.

The purpose of this chapter is to describe the activities that comprise the analysis phase of systematic development.

4-2. Applicable DIDs.

- DID-2, Task and Skills Analysis Report
- DID-3, Cognitive Task Analysis Report

4-3. Description.

Analysis is the foundation for all desired training outcomes; it identifies the tasks that require training and the characteristics of each task. A task analysis provides specific information about job performance needed for the design and development of quality training. Analysis is also used in the design phase to determine the most effective manner of training personnel to achieve the desired job performance. The analysis phase has two parts: task and skills analysis and cognitive task analysis.

A *task and skills analysis* (TASA) analyzes and documents the components of accomplishing work; i.e., it is a process for determining the parts of a given task, identifying stimulus and response requirements for performing each task element, and identifying how the parts relate.

A *cognitive task analysis* (CTA) analyzes the components of learning required to achieve mastery, i.e., it is a process for determining how someone thinks and makes decisions. By its nature, CTA procedures and products are an extension of a traditional TASA they are intended to supplement. As such, the analysis must be both flexible and tailored to the specific information needs of the tasks selected for analysis.

Both parts of the task analysis include the identification of job performance requirements. These requirements are:

- Tasks that a person must perform
- Conditions under which these tasks must be accomplished
- Standards of performance.

Continued on next page.

4-4. Process.

A task analysis is conducted when there are changes in job requirements. The changes may result from:

- installation/application of new technology
- installation of new equipment
- new versions of equipment already in use
- workforce expansion
- redistribution of job responsibilities
- need to improve workforce proficiency
- change in process/procedures.

The results of the TASA will help identify the type of training needed, such as: initial, advanced, transition, refresher, and/or on-the-job. A task analysis should be updated to incorporate current job information.

4-5. Key Factors.

The task analysis shall be kept current throughout the training development effort. Revision of the task analysis will generally be required if one or more of the following occur:

- Data collected is incorrect
- New data is uncovered
- Changes in the system/equipment cause a change in the tasks, subtasks, elements.

The CTA is performed only when expressly specified in the FAA Statement of Work (SOW).

End of Chapter.

CHAPTER 5—COMMERCIAL-OFF-THE-SHELF TRAINING MATERIALS

5-1. Purpose.
The purpose of this chapter is to describe how the contractor ensures that Commercial-Off-The-Shelf (COTS) training materials, if proposed for use in meeting an FAA training requirement, will be comprehensive and effective in meeting that requirement.

5-2. Applicable DIDs.
DID-4, Commercial-Off-The-Shelf Training Materials Report

5-3. Description.
COTS training materials are existing, commercially available training materials that have been used previously; they are not "on-the-shelf technical documents." When COTS materials are to be used for FAA training, the contractor must follow the same planning steps and the same validation steps as any other training developed for the FAA.

COTS training materials must match the FAA requirements as defined in the TASA. If the contents do not match the TASA exactly, the contractor must develop training to cover the portion of the required training that is not in the COTS materials, and delete any material that is unnecessary.

5-4. Process.
The contractor shall assess the suitability of the proposed COTS training materials against the TASA developed during the analysis phase. The findings of the assessment shall be compiled into a COTS report and submitted to the FAA for approval.

The contractor is encouraged to use commercial-off-the-shelf training materials where ever possible but only if they meet the specifications of the contract and are approved in advance. Clear communications with the government are critical to determine if the suggested COTS are acceptable to the process.

5-5. Key Factors.
The proposed COTS training materials shall be submitted to the FAA along with the COTS Materials Report.

If additional training materials must be developed to supplement the proposed COTS, the contractor shall follow the training development process cited in this standard for the additional training materials.

End of Chapter.

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CHAPTER 6—TRAINING APPROACHES

6-1. Purpose.

The purpose of this chapter is to describe the various approaches to training that can be used to most effectively present the knowledge and skills identified in the task analysis.

6-2. Applicable DIDs.

None.

6-3. Description.

A training approach is a combination of an instructional delivery platform with complementary instructional methods (e.g., computer-based instruction with tutorials).

Approaches generally applied in the FAA are described below. One or more approach may be used dependent upon the nature of the training requirement. The training approach decision is documented in the training development plan (TDP).

Any of these training approaches may have the capability to present instruction via multiple media.

Training Approach	*Characteristics*
Classroom training	Is useful when: • immediate instructor/student interaction is necessary • group activity is planned • hands-on equipment is required, and • class size is small. Note: Classroom delivery may include multimedia, such as video, simulations, and computer graphics.
Correspondence study training	Is useful when large numbers of students need to be trained at minimum cost. There are no travel costs, and instructional materials can be easily distributed. However, it can be difficult to assess student progress and arrangements must be made for examinations. There is little or no instructor/student interaction.
Computer-based instruction (CBI)	Is useful when large numbers of students need training and when the infrastructure is in place. CBI may have color graphics, video, and audio that can become as realistic as "hands on" demonstrations and practice. There may be no travel costs involved. However, the cost of initial course development is high.
Interactive video teletraining (IVT)	Is useful when geographically dispersed students need to see (via video) and hear an instructor, and interact immediately. IVT can reach an unlimited number of students in one broadcast. Long courses may impact student retention and scheduling across various time zones may be a problem. Also, there may be some travel costs and a downlink site must be available.

Continued on next page.

6-3. Description (continued).

Training Approach	*Characteristic*
Simulation/Laboratory Training	Is useful when students require practice and/or performance assessment on actual equipment or under realistic job conditions, but actual job conditions would be too costly or dangerous to use. This practice may be used to refine cognitive or motor skills or to integrate the performance of many tasks. Generally, the number of students that can be trained at one time is low. Costs are dependent on several factors: • Has the simulator or lab equipment been developed and fielded? • Will students have to travel to the simulator/lab location? • What are simulation scenario development costs? • How many instructors per student are required?
Video training	Is useful when students: • need a brief overview • have little time to spend in training, but need to know useful, critical information • need to see and hear instruction that has strong visual and audio components, or • need to see realistic movement or process, realistic sounds, and explanations. Video training is most effective when limited to 20 minutes or less. Longer videos can be used, but student attention decreases as the length increases.
Web-Based Training	Is useful when large numbers of geographically dispersed individuals need training. The ability to use the Web depends on having appropriate equipment (computer/modem) to access the internet.

6-4. Process.

The FAA makes decisions about the training approach in two stages. In the first stage, the general approach to training is determined.

Once the approach has been determined and approved, individual media decisions are made. These choices, which include the use of graphics, photographs, schematics, flow charts, models, etc., are documented in the CDG.

Airway Facilities most often selects the training approach through its Curriculum Modernization System (CMS) process. If the CMS process is not used, the contractor may recommend the training approach.

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6-4. Process (continued).

Figure 6-1 shows the process for selecting a training approach. Note that the process may be a cycle and that the training approach is documented in the TDP.

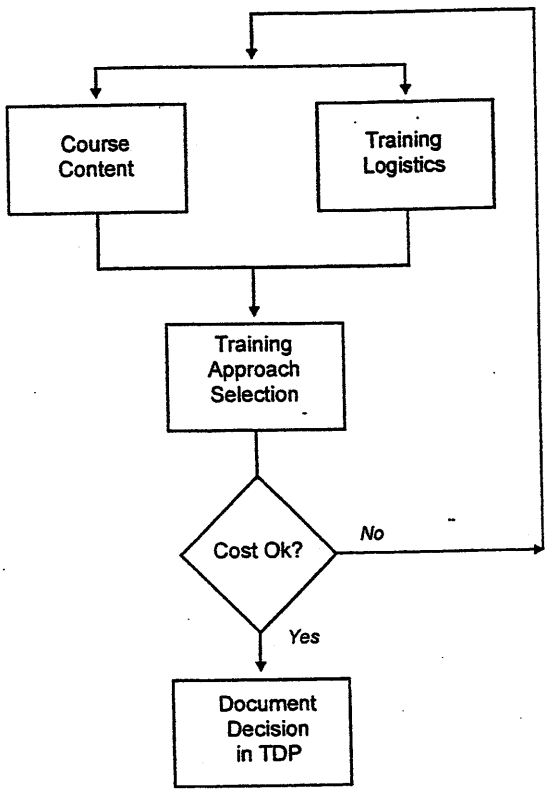

Figure 6-1. Process of Selecting a Training Approach.

6-5. Key Factors.

None.

End of Chapter.

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CHAPTER 7—DESIGN

7-1. Purpose.

The purpose of this chapter is to describe the design phase of the systematic development process in which the training course structure is documented. The detailed design for the training course is based on the information gathered in the analysis phase.

7-2. Applicable DIDs.

- DID-5, Training Development Plan
- DID-6, Course Design Guide
- DID-7, Tests

7-3. Description.

The design phase focuses on determining the most effective manner in which to train employees to achieve the desired level of job performance. In the design phase, plans for achieving the training are prepared, individual courses are designed, and test items that measure the objectives are developed.

The TDP recommends a plan to achieve the desired training and provides a record of the basic planning for training. Also, the TDP provides communication and agreement between the FAA and the contractor on how the training will be developed. The contractor's TDP builds on the information that was gained in completing the task analysis and on the knowledge of the training approach selected for the training effort.

If COTS materials were selected, the TDP must address both the materials/content that must be developed and those that must be removed.

In the CDG, training outcomes and their associated objectives are developed and sequenced. For each enabling objective, the instructional methods and training media, testing activities, and specific technical content are identified. An existing, developed, or modified CDG must be provided for COTS materials.

Tests are used to measure and document a student's knowledge, cognitive ability, and performance of job tasks and skills.

Continued on next page.

7-3. Description (continued).

The specific type of test item to use should be determined by the behavior specified in the objective to be tested and the instructional delivery system used. Various types of test items may be used and are described below.

Test Item Type	Characteristics
Multiple-choice	• Useful for testing knowledge and cognitive abilities. • Consists of a stem and four responses.
Matching	• Useful for testing terms and labels. • Consists of two columns of related words, phrases, or symbols to be matched by the student.
True/False	• Useful for testing knowledge. • Consists of a single statement.
Completion or "fill in the blank"	• Useful for testing recall of knowledge committed to memory. • Consists of a statement from which a word(s) or short phrase has been omitted. The student must supply the missing word(s) or phrase in the blank(s) provided.
Performance	• Useful for testing job tasks and skills. • Consists of a checklist and a simulated or actual environment with certain conditions of performance and certain expected outcomes.
Physical response	• Useful for testing motor skills. • Consists of a device that requires the student to locate or identify an item or manipulate it in some manner.

7-4. Process.

The contractor shall perform an analysis of FAA training needs and validate the findings. After the training approach(es) is selected, a meeting will be convened to discuss the analysis and selected training approach(es). The TDP is then submitted to the FAA for review, before the contractor develops the course design guide. The generalized sequence of planning for development of training is shown in Figure 7-1.

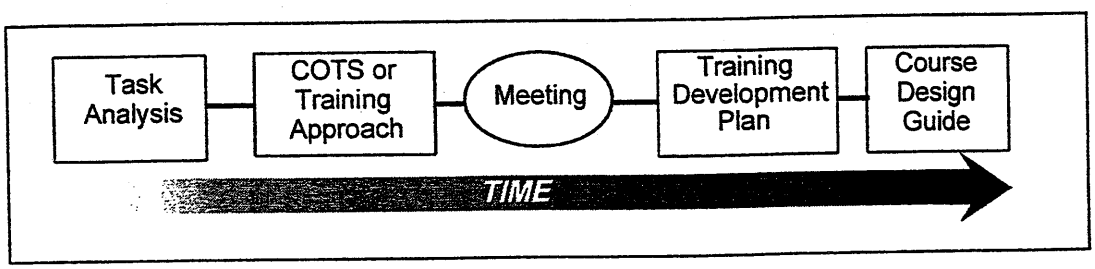

Figure 7-1. Generalized Planning for Training Development.

Continued on next page.

7-4. Process (continued).

The contractor develops the CDG after FAA approves the TDP. The detailed design for the training course is based on the information gathered in the analysis phase.

The contractor shall develop a brief plan for the test, if required, outlining the approach to test development.

The contractor shall develop the required test items, and all required supplemental materials (e.g., instructions for the instructor, instructions for the student, scoring procedures, answer key, etc.). Delivery and review of test items will coincide with delivery of draft course materials.

The contractor shall take corrective action to revise the instruction or the test item(s), or both, if necessary.

7-5. Key Factors.

The detail and depth of the TDP will vary from service to service. Close coordination between the contractor and service is necessary to ensure each service's requirements are met. The service may be able to provide examples of previous plans.

The CDG must be kept current throughout the development effort. Revision will generally be required if one or more of the following occur:

- Information is incorrect
- New information is uncovered
- Changes in the new system/equipment cause a resultant change in the tasks
- Validation identifies deficiencies.

Templates for the CDG will be available from the FAA.

Test item security is critical to ensure there is no compromise of the content and correct answers.

The number of test items shall be sufficient to adequately measure student mastery of each objective and to provide multiple versions of a test.

End of Chapter.

CHAPTER 8—DEVELOPMENT

8-1. Purpose.
The purpose of this chapter is to describe the process for developing instructional materials.

8-2. Applicable DIDs.

- DID-8, Classroom Training
- DID-9, Correspondence Study Training
- DID-10, Computer-Based Instruction
- DID-11, Video Training
- DID-12, Interactive Video Teletraining
- DID-13, Web-Based Training
- DID-14, Contractor's Presentation
- DID-15, Operational Tryout

8-3. Description.
In the development phase, the instructional materials for the course are developed, validated, and revised.

8-4. Process.
The instructional design stated in the CDG is translated into effective instructional materials.

Instructional materials are created that are traceable from the objectives in the CDG.

The contractor revises the instructional materials based upon the course material review(s), the contractor's presentation, and the operational tryout.

8-5. Key Factors.
The contractor shall coordinate with the service for additional guidance and requirements for the development of simulation/laboratory training.

Target populations often differ from each other in terminology, environment, and demographics.

The contractor may be required to complete the operational tryout if the results are unsatisfactory.

End of Chapter.

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CHAPTER 9—DELIVERY

9-1. Purpose.
The purpose of this chapter is to describe the activities associated with the delivery phase.

9-2. Applicable DIDs.
DID-16, First Course Conduct

9-3. Description.
In the delivery phase, the contractor presents training to the target population and delivers final products to the FAA.

9-4. Process.
The contractor conducts the course(s) in the intended training environment to the target population.

The contractor documents the results in a final report, revises all course materials based on the comments, and delivers final course materials to the FAA.

9-5. Key Factors.
The contractor may be required to repeat the first course conduct if the results are unsatisfactory.

A letter of transmittal, from the contractor to the FAA, shall accompany the final course documentation and certify that the approved revisions have been completed, the materials are free of all encumbrances, and all software is certified to be error free.

If specified by the contract, the contractor shall conduct a number of classes following the first course conduct. Before each class is conducted, the revisions identified during the previous class, if any, shall be incorporated into the course. Course revision change indicators are required for each submission.

End of Chapter.

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CHAPTER 10—VALIDATION

10-1. Purpose.

The purpose of this chapter is to describe the validation process in systematic development of training.

10-2. Applicable DIDs.

All DIDs except DID-1, Personnel Qualifications Report

10-3. Description.

Validation is a series of activities performed by the FAA that assess the accuracy, completeness, effectiveness, and appropriateness of all training products. Validation of FAA training materials is an on-going process. It begins with the TASA, where tasks, skills, and required knowledge are validated. The process continues throughout the development of all instructional materials, as illustrated in Figure 10-1.

Validation of instructional materials begins with the development phase and is accomplished by the FAA through reviews of instructional materials, contractor's presentation, operational tryout, and first course conduct. Validation is completed after the first formal presentation of the course has been conducted and the course report has been submitted to the FAA.

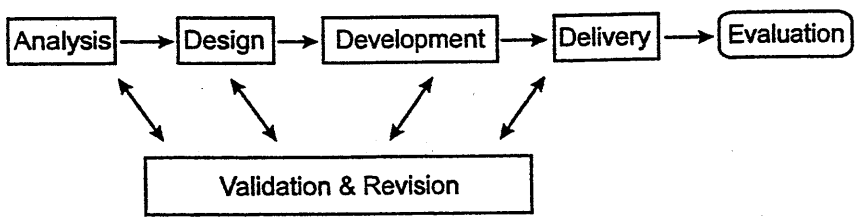

Figure 10-1. Phases in the Development Process and Their Relation to Validation.

10-4. Process.

Revision of instructional materials that results from validation activities is the contractor's responsibility. All instructional materials must be validated using the FAA validation process. The contractor may be required to repeat any of the development steps if the deliverables fail to meet FAA requirements, as specified in the DIDs. Figure 10-2 summarizes the validation process for contractor-developed course materials.

Continued on next page.

	Course Materials Review	*Contractor's Presentation*	*Operational Tryout*	*First Course Conduct*
What	"Desktop" review	Contractor Presentation	Preliminary Classroom Presentation	Classroom Presentation
Purpose	To determine if the instructional materials and test items are technically accurate and conform to the CDG	To determine if the content, flow, and sequence of instructional materials are effective, well-integrated, and all previous revisions have been made	To determine if: • instruction is effective • test items are valid • time allocations are appropriate • format of materials is easy to use • students are able to accomplish the objectives • students find the materials acceptable.	To determine if the course: • accomplishes the objectives and training outcomes in the CDG • students are able to accomplish the objectives • test items are valid.
Materials Submitted	Course schedule Draft (paper) lessons and all supporting materials Draft test items	Detailed course schedule Fully developed lessons and supporting materials Draft test items	Draft materials, e.g.: • student guides • instructor guides • lessons • test items • visuals.	Completed course materials, e.g.: • computer files • student guides • instructor guides • tests • other course conduct materials.
Who Attends	Contractor training staff FAA TTA FAA designated SME FAA ISS	Contractor training staff FAA TTA FAA ISS FAA designated SME	Contractor training staff FAA TTA FAA ISS FAA designated SME FAA students	Contractor training staff FAA TTA FAA ISS FAA designated SME FAA students
Expected Results	Revisions to course materials identified	Agreed upon Sequence of instructional materials. Revisions checked. Authorization for operational tryout.	Assessment of effectiveness Content, sequence, and/or timing may be adjusted Authorization to conduct first course	Final revision (if any) identified Validation successfully completed Course ready to offer

Figure 10-2. Validation Process for Course Materials.

End of Chapter.

CHAPTER 11—AIRWAY FACILITIES MAINTENANCE PERSONNEL CERTIFICATION PROGRAM

11-1. Purpose.

This chapter describes the testing used in the certification authority phase of the Airway Facilities (AF) Maintenance Personnel Certification Program.

11-2. Applicable DIDs.

- DID-17, Theory-of-Operation Examination
- DID-18, On-the-Job Training
- DID-19, Performance Examination

11-3. Description.

The AF Maintenance Personnel Certification Program assures the technical competency of personnel who are involved in the certification of systems and facilities used in the National Airspace System (NAS). This program ensures that technical personnel responsible for maintenance and certification on facilities used in the NAS are proficient in performing their assigned duties.

Through the AF Maintenance Personnel Certification Program, the FAA issues certification credentials to personnel who have attained a professional level and are responsible for the operation and performance of air traffic control facilities used by the aviation community. The personnel certification process is a confirmation that the individual possesses the requisite knowledge and skills to assume full responsibility for attesting to the continued operational status of a particular system/equipment or service.

The technical specialist must satisfy theory and performance criteria, in a two-phased process, to meet FAA requirements for certification.

a. The certification authority phase measures the technical specialist's ability and knowledge of equipment theory-of-operation and requires a practical demonstration of skills by the administration of a performance examination by an appointed examiner. This phase ensures that technical specialists possess the minimum skills necessary to certify a given type system/subsystem/equipment or service.

b. The certification responsibility phase enables the technical specialist to exercise certification authority to certify a discrete system/subsystem/equipment or service. Certification authority is exercised only after responsibility is assigned in writing.

Continued on next page.

11-3. Description (continued).

The focus of this chapter is on two elements of the certification authority phase, the theory-of operation examination and the performance examination.

11-5. Process.

The personnel certification process is given in Figure 11-1. More specific details about the certification process can be found in FAA Order 3400.3, Airway Facilities Maintenance Personnel Certification Program.

Phase	*Step*	*Description*
Certification Authority	1 **Theory-of-Operation**	Satisfied by any one of the following: • Classroom or out-of-agency training • Theory-of-operation examination • Distance learning training • Equivalent training from sources other than FAA
	2 **On-the-Job Training (OJT)**	• Formalized training to bring skills to level expected for maintenance and/or certification • Prepares technician for performance exam.
	3 **Performance Examination**	• Successful demonstration of performance proficiency on equipment • Consists of work assignments and success on performance exam.
	4 Review and Confirmation	SMO Manager: • Ensures that all steps have been successfully completed, and • Determines that certification authority can be granted.
Certification Responsibility	Assignment	Official assignment of a system/subsystem/equipment or service to a technical specialist in writing by SMO Manager.

Figure 11-1. Steps in the AF Maintenance Personnel Certification Process.

Continued on next page.

11-6. Key Factors.

If no classroom training is available, the theory-of-operation examination is the principle means to measure understanding of the system/subsystem/equipment or service theory.

Written theory-of-operation examinations are considered secure and any compromise is a serious violation of the conduct and discipline standards. Examinations must be kept sealed, mailed via certified mail, not be reproduced, kept in locked and secure storage, be handled within specified time limits, and any working notes must be returned.

Performance examinations cannot be developed unless there is an approved technical instruction manual available for the specified equipment.

Certain operations and critical parameters on performance examinations are considered "lockout" items and failure on any one of these items constitutes a failure of the entire examination.

11-7. Contents.

The scope and depth of theory-of-operation examinations is representative of the knowledge required to perform on the job. Each examination shall be developed such that an individual achieving the passing score possesses the requisite knowledge of the subject matter or equipment needed for certification. Theory-of-operation examinations can be delivered in the form of written or computer-assisted examinations.

Performance examinations contain operations performed on equipment within a system and auxiliary equipment considered to be part of the overall system. The examinations include actual adjustments or software program changes, evaluation of system/equipment performance, and correction of defects and equipment malfunctions.

End of Chapter.

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CHAPTER 12—WEB-BASED TRAINING

12-1. Purpose.

The use of the Web is a constantly growing means of delivering training. There are tremendous advantages that the Web promises as this training delivery method matures but there are equally as many concerns.

12-2. Applicable DIDs.

DID-13, Web-Based Training

12-3. Description.

Several types of training delivery can be put on the World Wide Web (www), and emerging technology presents others everyday. The main differences for the types of training to be delivered is whether the training is synchronous or asynchronous or a combination of the two. Some synchronous training could require other course work by CBI, e-mail, on-line chats, research, gaming, demonstrations, student/student discussion, or student/teacher discussions.

The contractor's role in developing training for FAA personnel on the Web can vary. The contractor may:

- develop a totally new FAA course
- revise an existing FAA resident or other medium course
- use an existing Web course, and
- integrate parts of an existing Web course, such as a university course, into a course for FAA personnel.

12-4. Process.

The following issues must be addressed when Web-based training is considered for the FAA:

a. *Security.* Security of the information in the course or on a website.

b. *Courtesy.* There are common expected courtesies that are practiced when using the Web. When learning is presented through the Web, thought should be given to what the parameters of this courtesy will be.

Continued on next page.

12-4. Process (continued).

c. *Administration.* When a course is presented on the Web, whether synchronous or asynchronous, there are a number of administrative issues that should be addressed. These will vary based on the medium of delivery.

- The enrollment process should be specified for all students.
- System specifications to administer training should be defined.
- How the organization sponsoring training monitors course feedback must be specified.
- Required levels of active participation must be specified.
- Other methods to support the delivery including e-mail, off-line discussion, group chats, on-line research and/or demonstration should be defined.

d. *Bandwith.* Most training has a strong, visual component; the need for visual presentations must be balanced by the bandwidth available.

e. *Infrastructure.* Ensure training is developed for the current infrastructure for the intended audience, i.e., the courseware operates properly on the available infrastructure and the students are capable of reaching the Web.

f. *COTS.* If COTS training materials are to be used on the Web, licensing requirements, copyright agreements and compliance, and student accreditation for the course must also be considered and addressed.

12-5. Key Factors.

When a contractor develops an FAA course for the Web, the systematic development process must be used.

End of Chapter.

DATA ITEM DESCRIPTION (DID)-1

1. **Title:** Personnel Qualifications Report

2. **Purpose:**
The purpose of this DID is to establish the requirements for the content and format of the Personnel Qualifications Report (PQR).

3. **Applies To:**
This DID is applicable to all contract training efforts.

4. **Description:**
A PQR contains a description of the contractor personnel who will be involved in the development and/or delivery of training. The report includes a description of their minimum experience, education, knowledge, and skills.

5. **Process:**
The deliverable shall be submitted as a draft for FAA review. Any deficiencies in the qualifications of training personnel will be noted and communicated to the contractor.

The contractor shall correct any noted deficiencies, incorporate the resultant changes into the PQR and submit a revised draft.

The contractor shall notify FAA of any change in key personnel and resubmit the PQR, if requested by FAA. FAA reserves the right to approve changes in key personnel for training development and delivery, based on qualification requirements.

6. **Source Materials:**
Sources for the PQR include contract documents and contractor personnel resumes or other related information.

7. **Deliverables:**
The deliverable is the PQR.

Continued on next page.

8. Content Requirements:
The PQR shall contain:

a. *Cover sheet.* A PQR shall have a cover sheet displaying the following information:

- document title
- FAA solicitation reference number and/or course identification number/course title
- contract number, when submitted after contract award
- contractor name and address
- submission date.

b. *Table of contents.* The report shall have a table of contents page that includes the following information:

- introduction
- development team
- tasks and personnel
- resumes.

c. *Introduction.* The introduction to the PQR shall contain:

- summary of training requirement
- overview of contract tasks for designing, developing, and delivering training
- OSHA regulations attached to this training.

d. *Development team.* The key members of the development team shall be listed by name and categorized by type. The duties listed for each position may be shared by more than one individual or divided among several individuals. And, one individual may serve in multiple roles. If duties are shared or divided, the contractor must identify the percentage of time the individual will spend in each role. Development team members are as follows:

1. Management personnel, who is responsible for the day-to-day management of the technical performance and costs of the training development effort.

Continued on next page.

8. Content Requirements (continued):

2. Instructional development staff:

   - Lead Instructional Systems Designer(s) who plans the strategies and is responsible for the final product. The minimum qualifications for a lead instructional systems designer are:
     - four-year college degree, with knowledge of /experience in instructional design and adult learning
     - five years training experience using ISD process
     - experience with task and skills analysis.

   - Instructional developer(s) who is responsible for developing and documenting the lesson content and sequence, as specified by the designer and the subject matter expert (SME).

3. Multi-disciplinary support staff with skills appropriate to the training media selected or to the portion of a contract, if applicable. Examples are:

   - Programmer(s) who programs CBI lessons from CBI materials developed by the ISD team and using FAA approved authoring tools and templates

   - Graphic artist(s) who creates graphics for various types of training materials, including: CBI lessons, instructor guides, student guides, slide presentations, etc.

   - Camera operators and sound engineers

   - Advanced training method personnel who develop Web sites and IVT

   - Administrative support, such as typists and proofreaders.

4. Subject matter expert (SME) who is responsible for lesson content and for assuring the content validity and technical accuracy of the materials.

5. SME who is knowledgeable about OSHA regulations and requirements.

6. Instructor who has received training in teaching skills and/or instructional techniques and possesses a wide variety of teaching, counseling, evaluation, and adult learning skills.

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8. Content Requirements (continued):

e. *Tasks and personnel matrix.* All contract tasks for performing, designing, developing, and delivering instruction shall be listed. For each task, the names of all personnel who will be involved with the task shall be listed, with the amount of time each will spend on the specific tasks.

f. *Resumes.* Resumes shall be provided for all project personnel. Each resume shall include:

1. Summary of experience, which includes the number of years of experience in major skill areas, either in development or instruction, such as instructional design and development, user training, project management, etc.

2. Education, which includes high school, college and technical schools, the year graduated, degrees, diplomas, licenses, certificates, and major fields of study.

3. Work experience, which is a list of work experience beginning with the most recent and indicates the organizations' names, and year(s) of employment with each organization. If the training is COTS, the resumes should include whether the person helped develop or taught the course, and the level of personnel taught.

4. Professional recognition awards and relevant publications.

9. Format Requirements:
The contractor shall use an agreed upon format. The report will contain, at minimum, a cover sheet, table of contents, and report body.

10. Special Instructions:
Individual services within the FAA may specify minimum or unique personnel qualification requirements. If so, they will be included in the contract.

This ends DID-1.

DATA ITEM DESCRIPTION (DID)-2

1. **Title:** Task and Skills Analysis Report

2. **Purpose:**
The purpose of this DID is to describe the content and format requirements for the task and skills analysis (TASA) report.

3. **Applies To:**
This DID is applicable to all contractors developing training for the FAA.

4. **Description:**
A task and skills analysis identifies changes in job performance that may be caused by new equipment, technology, and/or workforce requirements and the knowledge required to perform.

5. **Process:**
Existing task analyses, work load models, and other relevant data provided as government-furnished information shall be used during development of the TASA so that existing data are not duplicated.

The TASA report shall be submitted in draft form. The contractor shall incorporate FAA comments and submit a revised draft for review. The contractor shall again revise the TASA report if the FAA considers the deliverable inadequate or inconsistent with comments received during the FAA review.

After the TASA has been approved in draft form, the contractor will track all changes made in the sequence or content of the training. Thirty days prior to conducting the first class, the contractor will produce a revised TASA that accurately reflects these changes. The revised TASA will be used for validating the content and sequence of the course during first course conduct.

The TASA report must be approved by the FAA prior to submission of subsequent training deliverables for FAA review.

Continued on next page.

6. Source Materials:
Sources for the TASA include, but are not limited to:

- Technical manuals
- FAA orders
- Operator's manuals
- Government furnished materials (existing TASAs)
- Other materials as identified.

7. Deliverables:
A TASA report with all the data is the deliverable.

8. Content Requirements:
The TASA report shall contain:

a. Introductory information

1. Purpose and scope of the document.

2. Organization of the document.

3. Applicable references.

4. Description of the procedures used to conduct the TASA to include:

a) Qualifications of the person(s) conducting the TASA

b) Criteria used to identify tasks selected for training

c) Information on sources of data, i.e., the group of employees who provided data, their occupations, the level of experience within the occupation

d) Whether the data was obtained through observation or interview of FAA field technicians/operators, technical document(s), or some combination

e) A description of the method used to verify the accuracy of the tasks (including subtasks, elements, and subelements).

Continued on next page.

8. Content Requirements (continued):

b. Task data

1. A TASA will be completed for each job. This may include managers, supervisors, maintainers, operators, system administrators, and training personnel. Within each analysis, the duties, tasks, and subtasks required to perform the job shall be listed. Actions below the subtask level shall also be identified when lower levels of observable and measurable performance are required for course design.

a) *Job.* For purposes of the TASA, the job(s) will be defined by the affected FAA service organizations. Specific examples of jobs include air traffic control specialist (en route), supervisory air traffic control specialist (en route), hardware maintenance technician, NAS/NOM, etc.

b) *Duty.* A duty shall represent a major subdivision of the work performed by one individual and shall encompass two or more related tasks in one functional area.

c) *Task.* A task shall represent a unit of work which:

- is directly observable and measurable
- has a clear beginning and ending point
- is performed independent of other tasks.

d) *Subtask.* Tasks shall be divided into subtasks. Each subtask shall document a single step in task performance.

e) *Element.* Subtasks to be trained shall be divided into task elements when observable and measurable performance below the subtask level is required for course design.

f) *Numbering system.* The following numbering system shall be used to label a job's associated duties, tasks, subtasks, and elements:

Example: 1.0 Duty
1.1 Task
1.1.1 Subtask
1.1.1.1 Element
1.1.1.1.1 Subelements

Continued on next page.

8. Content Requirements (continued):

2. List in order of performance the duties, tasks, and subtasks associated with the job. Performance steps that are below the subtask level shall also be identified when lower levels of observable and measurable performance are required for course design.

3. List OSHA regulations covering tasks to be performed as required by OSHA CFR 29.1910. Include any safety and environmental requirements specific to the task.

4. Cues shall indicate the signal(s) to begin performance of each task and subtask.

5. Conditions for the performance of each task and subtask shall describe the situation/environment in which the specific job behavior will be carried out. Conditions shall describe any pertinent influence upon task and subtask performance.

6. Standards for the performance of each task shall describe the observable behaviors and/or system events that indicate the task has been performed successfully. Standards should include any pertinent operational standards that apply, but are not immediately apparent, such as a minimum time to complete. Standards should be complete and explicit enough that an independent observer could use them to confirm successful completion of the task.

7. Identify knowledge and skills required for each task and subtask. Knowledge is the supporting facts, rules, formulas, etc., and skills are supporting procedures or guidelines needed to perform a task or subtask.

Continued on next page.

8. Content Requirements (continued):

8. Data on the criticality, frequency, difficulty, and delay tolerance of each task and subtask shall be documented to assist in the identification of tasks selected for training.

- **Critical tasks and subtasks** are defined as those which are essential to job performance, regardless of the frequency with which they are performed. Criticality is rated according to the consequences for inadequate performance (i.e., injury to personnel, damage to equipment, etc.). A critical task is one that affects the safety of the system in the support of the National Airspace System (NAS). Where applicable, a critical task may require instant recall with automatic levels of performance. The levels of criticality and their descriptions are:

Code	*Description*
4 (Extreme)	Incorrect or delayed performance **could directly** effect safety (i.e. can result in the loss of life and/or property.
3 (High)	✧ Incorrect or delayed performance could **indirectly** safety (i.e., could cause incorrect or delayed performance of an extreme critical task) and/or ✧ Incorrect or delayed performance could **directly** effect system operations(i.e., cause operational errors or reduced effectiveness).
2 (Moderate)	✧ Incorrect or delayed performance has **no direct or indirect** effect on extreme critical tasks, and/or ✧ Incorrect or delayed performance could **indirectly** effect system operations.
1 (Low)	Incorrect or delayed performance does not affect safety or system operations.

If the product or task lends itself to alternate criticalities, the respective definitions will be provided for inclusion in the appropriate TASA.

Continued on next page.

8. Content Requirements (continued):

- **Frequency** refers to how often a task and subtask are performed. Frequency shall be coded as follows:

Code	*Description*
CA	Continuous Activity
H	Hourly
D	Daily
W	Weekly
M	Monthly
Q	Quarterly
A	Annually
AR	As Required (i.e., unpredicted, critical events)

- **Difficulty** refers to the mental and physical effort required by an employee to master performance of a task. Rating the difficulty of a task requires considering the typical situations involved in performing the task, not unusual circumstances or locations rarely encountered on the job.

  To rate the level of difficulty of a task or subtask, a scale shall be used. A sample scale defining three levels is:

Code	*Criteria*	*Example*
3	Requires problem solving.	Determining the cause and resolution of loss of separation standards.
2	Requires recognition, evaluation, comprehension, and understanding.	Understanding and applying situational display items in the effective control of air traffic.
1	Requires retention and recall.	Remembering the correct sequence of procedures for completing a task.

  The rating of task difficulty covers criteria such as the knowledge to troubleshoot beyond the self-diagnostic stage, the size of the system with interdependent components, and the complexity of the procedures to maintain operation.

8. Content Requirements (continued):

- **Delay tolerance** refers to the amount of time available to perform a task before safety or operational effectiveness may be compromised. A sample scale is:

Code	*Description*
3 (low)	Task must be performed immediately.
2 (moderate)	Task can be delayed briefly.
1 (high)	Task can be performed at employee's discretion.

9. The decision to train or not train shall be indicated for each task and subtask. If a task is selected for training, all its subtasks must also be selected for training.

10. Each task and subtask shall be designated as "new" or "old." The term "old" shall refer to tasks and subtasks that job incumbents are familiar with because they were performed in previous FAA positions. However, if any portion of a task is new, then the entire task shall be included in the training.

11. The amount of time it takes to perform each task and subtask shall be identified.

12. Each task and subtask shall be coded as individual or team performance. For team performance, the individuals that perform the task and subtask collectively shall be specified, even if one of the individuals is not an FAA employee. The codes are "I" or "T."

Code	*Description*
I	Shall be used to designate **individual** performance where coordinated action with another person <u>is not required</u> to carry out a task or subtask.
T	Shall be used to designate **team** performance where coordinated action <u>is required</u> to accomplish the task. The performance of a team task may contain subtasks which are performed independently by an individual.

Continued on next page.

8. Content Requirements (continued):

13. Tasks that must be trained to an automatic level of performance shall be identified. This ensures skills that need to be performed quickly without conscious thought are taught to automatic levels of performance (automaticity). Automatic performance means the student can perform a task, subtask, or step without having to:

- consciously recall the steps involved, or
- stop to locate the button, knob, key, etc., that is manipulated.

The skill becomes automatic so that the student can concentrate on the thinking skills, e.g., when learning to drive a car, to focus attention on traffic and other driving conditions, the driver must be able to locate and use the brakes, mirrors, accelerator, and steering wheel automatically.

If the answers to several of the following questions about a task are yes, the task, subtask, or elements may need to be trained to an automatic response level.

- Does the task have both a cognitive and psychomotor component?
- Is the psychomotor component performed the same way every time?
- Is the task criticality rated "high" or "extreme"?
- Is the task delay tolerance low?
- Must the task be performed so quickly that there is no time to stop and think about how to do it?
- Are there previously learned skills that might create interference in learning the new skill?
- Must the task be performed quickly, correctly, and accurately every time?
- Is there evidence or reason to believe that task performance will be unacceptable if psychomotor skills are not automatic?

14. A personnel position summary table shall be developed which identifies:

- job categories of personnel
- types of tasks to be performed by job category
- number of personnel to be trained.

Continued on next page.

8. Content Requirements (continued):

c. Supplementary information

1. List of acronyms
2. List of abbreviations
3. Glossary of terms
4. Index
5. Other supporting information as required.

9. Format Requirements:
The format of the report must be accepted by the FAA. The TASA will:

- have a cover page that specifies the course identification number, course title, a contract number, contractor name and address, and submission date
- have a table of contents, if necessary
- be delivered on paper and electronically.

Task data sheets shall be developed that display the TASA data required in paragraph 8.b, 1 through 14, above.

No data shall be eliminated, unless specifically directed by the FAA, although the formats of the figures may be modified.

The task data sheets shall be submitted as part of the TASA deliverables.

10. Special Instructions:
Any undetermined task/subtask characteristics shall be designated as to be determined (TBD) if prior approval is obtained from the FAA. The date when the information will be available shall be provided within the TASA report.

The contractor shall coordinate with the appropriate service to determine the specific format requirements and the availability of a template used by that service.

This ends DID-2.

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DATA ITEM DESCRIPTION (DID)-3

1. **Title:** Cognitive Task Analysis Report

2. **Purpose:**
The purpose of this DID is to describe the content and format of the cognitive task analysis (CTA) deliverables and report.

3. **Applies To:**
This DID is applicable to all contractors developing training for the FAA when specified in the contract.

4. **Description:**
Cognitive task analysis is a systematic process for determining the cognitive processes and strategies that support job performance. It provides critical information about job performance that will be used to develop the CDG.

A CTA may be conducted when the results of a human factors or similar study indicates one or more of the following:

a. The cognitive aspects of specific tasks within a job have qualitatively changed as a result of new equipment, procedures, computer-human interfaces, or other job-related changes.

b. The level of difficulty in the TASA is rated as 3

c. An error or opportunities for improvement within a job can be addressed through an analysis of the cognitive aspect of certain tasks.

5. **Process:**
When a CTA is required as part of curriculum development, it shall be performed after the traditional task analysis.

Each deliverable shall be submitted as a draft for FAA review. The contractor shall incorporate FAA comments and shall submit a revised draft of each deliverable.

The contractor shall revise the deliverables if the FAA considers them inadequate or inconsistent with the comments received during the FAA review.

The CTA report must be approved by the FAA prior to submission of subsequent training deliverables for FAA review.

Continued on next page.

6. Source Materials:
Sources for the CTA include but are not limited to:

- TASA
- Technical manuals
- FAA orders
- Operator's manuals
- Government furnished materials
- Other materials as identified.

7. Deliverables:
Three deliverables are required:

- CTA plan
- Preliminary CTA data
- CTA report.

8. Content Requirements:

a. *Cognitive Task Analysis Plan.* The CTA plan shall contain the following:

1. Purpose and scope of the cognitive analysis

2. Organization of the document

3. Applicable references

4. Overview of the equipment, technology, procedures, and workforce changes that require a cognitive task analysis to be conducted

5. Specification of the criteria used to select tasks for cognitive analysis. The following criteria shall be considered when determining complex tasks:

   - Require large amounts of knowledge to be learned during training.

   - Have a significant component involving judgment, problem solving, or decision-making.

   - Are considered by experts to be difficult to verbalize or demonstrate through overt actions.

Continued on next page.

8. Content Requirements (continued):

- Have considerable differences on how individuals perform the tasks due to the number of cognitive strategies available.
- Involve tasks that are rated as extreme or high in criticality.

6. Documentation of possible methods of conducting the CTA. The following methods shall be considered:

   - Protocol analysis, in which individuals verbalize what they are doing or thinking about when performing a task.
   - Psychological scaling, in which individuals sort, rate, or rank task-relevant knowledge.
   - Performance modeling, in which a job or task is simulated and a model of task performance is developed and tested under varying conditions.
   - Observation of job performance and interviews to obtain information and to assess the reasoning processes of task performers.

7. Information on how data sources will be obtained; as well as information on the groups of employees that will provide data; for example, their occupations, and their experience levels within the occupation.

8. Data collection instruments, for review and approval by the FAA prior to use.

9. Specification of how reliability and validity of the data will be determined.

b. *Preliminary Cognitive Task Analysis Data.* The data shall include the following information:

1. The list of tasks selected for CTA, based on the approved criteria identified in the CTA plan. These tasks shall be grouped by duties. If task groupings are different than from those specified in the TASA, an explanation for the differences shall be provided.

Continued on next page.

8. Content Requirements (continued):

2. Analysis of the characteristics listed below as well as those described in DID-2.

- *Critical nature of performance*. Identifying the criticality of the decisions and judgements that must be made.
- *Difficulty*. Identifying the amount of mental effort needed to master the performance.
- *Reaction time*. Identifying the amount of time needed to react to changing conditions and situations.
- *Information interchange*. Identifying the need to communicate time sensitive information.
- *Retention*. Identifying the need to clearly visualize possible solutions to problems.
- *Decision-making*. Identifying the need to assess situations and make immediate decisions, based on short-lived cues and low delay tolerance.

c. *Cognitive Task Analysis Report*. The CTA report shall contain all information listed in a and b above and the following:

1. The knowledge structure, skills, and strategies required for optimal task performance.

2. Visual representation or listing of the knowledge structure for each task.

3. Identification of heuristics, algorithms, or aids used in job performance.

4. Discussion of the relevance of the cognitive task analysis for the design of training, including recommended:

- content and organization of the instructional material
- instructional setting, media, and learning strategies.

Continued on next page.

9. Format Requirements:
The format of the report must be accepted by the FAA. The CTA will:

- have a cover page that specifies the course identification number, course title, a contract number, contractor name and address, and submission date
- have a table of contents, if necessary
- be delivered on paper and electronically.

10. Special Instructions:
None.

This ends DID-3.

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DATA ITEM DESCRIPTION (DID)-4

1. **Title:** Commercial Off-The-Shelf Training Materials Report

2. **Purpose:**
The purpose of this DID is to describe the content and format requirements for a Commercial Off-the-Shelf (COTS) report.

3. **Applies To:**
This DID is applicable to all contract efforts when COTS materials are proposed for the training for a course. This DID also is applicable for COTS materials that are used as part of a total course.

4. **Description:**
COTS materials are existing, commercially available training materials that were developed/modified according to the process cited in this standard and show traceability of objectives to the TASA. The COTS materials report is the contractor's assessment of the suitability of the COTS training materials for a specific FAA course.

5. **Process:**
The contractor shall review the COTS and submit a draft COTS report following completion of the TASA and prior to completion of the TDP. The government will review the report and the materials to determine whether to accept the recommendation to use COTS.

If COTS are selected for use, the contractor will provide a complete and accurate TDP and CDG. The contractor will revise the materials in accordance with the recommended revisions in the COTS report.

The contractor shall revise the deliverables if the FAA considers them inadequate.

6. **Source Materials:**
The source for the COTS report includes, but is not limited to:

- TASA
- COTS materials and documentation
- Relevant technical publications.

7. **Deliverables:**
The deliverables include the COTS report and the proposed COTS training materials.

Continued on next page.

8. Content Requirements:
The COTS report shall contain the following:

a. Introduction

- Purpose and scope
- Description of report organization
- List of applicable references.

b. Description of COTS materials

- *Proposed COTS training materials.* This includes its name, function, and information that validates the ability of the proposed COTS training materials to satisfy the required training need.

- *Materials list.* This list includes the title of each component associated with the COTS training materials and the duration of use of each component. The instructor materials and the student materials shall be separately identified.

- *Historical data.* The contractor shall describe the length of time the COTS has been on the commercial market and include a listing of customers who have used the training. Provide a list of locations where COTS materials were taught, if applicable.

- *Target population.* This includes the target population for whom the COTS materials were designed (reading level, experience levels) and other relevant factors).

- *Special equipment list, if required.* This list includes all special equipment required to develop or deliver the instruction using the COTS training materials.

c. Assessment

- Procedures used to assess the TASA against the proposed COTS materials

- Results of the comparison of the COTS objectives and materials against the TASA

- Proposed recommendations

Continued on next page.

8. Content Requirements (continued):

- *Tailoring requirements.* The contractor must show how the contents of the COTS materials will be modified to match the training identified in the TASA.

- *Cost impact.* The contractor will provide an estimate of all costs anticipated to ensure COTS materials meet FAA requirements, to include impact due to tailoring requirements, license fees, etc. If COTS was not proposed in the SOW, cost impact due to the use of COTS will be provided.

- *Traceability.* The traceability of the objectives for the COTS materials to the TASA.

- *Delivery.* This includes whether the contractor can deliver training to meet the planned deployment schedule and locations.

- *Copyright/License.* The contractor must show that duplication rights to the COTS materials will be sufficient for required training. The contractor must show that licensing agreements can be obtained for intended training use. The contractor must show that the license for the COTS materials is sufficient for training. Any cost necessary to retain copyright permissions and/or licenses will be specified.

d. Supplemental information if necessary

9. Format Requirements:
The format of the report must be accepted by the FAA. Each item that is submitted to the FAA for review and acceptance will:

- have a cover page that specifies the course identification number, course title, a contract number, contractor name and address, and submission date
- have a table of contents, if necessary
- be delivered on paper and electronically.

10. Special Instructions:
The contractor will note where any COTS course documents are unavailable or were not developed.

This ends DID-4.

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DATA ITEM DESCRIPTION (DID)-5

1. **Title:** Training Development Plan

2. **Purpose:**
The purpose of this DID is to establish the minimum requirements for the content and format of a training development plan (TDP) following an approved task analysis.

3. **Applies To:**
This DID is applicable to all contractors who are developing:

- training for FAA personnel, including several types of training for specific audiences within one program
- the training plan for using COTS materials.

4. **Description:**
The deliverable is the contractor's plan for accomplishing the training. It contains the strategies for developing and/or delivering training, as required by the FAA Statement of Work (SOW). The contractor's TDP builds on the information that the contractor gained in completing the task analysis and the media selection for the training effort.

The TDP shall include the list of tasks to be trained and the training outcome(s) for each course. The training outcome(s) will indicate the degree to which the training will replicate job conditions and standards. Each training outcome will clearly specify the:

- conditions under which students will be expected to perform
- tasks they must perform
- standard of performance that is expected following training.

5. **Process:**
The contractor shall attend an FAA/contractor post-award conference or training planning meeting.

The deliverable shall be submitted as a draft for FAA review. The contractor shall incorporate FAA comments and shall submit a revised draft of the deliverable.

The contractor shall revise the deliverable if the FAA considers it inadequate or inconsistent with comments received during the FAA review.

The TDP must be approved by the FAA prior to submission of subsequent training deliverables for FAA review.

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6. Source Materials:
Sources for the TDP include, but are not limited to:

- TASA
- COTS report, if applicable
- Technical manuals
- FAA orders
- Operator's manuals
- Government furnished materials (e.g., existing TASAs), and
- Other materials as identified.

7. Deliverables:
The deliverable is the TDP.

8. Content Requirements:
The TDP shall contain:

a. Introduction

1. Purpose and scope
2. Document organization
3. List of applicable references

b. Planning data

1. Training outcome(s)/terminal objective(s)
2. List of tasks to be trained and other task analysis data to be used
3. Course(s) to be developed and number of students to be trained in each course

Continued on next page.

8. Content Requirements (continued):

4. Approach to be taken for each course. The approach includes:

- Instructional delivery platform
- Instructional strategies or methods
- Training modules and lessons within modules
- Job aids
- Student involvement/interaction
- Testing methods to include:

  - Type and number of tests to be developed (cognitive and/or performance)
  - Test items to be used for each test type (e.g., multiple choice for cognitive test and checklist for performance).

NOTE: For Air Traffic, specifically. The TDP for Air Traffic will specify how each of the following types of training will be accomplished:

- Transition training—This constitutes the initial presentation of the training and is usually the product delivered by the contractor. It typically culminates in a test of student's knowledge and ability to perform job tasks individually or together. However, the training and testing may be under less complex conditions than the actual job and usually does not include procedures.

- Procedures training—Those procedures that are new and result from the introduction of new equipment.

- Refresher training—This constitutes the training that is provided when there is a delay between the time the transition and proficiency training is conducted and the training is applied, as occurs when new equipment systems are fielded. Refresher training may be a variant or subset of the transition and proficiency training products.

- Proficiency training—This constitutes the training that is administered to bridge the gap between transition training and mastery of the tasks under full job-like conditions applying appropriate procedures. If students reach proficiency during transition training, then proficiency training is not necessary.

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8. Content Requirements (continued):

5. Rationale for recommended training approach for each course to include:

   - Cost to develop (or limitations imposed by cost)
   - Time to develop
   - Ease of distribution of the training
   - Requirement for student/instructor interaction
   - Requirement for hands-on activity
   - Availability of infrastructure.

   When a course involves more than one training approach, such as CBI and resident labs, the TDP shall include all of the above for each approach recommended.

6. Quality assurance provisions

7. Assumptions upon which the success of the training development depends

8. OSHA regulations applicable to the tasks

9. Hardware and/or interface requirements

10. FAA resources needed to develop/deliver the training

11. Issues and concerns that left unresolved could jeopardize the success of the training

12. Project milestone schedule. The TDP shall include a schedule for development of individual deliverables and be updated when changes occur or when directed by the FAA. The schedule shall include, for each deliverable:

    a) The time allowed for:

       - contractor development
       - FAA review
       - revisions of the material by the contractor and any additional review requested
       - submission of the final form of the deliverable.

Continued on next page.

8. Content Requirements (continued):

b) The scheduled meetings for in-progress reviews of deliverables.

c) The date the schedule was produced or revised.

c. Supplementary information

1. List of acronyms
2. List of abbreviations
3. Glossary of terms
4. Index
5. Other supporting information as required.

9. Format Requirements:
The format of the report must be accepted by the FAA. The TDP and subsequent submissions of the milestone schedule will:

- have a cover page that specifies the course identification number, course title, a contract number, contractor name and address, and submission date
- have a table of contents, if necessary
- be delivered on paper and electronically.

10. Special Instructions:
When the TDP includes actions that are the responsibility of FAA, these actions may be so designated within the document.

This ends DID-5.

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DATA ITEM DESCRIPTION (DID)-6

1. **Title:** Course Design Guide

2. **Purpose:**
The purpose of this DID is to establish the minimum requirements for the content and format of the Course Design Guide (CDG).

3. **Applies To:**
This DID is applicable to all contractors developing training for the FAA.

4. **Description:**
The CDG provides a road map for development or revision of a course. It includes the goals and/or outcomes for the course, the skills and knowledge to be provided to students, and the methods and techniques to be used in the conduct of the course. All information needed to develop the course, including objectives, testing techniques, tools and equipment, teaching strategies, and content are outlined.

5. **Process:**
The CDG shall be submitted as a draft for FAA review. The contractor shall incorporate FAA comments and shall submit a revised draft of the CDG.

The contractor shall revise the revised CDG if the FAA considers it inadequate or inconsistent with the comments received during the FAA review.

After the CDG has been approved in draft form, the contractor will track changes made in the sequence or content of the training. Thirty days prior to conducting the first class, the contractor will produce a revised CDG that accurately reflects these changes. The revised CDG will be used for validating the content and the sequence of the course during first course conduct.

The CDG document must be approved by the FAA prior to submission of subsequent training deliverables for FAA review.

Continued on next page.

6. Source Materials:
Sources for the CDG include, but are not limited to:

- TASA
- TDP
- Technical manuals
- FAA orders
- Operator's manuals
- Government furnished materials (e.g., existing TASAs)
- Other materials as identified.

7. Deliverable:
Unless otherwise specified, a separate CDG will be prepared for each course.

8. Content Requirements:
The CDG shall contain the following:

a. *Introduction*

1. Purpose and scope of the document.

2. Organization of the document.

3. Applicable references.

4. Approach to be taken for each course. The contractor may use the information from the TDP. The approach includes:

- Instructional delivery platform
- Instructional strategies or methods
- Training modules and lessons within modules
- Training activities/practical exercises
- Job aids
- Student involvement/interaction
- Testing methods to include:

  - Type and number of tests to be developed (cognitive and/or performance)
  - Test items to be used for each test type (e.g., multiple choice for cognitive test and checklist for performance).

Continued on next page.

8. Content Requirements (continued):

5. Equipment. A description of the equipment that will be used to develop or conduct the training. For each type of equipment, the:

   a) Type
   b) Model
   c) Number of equipment item needed.

6. Course catalogue entry. The course catalogue entry shall include:

   a) Proposed course title, which shall be brief and self-explanatory (60 characters, maximum).

   b) Estimated course length, in hours.

   c) Course description, not to exceed 700 characters, including spaces and punctuation. The course description shall include:

      - Target audience for whom the course is intended
      - Delivery platform(s) (classroom, CBI, simulator, laboratory, workshop, flight training, or correspondence study)
      - Major subjects included in the course
      - Course titles for all the courses in a series, if applicable.

   d) Course prerequisite(s), which the student must:

      - Successfully complete prior to enrollment
      - Pass an approved screening examination measuring a level of knowledge/skill equivalent to that which could have been achieved in the prerequisite courses.
      - Achieve specified certificates, licenses, and/or flight hours required before course enrollment.

7. Training site(s). The location(s) of the facilities where the training will be presented.

Continued on next page.

8. Content Requirements (continued):

b. *Course design guide data sheets.* Levels of objectives established during the design phase are documented in the CDG. Training outcomes occupy the highest level of the hierarchy in the CDG, followed by terminal objectives and their supporting enabling objectives.

1. Training outcomes. Training outcomes are written at the duty level of the TASA. Each page shall contain one training outcome. The training outcomes shall be sequenced in one or more logical training segments. For the purpose of identification and traceability, each training outcome shall be labeled with consecutive upper case letters, beginning with "A."

2. Terminal objectives. Terminal objectives describe the full skill or task that the student must be able to perform, e.g., repair a transmitter. The terminal objectives and their supporting data shall conform to the following requirements.

a) The terminal objectives shall be derived from the tasks selected for training in the TASA. At least one terminal objective shall be written for each task selected for training.

b) Each terminal objective shall have three parts: performance, condition(s), and standards.

- *Performance/Behavior.* Each enabling objective must specify a precise statement of what students must do to show they learned what they were expected to learn.

- *Conditions.* A properly prepared objective clearly states the limits and/or conditions within which the student is expected to perform. Conditions answer questions such as:

  - What does the student have to work with?
  - Must the student select specific tools?
  - Can the student use notes or technical orders for guidance?
  - What information will be provided to the student as a starting point?

Continued on next page.

8. Content Requirements (continued):

- *Standards*. Each objective must include a standard of performance. For cognitive objectives, the standard will indicate student performance required on a cognitive test. For tasks or skills, the standard should be as close to the actual job standard as the training approach will permit, and may indicate performance required on a performance test.
  The standard describes how fast the job must be performed, how accurately the job must be performed, or the actual responses that are considered acceptable performances. Technical manuals, such as the Manufacturer's Instruction Book (MIB), when used in a standard of performance, should provide a specific reference. When a technical manual is referenced in a standard of performance, the technical manual shall be provided with the draft CDG for FAA review.

c) Terminal objectives shall state job performance behaviors rather than training behaviors.

d) The terminal objectives shall be sequenced in the best order for learning and shall be numbered consecutively, beginning with "1."

e) The time in hours to present each terminal objective shall be estimated. This should be a total of the time elements for all the enabling objectives within this terminal objective.

3. Enabling objectives. Enabling objectives describe the skills that the student must perform and knowledge they must possess to accomplish the terminal objective, e.g., test the transmitter's modulation frequency, test its power supply, to repair the transmitter. The enabling objectives and their supporting data shall conform to the following requirements.

a) The enabling objectives shall be derived from the subtasks and knowledge that support each task selected for training in the TASA.

b) Each enabling objective shall have three parts, as described above in terminal objectives, unless otherwise specified by the FAA.

c) The enabling objectives shall be sequenced in the best order for learning and shall be labeled with lower case letters, beginning with "a."

Continued on next page.

8. Content Requirements (continued):

d) The type of learning represented by each terminal and enabling objective shall be indicated, using the following labels.

Label	*For*	*When Enabling Objective Requires:*
C	Cognitive	Thought processes, thinking skills, or knowledge.
P	Performan ce	Performance skills.

e) In the case of enabling objectives supporting a performance terminal objective, at least one of the enabling objectives shall also reflect a performance requirement.

4. Content outline. The content shall:

a) Contain an outline of the technical content to support the enabling objective, organized into logical training segments that best support training.

b) For AF and AT courses covering new equipment, the first lesson shall contain an overview of the system.

c) The content shall be organized into logical training segments, and the segments shall be identified in the technical content outline.

d) The training segments appearing in the technical content outline shall be organized in a logical way that best supports the training.

e) The content outline will be sufficiently detailed to enable a one-for-one comparison to the subsequently developed training materials for ensuring the materials are complete and technically accurate.

5. Instructional methods and media. The CDG shall contain a listing of instructional methods and supporting media for attaining each terminal and enabling objective. Selection of methods and media shall be based on:

a) The training approach identified in the TDP and the type of learning to be supported.

8. Content Requirements (continued):

b) Capability to teach and test task knowledge and performance under realistic job conditions.

c) Instructional media or delivery systems needed to maintain an interactive learning environment; media should be specific (e.g., photographs, video segment, color graphic, etc.).

d) Variety of situations which may be encountered on the job.

6. Test types. Tests assess the extent of learning by measuring the behaviors specified in the objectives. Criterion-referenced tests will be used (a criterion-referenced test is one that compares a student's performance against a fixed standard, rather than the performance of other students). Unique instruments used for testing will be described.

a) Selection of test type shall be consistent with the type of learning associated with each objective. Test type shall be identified as "C" for cognitive or "P" for performance.

b) Each objective in the course shall be tested. The number of test items required per objective shall be sufficient to ensure students have mastered the content of the objective and to produce multiple versions of a test, if required. These test items shall be labeled with a number.

c) Simulation scenarios and performance checklists for use in testing may be delivered with their respective training materials or with the examination plan (see DID-7).

7. Developmental notes. These include guidance, notes, and references that provide information for developing the training. References to technical manuals and other written documentation shall be stated at the paragraph level, at a minimum. Other notes to be listed include what graphics/figures to use, whether to include animation, types of interactions to incorporate, testing strategies, etc.

Continued on next page.

8. Content Requirements (continued):

8. Cross reference matrix. The matrix shall trace between the training outcomes, the terminal objectives, and the tasks selected for training in the task and skills analysis. The matrix shall be comprised of the following information.

Column	*Description*
1	Each training outcome with the letter label from the body of the CDG shall be recorded (one training outcome per page).
2	The supporting terminal objectives with number label that is associated with each training outcome.
3	Task numbers from the Task and Skills Analysis which are associated with each terminal objective shall be recorded

c. *Course Schedule*. The course schedule provides an overview of the course chronology. The course schedule is submitted concurrently with the CDG, and shows the major course segments as specified in the CDG. The course schedule is updated throughout the development process. At the contractor's presentation, the detailed schedule is submitted to the FAA. An example course schedule is provided in DID-8.

d. *Supplementary information*, if necessary

1. List of acronyms
2. List of abbreviations
3. Glossary of terms
4. Index
5. Other supporting information as required.

9. Format Requirements:

The format of the CDG must be accepted by the FAA. The CDG will:

- have a cover page that specifies the course identification number, course title, a contract number, contractor name and address, and submission date
- have a table of contents, if necessary

CDG data sheets shall be developed that display the CDG data required in paragraph 8.b, 1 through 8, above.

10. Special Instructions:
The contractor shall coordinate with the appropriate service to determine the availability of a template or format used by that service.

This ends DID-6.

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DATA ITEM DESCRIPTION (DID)-7

1. **Title:** Tests

2. **Purpose:**
The purpose of this DID is to specify the minimum requirements for the content and format of tests used in FAA training courses.

3. **Applies To:**
This DID is applicable to all contractors developing training for the FAA.

4. **Description:**
Cognitive tests are used to determine whether or not the student has acquired the basic facts, theory, concepts, principles, and procedures associated with a particular item of equipment or system. Tests are criterion-referenced (a criterion-referenced test is one that compares a student's performance against a fixed standard, rather than the performance of other students). Cognitive tests will precede performance tests unless otherwise specified.

Performance tests require students to demonstrate skills and knowledge necessary to perform specified tasks. The conditions under which students will complete a performance test should be as realistic as possible (i.e., reflective of actual, on-the-job conditions), given available training devices and/or safety considerations. In general, the use of realistic simulation is preferred over both testing during actual operations and testing using less realistic conditions.

5. **Process:**
The test plan shall be submitted as draft for FAA review. The contractor shall incorporate FAA comments and shall submit a revised test plan.

All test materials shall be developed in accordance with the approved CDG and test plan, and shall be revised when the CDG is revised or at the direction of the FAA.

Test materials shall be submitted as draft for FAA review. The contractor shall incorporate FAA comments and shall submit a revised draft of the test materials.

The contractor shall revise the revised test materials if the FAA considers them inadequate or inconsistent with the comments received during the FAA review.

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6. Source Materials:
Sources for tests include, but are not limited to:

- TASA
- TDP
- Approved CDG
- System specifications
- Operator's manual
- Manufacturer's technical documentation
- Course content
- Other materials as identified.

7. Deliverables:
The deliverables are:

a. Test plan, if required

b. Student test version(s)

c. Instructor test version(s)

d. Answer key and/or performance checklist with scoring procedures.

8. Content Requirements:

a. *Test plan.* The test plan documents the decisions made about testing and how testing will be managed in the course(s). It includes:

1. General description of test format and delivery method to include the media (i.e., paper, CBI, simulation, etc.) and type of test item to be used (e.g., multiple choice, matching, etc.)

2. Number of versions of the test and/or simulation scenarios, if required

3. Number of test items and/or the test and identification of any items that are considered critical (i.e., knowledge or performance related to tasks rated high or extreme in criticality).

4. Administration and scoring of tests

Continued on next page.

8. Content Requirements (continued):

5. Estimated time required to complete the test and test time limit

6. Passing standard for the test

7. Process to be followed should a student not achieve the passing standard and whether the test can be retaken and the circumstances

8. How and what type of practice will be provided prior to testing, if applicable

9. Quality control mechanisms to ensure the test meets requirements.

b. *Test items*. Cognitive and performance tests shall be based on training requirements identified in the TASA and consistent with objectives and content in the technical outline of the CDG. All terminal and enabling objectives in the CDG will be tested unless otherwise specified. The number of test items shall be sufficient to adequately measure student mastery of each terminal and enabling objective and to produce multiple version of a test, if required. Performance tests may be structured such that enabling objectives are tested first and separately from terminal objectives.

1. The format of the test items may be multiple choice, matching, true/false, completion/short answer, or performance checklists. The FAA will specify the type(s) of test item to use.

2. Each test item shall have the alphanumeric label from the CDG for the corresponding enabling objective in parentheses next to the test item.

3. Each student version of the test items shall include the same test items as that in the instructor's set of test items.

c. *Materials for the student*. The student copy of the test shall include test instructions and test items. The instructions shall include clear, concise, written instructions that include:

1. Time allowed for completing test

2. List of allowed reference materials, if appropriate

3. Required manner for indicating response

Continued on next page.

8. Content Requirements (continued):

4. Method for grading test, if appropriate

5. Statement concerning the contribution of the test score to the student's final grade for the course

6. Specification of assistance to be made available for the student

7. Description of simulated situation (for performance tests).

d. *Materials for instructor*. The test materials for the instructor shall include instructions, test items, and answer key.

1. Instructions to the instructor. The instructions shall include:

- Procedures for security of tests
- Description of student activities during the test
- Instructor responsibilities, such as ensuring satisfactory test area and ensuring simulator/test equipment is operable for a performance test
- Time allowed for student to complete the test, and
- Emergency procedures for accidents, illnesses, equipment failure, power failure, severe weather, and fire drills.

2. Answer Key. The test materials for the instructor shall include an answer key which contains the following items:

a. Cognitive tests:

- Correct answer for each test item in the order in which the items appear on the student test copy and references to technical documentation
- Acceptable responses and acceptable variations of the answer for completion/short answer test items
- Directions for recording and scoring student test performance.

Continued on next page.

8. Content Requirements (continued):

b. Performance tests:

- Performance test, checklist of procedures to be performed by the student in the order the procedures should be performed, with sufficient detail to enable instructor to make a go/no go decision
- Tools and supplies to be used
- Activities of the student during performance test
- Directions for recording and scoring student test performance.

e. *Test item analysis*. The contractor may be required to conduct a test item analysis at the operational tryout and first course conduct. For this analysis, the contractor will:

1. Calculate an Ease Index for each item (percent of students answering each item correctly).

2. Examine the distractor pattern of items in which the Ease Index is less than 70% to determine if the cause of the error is insufficient/inaccurate instruction, and/or the test item is deficient in some way.

3. Perform additional analysis methods, such as point biserial correlation and analysis of distractor patterns, as required by the FAA to further examine test items and ensure their validity.

4. Revise test items and/or instructional content as necessary to ensure that each test item attains a minimum Ease Index of 70%. Item analysis and corrective action may be repeated, using a different group of students, until all items are answered correctly by at least 70% of the students, before the test is considered valid.

9. Format Requirements:

The format of the written and performance test(s) shall be approved by the FAA.

10. Special Instructions:

a. The contractor shall coordinate with the service for which the training is being developed to identify any FAA templates or testing formats required.

Continued on next page.

10. Special Instructions (continued):

b. Design guidelines for multiple-choice test items include:

- Write items that are brief, specific, stated in positive terms, and do not give away the correct choice
- Ensure responses are plausible, grammatically consistent, in logical order and of similar length
- Each item shall be independent of every other item and contain only one correct answer
- Avoid use of "all..." or "none of the above" as responses
- Avoid patterns of correct answers
- Avoid the use of "a" and "an" at the end of a stem; each alternative shall be grammatically parallel with the stem
- Numerical choices shall be listed in ascending or descending order of magnitude.

c. Design guidelines for matching test items include:

- Use only related material in one matching set
- Keep matching entries brief
- Ensure the number of responses is greater than the number of items to be matched
- Use a maximum of twelve responses
- Indicate whether a response can be used more than once
- Arrange responses in logical order
- Never carry a matching set from one page to another.

d. Design guidelines for true/false items include:

- Relate items to specific objectives and learning levels
- Address only one item in each statement
- Ensure approximately half the answers are true and half false
- Use words with precise meanings
- Ensure all statements are approximately the same length
- Avoid broad general statements
- Avoid words such as all, none, always, and never, which tend to make the item false
- Avoid trivial content.

Continued on next page.

10. Special Instructions (continued):

e. Design guidelines for completion items include:

- Ensure all blanks are of equal length
- Word each item so there is only one correct response or synonym
- Ensure blanks are at or toward the end of each item.

f. Design guidelines for performance checklists include:

- State each item simply, clearly, and in observable performance terms
- Include the important/critical parts of a skill in the performance
- Identify which steps will be graded and which will not be graded
- Include all tasks, at minimum.
- List items in logical order
- Indicate steps of the procedure that could be potentially dangerous or lethal (potentially dangerous behavior should be stopped immediately).

This ends DID-7.

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DATA ITEM DESCRIPTION (DID)-8

1. **Title:** Classroom Training

2. **Purpose:**
The purpose of this DID is to specify the minimum requirements for the content and format of training materials developed for classroom training.

3. **Applies To:**
This DID is applicable to all contractors developing and delivering training materials for classroom delivery, including classroom training as part of a course.

4. **Description:**
Classroom training is training conducted in one location with a specified group of individuals, with one or more instructors, and may include laboratory or simulation hands-on type activities. The training materials must meet the objectives in the CDG.

5. **Process:**
All course materials (instructor guide, student guide, tests, etc.) shall be developed in accordance with the approved CDG, and shall be revised when the CDG is revised or at the direction of the FAA.

Course materials shall be submitted as draft for FAA review. The contractor shall incorporate FAA comments and shall submit a revised draft of the course materials.

The contractor shall revise the revised course materials if the FAA considers them inadequate or inconsistent with the comments submitted during the FAA review.

Following revisions, the contractor shall present the course in part or in whole at FAA direction and revise the course materials based on comments received.

Continued on next page.

6. Source Materials:

Sources for the classroom training materials include, but are not limited to:

- TASA
- TDP
- Approved CDG
- Technical manuals
- FAA orders
- Operator's manuals
- Government furnished materials (e.g., templates, existing course materials)
- Other materials as identified.

7. Deliverables:

The deliverable is a completed classroom course with all required materials.

8. Content Requirements:

a. *Course Schedule*. The course schedule identifies the major course topics and time allocated for each in terms of week days. The course schedule depicts:

- Starting and ending days of the course
- Time allocations for major topics and lessons in the course, arranged in the sequence of delivery
- Time slots at which tests are administered
- The number of instructors for each instructional segment (if more than one instructor is used in training delivery).

b. *Instructor Guide*. The instructor guide materials shall contain:

1. Procedures for conducting the course. The instructor guide includes guidelines for conducting the course. Any special activities should be explained fully. Information about the instructional delivery system or equipment should be included, with an explanation of equipment set up and use, to teach course objectives. A sufficient description should be included to clarify:

    - Course flow
    - Which objectives are taught using each instructional approach
    - How the instructor should transition from one medium to the other.

Continued on next page.

8. Content Requirements (continued):

2. Lesson Activities. Instructor activities include:

- Lecture
- Demonstrations
- Description of personal experiences on the job
- Detailed explanations/examples to use for hard-to-grasp concepts
- Audiotape or videotape segments.

Student activities include:

- Practice exercises (written or hands on)
- Knowledge and performance tests
- Group discussions
- Group problem solving.

The instructor guide contains a detailed description of all activities to be accomplished in each class session and each laboratory session. An explanation of how the planned activities are to be achieved should also be included.

3. Classroom Preparation. Physical areas to be prepared for classroom activities include:

- Student work and study areas
- Classroom
- Laboratory areas such as simulators or equipment.

4. Lesson Plans. Lesson plans lay out the content of the course as specified in the CDG.

- cover sheet
- terminal and enabling objectives
- subject outline that documents sequence of delivery; questions and possible responses; any role-plays; and any instructional materials required, such as overhead transparencies and handouts, and
- classroom preparation.

5. Teaching Aids. The instructor guide should list all the teaching aids that will be used in the course. They may be listed all together at the beginning of the guide, or listed as appropriate with each lesson or lab procedure.

Continued on next page.

8. Content Requirements (continued):

Listing all the teaching aids in the front of the guide will help the instructor plan ahead when long-term preparation is necessary. Listing teaching aids with each lesson or lab is helpful to remind the instructor of what will be needed while preparing for the class.

6. Laboratory Guide. The laboratory guide is used to present instructions for maneuvering through the laboratory portion of the course, provide information about the procedure(s) to be performed, and provide references and pertinent visuals. The laboratory guide contains:

- Administrative information
- Laboratory objective(s)
- Equipment needed
- Safety precautions
- Procedure(s).

c. *Student Materials*. The contractor may be required to develop some or all of the following materials:

1. Student Guide or Handout. The student guide is used to provide instructions for maneuvering through the course, including all content necessary. Additionally, the student guide may include:

a) Reference material required for the course.

b) Administrative information:

- Course schedule
- Any safety precautions to be observed during the course.

c) Guidelines for using the material in the student guide.

d) Course lessons. Each lesson in the student guide shall contain:

- Introduction that lists all objectives for the lesson.

- Information sheets that support important information from the instruction and from documents that are not readily available to the student (e.g., list of training outcome(s), narrative description, and appropriate diagrams, sketches, charts, graphs, pictures, tables, and flowcharts).

Continued on next page.

8. Content Requirements (continued):

- Assignment sheets that support instruction by preparing students for upcoming materials; for example, study assignments, and/or study questions that require decisions similar to those made on the job.

- Job aids for use during training or on the job following training.

2. Student Manual. The student manual is used to provide technical information about equipment, systems, or procedures.

3. Student Workbook. The student workbook is used to present learning activities that apply the principles learned in the classroom, such as problem solving, paper troubleshooting, mathematical calculations, etc.

4. Laboratory Guide. The laboratory guide is used to inform the student of what to expect in the lab and present instructions for the laboratory activities, including any content that is appropriate to the laboratory. It is also a tool for the student when working on problems, such as calculations, at a console, at a computer, on equipment, etc.

5. Laboratory Workbook. The laboratory workbook is used to present learning activities, including job sheets that provide steps of procedures to be performed.

6. Supplementary Materials. Supplementary materials include such items as system or equipment publications, operator's manuals, computer documentation, periodicals and pamphlets, and technical manuals, block diagrams, or anything used as a reference.

d. *Tests*. Tests are used to measure and document a student's knowledge, cognitive ability, and performance of job tasks and skills. Tests are criterion referenced. See DID-7 for development of tests.

9. Format Requirements:

a. The format for *all* materials must be approved by the FAA. Each deliverable will:

- Have a cover page that specifies the course identification number, course title, contract number, contractor name and address, and submission date
- Have a table of contents, if necessary, and
- Be delivered on paper and electronically.

Continued on next page.

9. Format Requirements (continued):

b. Course Schedule. The course schedule identifies the major course topics and time allocated for each in terms of weekdays. A sample course schedule is shown in Figure 8-1.

COURSE LOADS ANALYSIS FOR SMALL AIRPLANES

COURSE NO. 22521 (200001)

WEEK: 1

DATES: 10/19/99 - 11/3/99

	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5
PERIOD					
1	REGISTRATION AND INTRODUCTION		AIRFOIL CHARACTERISTICS	V-N DIAGRAMS	AIRPLANE BLANCING
2	INTRODUCTION TO COURSE				
3					
4		PROGRESS TEST			
5	MAJOR TOPICS	DESIGN DATA		V-N DIAGRAMS. PROBLEM SESSION	
6					
7					
8					PROGRESS TEST

Figure 8-1. Sample Course Schedule.

c. Lesson plans. Templates and/or examples will be provided by the FAA.

10. Special Instructions:

The contractor should coordinate with the service for which the course materials are being developed to determine specific formats or the availability of templates used by that service.

This ends DID-8.

DATA ITEM DESCRIPTION (DID)-9

1. **Title:** Correspondence Study Training

2. **Purpose:**
This DID establishes the minimum requirements for the content and format of training materials developed for a correspondence study course.

3. **Applies To:**
This DID is applicable to all contractors developing and delivering training materials for correspondence study, including correspondence as part of a course.

4. **Description:**
A correspondence study course is a self-contained training course that does not require an instructor, i.e., the student completes the training on his or her own. Course materials are typically paper-based but may be supplemented with video and computer-based exercises.

5. **Process:**
All course materials shall be developed in accordance with the approved CDG, and shall be revised when the CDG is revised or at the direction of the FAA.

Course materials shall be submitted as a draft for FAA review. The contractor shall incorporate FAA comments and shall submit a revised draft of the course materials.

The contractor shall revise the revised course materials if the FAA considers them inadequate or inconsistent with the comments received during the FAA review.

Following revisions, the contractor shall present the course in part or in whole at FAA direction and revise the course materials based on comments received.

6. **Source Materials:**
Sources for the correspondence study training materials include, but are not limited to:

- TASA
- TDP
- Approved CDG
- Technical manuals
- FAA orders
- Operator's manuals
- Government furnished materials (existing TASAs)
- Other materials as identified.

Continued on next page.

7. Deliverables:

The deliverable is a completed correspondence study training package with all required materials, to include:

- Study text
- Tests
- Other content elements, as required.

8. Content Requirements:

a. *Study Text*

1. Administrative Information

a) Course title
b) Course description
c) A listing of all materials in student package, including course media (video, Academy lab, CBE)
d) Total course hours
e) Explanation of training methods (e.g., correspondence study with Academy labs)
f) Instructions on use of course materials, including CBEs, if required
g) Explanation of testing procedures (module/lesson/end of course, included with package or must be requested, etc.)
h) Explanation of Academy labs, if required
i) Explanation and use of end of course critique
j) Assistance information.

2. Lessons

a) Introductory Information. Introductory information includes review, objective(s) for the lesson, overview of the lesson, required equipment/materials, and estimated completion time for each lesson.

b) Lesson Material. Lesson material should convey information in a logical learning sequence (simple to complex, known to unknown, or job performance sequence), teach the objectives, and include safety precautions. Summaries, or interim summaries, should be over main points, key terms and definitions, and safety precautions. The presentation of lesson material will follow the CDG and may include graphics, tables, charts, or other visuals.

Continued on next page.

8. Content Requirements (continued):

b. *Exercises (paper-based).* The exercises reinforce the material presented in the text and/or in the computer-based exercises (CBE). The exercises may include review questions, problem solving, paper troubleshooting, mathematical calculations, etc.

c. *Job Aids.* These supplement instruction, provide information on the steps in a procedure, or may guide the student in making decisions related to the performance of a job task.

d. *Tests.* Tests are used to measure and document a student's knowledge, cognitive ability, and performance of job tasks and skills. Tests are criterion referenced. See DID-7 for development of tests.

e. *Computer-based exercises (CBEs).* CBEs are computer-based simulations of the system/equipment. CBEs are used to illustrate a process or other time-dependent occurrence such as motion or the operation of equipment, or to reinforce major concepts and objectives. The content of required CBEs is identified in the CDG and is approved by the FAA. See DID-10 for specific development requirements for CBI.

f. *Laboratory workbook/On-the-Job Training (OJT) manual.* These are used, if required and identified in the CDG, to supplement and reinforce the study text and/or CBE. The laboratory workbook would be used for hands-on-equipment (HOE) labs at the FAA Academy and the OJT manual at field sites. See DID-17 for specific development requirements for OJT.

g. *Video.* Video is used as part of a course to supplement and reinforce the learning objective if identified in the CDG. See DID-11 for specific development requirements for video.

h. *Supplementary information.* This may include an acronym list, glossary, block diagrams, technical manuals, etc.

9. Format Requirements:

The format for *all* materials must be approved by the FAA. Each part of the correspondence study materials package will:

- Have a cover page that specifies the course identification number, course title, contract number, contractor name and address, and submission date
- Have a table of contents, if necessary, and
- Be delivered on paper and electronically.

10. Special Instructions:
The contractor shall coordinate with the appropriate service to determine if there are FAA templates and materials available for use.

This ends DID-9.

DATA ITEM DESCRIPTION (DID)-10

1. **Title:** Computer-Based Instruction

2. **Purpose:**
The purpose of this DID is to specify the minimum requirements for the content and format of training developed for computer-based instruction (CBI).

3. **Applies To:**
This DID is applicable to all contractors developing and delivering CBI training, including CBI used as part of a course.

4. **Description:**
Computer-based instruction is a course, or portions of a course delivered and taken entirely by the student on a computer, using a tool called computer-managed instruction (CMI) which routes the student through the training and tracks the student's progress. The training materials include all items required to present the CBI training.

5. **Process:**
The contractor will submit each part of the deliverable to the FAA in draft form for review and approval. The contractor will:

   1. Produce a prototype CBI lesson with associated lesson storyboards, for FAA review and approval of the storyboard format, approach, depth of content, and convention to be used, such as colors of hypertext and screen layout.

   2. Produce storyboards for all CBI lessons for FAA review and approval.

   3. Deliver the lessons based on the approved storyboards for FAA review and approval.

   4. Deliver accompanying student materials and job aids with each CBI lesson delivered, if required for FAA review and approval.

   5. Ensure the CBI courseware will run error free on an FAA CBI platform, that it is CMI-compliant, and certify, at final delivery, that all software is error-free.

   6. Provide incremental development and delivery of storyboards, lessons, and student materials until all lessons are delivered.

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5. Process (continued):

Course materials shall be submitted as a draft for FAA review. The contractor shall incorporate FAA comments and shall submit a revised draft of the course materials.

The contractor shall revise the revised course materials if the FAA considers them inadequate or inconsistent with the comments received during the FAA review.

Following revisions, the contractor shall present the course in part or in whole at FAA direction and revise the course materials based on comments received.

6. Source Materials:

Sources for the CBI materials include, but are not limited to:

- TASA
- TDP
- Approved CDG
- Technical manuals
- FAA orders
- Operator's manuals
- Government furnished materials (existing TASAs)
- Other materials as identified.

7. Deliverables:

The deliverable is a completed CBI training package with all required materials, to include:

- Lesson storyboards
- Prototype lesson materials
- CBI lessons
- Student guide
- Tests
- Other content elements, as required.

Continued on next page.

8. Content Requirements:

a. *Lesson Storyboards*. Storyboards for CBI build upon the information in the CDG and provide a detailed picture of each frame in the course. The CBI storyboards document the text, images, actions, dialogue, and video required to teach each enabling objective stated in the CDG.

All CBI training must have approved storyboards. These storyboards constitute the output from the instructional design process and the input to graphic artists and to programmers who produce the final training software.

Storyboards shall include a screen-by-screen representation/depiction of the lesson to include, but not limited to:

- On-screen text
- Graphics
- Graphic build instructions
- Detailed animation/simulation instructions
- Navigation
- Video
- Timing issues
- Color changes
- Specific touch sensitive areas and responses, if used
- Narration
- Programmer/production notes
- Interim testing, as required.

b. *Prototype Lesson Materials*. This is a lesson developed first to establish course look and feel by defining font size, text style, color, interaction, and other standards.

c. *CBI Lessons*. The CBI lessons are computer programs that instruct the student electronically. The lessons are programmed from FAA-approved storyboards, using the FAA CBI template and its approved authoring system.

The CBI lessons shall depict the information outlined in the approved storyboards.

Continued on next page.

8. Content Requirements (continued):

d. *Student Guide*. The student guide is a paper-based text that contains information about each of the CBI lessons. The student guide shall be prepared in accordance with the documents referenced in the contract and in the CDG and contain the following:

- Standardized basic course information
- Course navigational aids (Lesson 1)
- Summary of key graphics and instructional points
- Appendices, if required.

Each subject-matter lesson in the student guide shall contain:

- Introductory information (review of previous material, objective for lesson, and overview of lesson)
- Graphics and instructional points
- References as needed to FAA orders, etc.
- Summary of lesson
- Directions for continuing to next lesson, and
- Page for note taking.

e. *Tests*. Tests are used to measure and document a student's knowledge, cognitive ability, and performance of job tasks and skills. Tests are criterion referenced. The tests for a CBI course are given on the CBI platform (or as designated by the FAA). See DID-7 for development of test items.

f. *Job Aids*. These supplement instructions provide information on the steps in a procedure, or may guide the student in making decisions related to the performance of a job task.

g. *CBEs*. Computer-based exercises (CBE) are exercises based on computer simulations of the system/equipment. CBEs are used to illustrate a process or other time-dependent occurrence such as motion or the operation of equipment, or to reinforce major concepts and objectives. The content of required CBEs is identified in the CDG and is approved by the FAA.

h. *Video*. Video is used as part of a course to supplement and reinforce the learning objective if identified in the CDG. See DID-11 for specific development requirements for video.

Continued on next page.

8. Content Requirements (continued):

i. *Laboratory workbook/On-the-Job Training (OJT) manual.* These are used, if required and identified in the CDG, to supplement and reinforce the study text and/or CBE. The laboratory workbook is used for hands-on-equipment (HOE) labs at the FAA Academy and the OJT manual at field sites.

j. Supplementary materials and job aids for the CBI lessons may be required by the CDG. Examples of supplementary materials/job aids may include, but are not limited to:

- System or equipment publications
- Operator's manuals
- Computer documentation
- Periodicals, pamphlets
- Videos
- Checklists
- Procedural lists
- Templates, and
- Visuals, such as flowcharts, diagrams, and illustrations.

The contractor shall submit any published supplementary materials to the FAA for review and approval. If video is to be developed as supplemental materials, the contractor must develop it in accordance with DID-11.

9. Format Requirements:

The format for *all* materials must be approved by the FAA.

a. Storyboards. An FAA-approved CBI storyboard format shall be used to specify the content and configuration of each CBI frame. Storyboards shall be delivered in paper-based form and/or electronically. Storyboards delivered in an electronic format shall be compatible with FAA computer-based systems and software.

b. Prototype lessons. As directed by the FAA.

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9. Format Requirements (continued):

c. CBI lessons. CBI lessons shall conform to the FAA CBI format and be delivered electronically on a CD-ROM. The following CBI lesson format standards shall apply:

- Limit the amount of text on the screen. Short bulleted phrases are preferable to lengthy passages. If explanatory text is required, keep paragraph(s) short and avoid splitting paragraphs across screens.
- Keep lessons short (approximately 30 minutes maximum).
- Present one idea or message per screen.
- Maintain consistency in color, font schemes, and screen layouts; these may be specified by the FAA.
- Use a text font and type that is easy to read.
- Limit the number of different fonts and font sizes used (2 to 4).
- Limit the length of narration per screen (30 seconds or less) or divide into segments.
- Use the color red to depict only actual color of objects (e.g., equipment display) or to highlight safety warnings.
- Avoid extraneous detail in graphics.
- Label all graphics.
- Use short video segments if video is required.
- Ensure there is adequate "white space" unless the screen is replicating an actual display.

d. Student Guide. The format of the student guide shall conform to FAA guidelines as specified. The student guide will be delivered both electronically and in paper-based form.

e. Tests. When tests are required to be CMI-compliant, the FAA test template will be provided. Multiple versions of individual test items may be required in order to use the CBI's capability to produce randomly generated versions of a test. During development, test item analysis will be conducted on all versions of all test items.

f. Job Aids. As directed by the FAA.

g. Laboratory Workbook. As directed by the FAA.

h. Supplementary Materials. Supplementary materials shall conform to the format that is approved by the FAA.

Continued on next page.

10. Special Instructions:

The FAA will provide the specifications for CBI courseware and related materials that include, but are not limited to:

- Operating system and fonts
- Software/software version to be used for programming
- Templates
- CPU type
- Memory
- Screen resolution
- File media and location (e.g., DVD, CD-ROM, etc.), and
- Number of copies (e.g., number of CD-ROM copies).

The contractor shall coordinate with the service for which it is developing training to determine whether tests must be CMI-compliant and randomly generated, requiring multiple versions of test items.

This ends DID-10.

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DATA ITEM DESCRIPTION (DID)-11

1. **Title:** Video Training

2. **Purpose:**
This DID establishes the minimum requirements for the content and format of training materials developed for delivery by video.

3. **Applies To:**
This DID is applicable to all contractors developing and delivering video training, including video used as part of a total course.

4. **Description:**
Video training is training delivered primarily by means of videotape. Supplementary materials are typically included in the form of paper-based materials. The training package includes all items required to present the video training.

5. **Process:**
The contractor will submit the following parts of the deliverable to the FAA in draft form for review and approval:

   1. Video treatment
   2. Storyboard and script(s)
   3. Video shot list

   These materials shall be revised after FAA review and resubmitted.

   The contractor shall then deliver a first shoot and sound/audio track for FAA review and approval.

   The contractor shall submit an edited video with sound and audio track integrated for FAA review and approval.

   Supplementary materials shall be submitted as a draft for FAA review. The contractor shall incorporate FAA comments and shall submit a revised draft of the course materials.

   The contractor shall revise the revised video and/or supplementary materials if the FAA considers them inadequate or inconsistent with the comments received during the FAA review.

   Following revisions, the contractor shall present the course in part or in whole at FAA direction and revise the course materials based on comments received (see DID-14).

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6. Source Materials:

Sources for the video training materials include, but are not limited to:

- TASA
- TDP
- Approved CDG
- Technical manuals
- FAA orders
- Operator's manuals
- Previously developed FAA or commercially available video
- Government furnished materials (e.g., existing FAA video)
- Other materials as identified.

7. Deliverables:

The deliverable is a completed video training program with all required materials, to include:

- Video treatment
- Video storyboard and script
- Video shot list
- First shoot and sound/audio track
- Completed video
- Supplemental materials
- Tests.

8. Content Requirements:

a. *Video Treatment.* Video treatment is a narrative description of the proposed content for all video sequences identified to support the video training. These descriptions document the images, time, personnel, locations, and facility requirements needed to produce the video segment, whether original production or existing material.

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8. Content Requirements (continued):

Each video treatment document (one for each enabling objective) shall be prepared as follows:

1. Introduction. The overall treatment of the course shall be described with annotations to indicate each of the video sequences needed for the relevant enabling objective. A matrix showing which sequences have various factors in common shall be provided, if applicable.

2. Concept and approach. The overall approach to the video sequences and how continuity will be achieved shall be described. For example, will an off-camera narrator be used throughout? Will an on-camera instructor demonstrate the procedures? Will animation be used to show a process flow?

3. Video/audio treatments. Each video treatment shall include:

- Enabling objectives
- Summary discussion of the theme of each video event
- Narrative description of the set and/or location
- Sound/audio track requirements (i.e., narration, music, sound effects, etc.)
- Casting requirements
- Equipment/facilities required
- Special effects anticipated
- Narrative description of the action
- Estimated running time(s)
- Probable interaction with ongoing operations while taping
- Source (if existing footage is to be used).

b. *Video Storyboard and Scripts.* A storyboard and script shall be prepared for each video lesson required by the CDG. These provide information that is adequate to ensure that the content and organization of each video sequence meets the purpose of the enabling objectives.

Continued on next page.

8. Content Requirements (continued):

The storyboard and script shall provide the spoken word and a description of the scene, camera directions, and audio requirements. It shall meet the information needs of production functions.

1. Minimum requirements for video shall include:

   - Description of all shots, including the objectives for the sequence and the action to be photographed.
   - Details of each shot, such as a close up and a view from above.
   - Stage directions.
   - Editing instructions, including transitions such as fades, special effects, dissolves and wipes.
   - Resource tapes
   - Finished time requirements.

2. Minimum requirements for audio shall include all necessary information on the:

   - Audio track
   - Music cuts
   - Ambient sound
   - Sound effects
   - Written scripts for all narration/dialogue
   - Narration/dialogue voice requirements.

3. Minimum requirements for production notes shall include all necessary information on the:

   - Locations, sets, casting, stage directions, stock footage, and special effects
   - Details of each shot
   - Editing instructions
   - Special support required to accomplish the shooting of each video segment.

Continued on next page.

8. Content Requirements (continued):

4. The contractor shall document the following resources proposed for use:

- Existing audiovisual resource material, including titles, control numbers, reel numbers, and Society of Motion Picture and Television Engineers (SMPTE) time codes.
- Graphic artwork to be used in the training sequences
- Special support required to accomplish shooting each video sequence
- Existing musical segments.

c. *Video Shot List.* The video shot list shall document all video motion and still frame shots. In the video shot list deliverable, the shots shall be organized and sequenced in a way that will maximize production efficiency. The video shot list shall be prepared as follows:

1. Introduction. An overview of the video shot list procedures to be used to accomplish the video production shall be documented.

2. Summary matrix. A matrix or series of matrices shall be provided which relates video shots to descriptive and/or identification parameters. It also permits grouping for production efficiency, including:

- Storyboard and script references
- Location/set
- Shot sequence numbers
- Page numbers of specific shot descriptions.

3. Shot sequences. Brief descriptive material shall be provided, in storyboard reference number sequence, for each video segment. The descriptive material shall be taken from the final storyboard and script deliverable and sequenced into a concise workable document. Each segment shall be described in terms of:

- Shot location and/or set required.
- Shot description, including stills and motion sequences, angle and distance of view, stage directions, and transitions.

Continued on next page.

8. Content Requirements (continued):

d. *First Shoot and Sound/Audio Track.* The first shoot of the video and the sound/audio track must be reviewed and approved by the FAA.

e. *Video lesson.* The video lesson contains the subject content to be learned by the student.

f. *Supplemental Instructional Materials.* The supporting instructional material shall provide, at a minimum, the following information for the student:

1. The relationship of the supporting material to the videotape and how the supporting material will be used

2. Definition of key words and acronyms used in the videotape and supporting material

3. An outline of key points for each lesson or topic covered in the videotape

4. Review exercises to assess retention of key points

5. Diagrams, charts, and illustrations needed to facilitate comprehension and retention of key information

6. Information on test procedures, if applicable

7. Job aids (checklists, procedural lists, etc.)

8. The name of the individual to contact for further information or assistance.

g. *Tests.* Tests are used to measure and document a student's knowledge, cognitive ability, and performance of job tasks and skills. Tests are criterion referenced. See DID-7 for development of test items.

Continued on next page.

9. Format Requirements:
The format for all materials shall be approved by the FAA.

a. Paper-based deliverables will:

1. Have a cover page that specifies the course identification number, course title, contract number, contractor name and address, and submission date
2. Have a table of contents, if necessary, and
3. Be delivered on paper and electronically.

b. Videotape deliverables:

1. Will be on one-inch beta cam, or its equivalent, and shall be used for production of the master videotape.

2. The production format for final copies and the number of copies required shall be in accordance with the specifications of the contract or CDG.

3. The tape(s) will have a label that specifies the course identification number, course title, contract number, contractor name and address, and submission date.

c. Video treatment. The video treatment shall be prepared in accordance with the following requirements:

1. A separate video treatment (description) shall be prepared for each enabling objective identified in the CDG that involve a video sequence.

2. A Table of Contents page shall follow the cover sheet and shall include:

- Introduction
- Concept and approach
- Video treatments.

10. Special Instructions:
The contractor shall obtain any and all permissions and duplication rights for the materials, to include release of talent, prior to delivery of the course.

This ends DID-11.

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DATA ITEM DESCRIPTION (DID)-12

1. **Title:** Interactive Video Teletraining

2. **Purpose:**
This DID establishes the minimum requirements for the content and format of training materials developed for delivery by Interactive Video Teletraining (IVT).

3. **Applies To:**
This DID is applicable to all contractors developing and delivering interactive video teletraining, including IVT used as part of a total course.

4. **Description:**
IVT is training presented by television. Supplementary materials are typically included in the form of paper-based materials.

5. **Process:**
The contractor will submit the IVT course outline and project schedule to the FAA in draft form for review and approval. The contractor shall incorporate FAA comments and submit a revised draft of these materials.

The remainder of the course materials shall be submitted as a draft for FAA review. The contractor shall incorporate FAA comments and shall submit a revised draft of the course materials.

The contractor shall revise the revised course materials if the FAA considers them inadequate or inconsistent with the comments received during the FAA review.

Following revisions, the contractor shall present the course in part or in whole at FAA direction and revise the course materials based on comments received.

6. **Source Materials:**
Sources for the video training materials include, but are not limited to:

- TASA
- TDP
- Approved CDG
- Technical manuals
- FAA orders
- Operator's manuals
- Government furnished materials (existing TASAs)
- Other materials as identified.

Continued on next page.

7. Deliverables:

The deliverable is a completed IVT training program with all required materials. The training package includes all items required to present the IVT:

- Outline of IVT course
- Project schedule
- Instructor guide/facilitator guide
- Teleprompter scripts, if appropriate
- Participant scripts(s) , if required,
- Auxiliary media, e.g., slides, videos, if required
- Student materials
- Job aids, if required
- Tests.

8. Content Requirements:

a. *IVT Course Outline*. The IVT course outline shall be prepared as a description of the proposed content of the course. The outline shall be prepared in accordance with the documents referenced in the contract and in the CDG.

b. *Project Schedule*. Time constraints are extremely important to IVT because an IVT course must be scheduled to a specific time slot. The project schedule has two parts:

1. Pre-broadcast. The contractor shall document all activities required prior to IVT delivery, such as:

   - Location of broadcast and receive sites
   - Reproduction and distribution of course materials to receive sites
   - Rehearsals, including supplemental media
   - Broadcast simulation with receive sites to ensure proper operation
   - Administration of tests.

2. Course broadcast. This includes:

   - Starting and ending times/dates of the course
   - Time allocations for major topics in the course (in minutes), including test administration
   - Major course topics, lessons, and test(s) arranged in chronological order
   - Supplemental activities such as CBEs, laboratory activities, etc.

Continued on next page.

8. Content Requirements (continued):

c. *Instructor Guide/Facilitator Guide*. The Instructor Guide/Facilitator Guide is similar to the instructor guide for classroom delivery. The guide shall contain the following items:

1. How to Conduct the Course. The instructor guide includes guidelines for conducting the course. Any special activities should be explained. Information about the media should be included, with an explanation for using the media with specific course objectives. Sufficient description should be included to clarify:

   - Course flow
   - Which objectives are taught in which medium
   - How the instructor should transition from one medium to the other.

2. Lesson Activities. The instructor guide contains a detailed description of all activities to be accomplished in each class session and each laboratory session. An explanation of how the planned activities are to be achieved should also be included.

   Instructor activities include:

   - Lecture
   - Demonstrations
   - Description of personal experiences on the job
   - Detailed explanations/examples to use for hard-to-grasp concepts
   - Audiotape or videotape segments.

   Student activities include:

   - Practice exercises (written or hands on)
   - Knowledge and performance tests
   - Group discussions
   - Group problem solving.

Continued on next page.

8. Content Requirements (continued):

3. Receive Site. The contents of the instructor guide vary depending on the contents of the course and any planned activities.

4. Lesson Plans. Lesson plans lay out the content of the course as specified in the CDG. See DID-8, Classroom Training, for lesson plan contents and format requirements.

5. Teaching Aids. The instructor guide should list all the teaching aids that will be used in the course. They may be listed all together toward the beginning of the guide, or listed as appropriate with each lesson or lab procedure.

   Listing all the teaching aids in the front of the guide will help the instructor plan ahead when long-term preparation is necessary. Listing teaching aids with each lesson or lab is helpful to remind the instructor of what will be needed while preparing for the class.

6. Student Handouts. If the CDG specifies student handouts, they are included in the instructor guide. For AF, all student material shall be included in the Student Guide.

d. *Teleprompter scripts*. If the CDG requires a teleprompter script, it shall be prepared as the "word for word" script for the presentation. All oral text is included and each presenter must be identified in the script.

e. *Participant Scripts*. If a script is required for participants or actors, participant scripts will be prepared. The scripts will be "word for word" and each participant shall be identified.

f. *Auxiliary media*. If auxiliary media is required, such as slides or video, the materials shall be prepared with FAA approval.

g. *Student materials*. If student materials are required, the materials shall be prepared in accordance with the CDG and approved by the FAA.

h. *Job aids*. If job aids are required, the materials shall be approved by the FAA.

i. *Tests*. Tests are used to measure and document a student's knowledge, cognitive ability, and performance of job tasks and skills. Tests are criterion referenced. See DID-7 for development of test items.

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9. Format Requirements:

The format for *all* materials must be approved by the FAA. Each item submitted to the FAA for review and approval will:

- Have a cover page that specifies the course identification number, course title, a contract number, contractor name and address, and submission date
- Have a table of contents, if necessary, and
- Be delivered on paper and/or electronically.

10. Special Instructions:

The contractor shall coordinate with the FAA service for which the training program is being developed to determine whether any templates or other specific information is available from the FAA. The test may be delivered by paper or on the CBI platform.

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DATA ITEM DESCRIPTION (DID)-13

1. **Title:** Web-Based Training

2. **Purpose:**
This DID establishes the minimum requirements for the content and format of training materials developed for delivery via the World Wide Web (www), known as the Web.

3. **Applies To:**
This DID is applicable to all contractors developing and delivering Web-based training.

4. **Description:**
Web-based training is training delivered in part or in whole through the Web. There are many emerging means of delivering training across the Web to include synchronous and asynchronous delivery. Supplementary materials are typically included in the form of other types of media such as e-mail, student/teacher chat areas, student/student chats, research sites, testing and evaluation.

5. **Process:**
Asynchronous delivery such as CBI allows additional flexibility and in most cases is governed by other DIDs within this standard.

Synchronous delivery requires other considerations and planning. The contractor should coordinate with the government what is required for this type of delivery if it is not clearly delineated in the contract.

The contractor will submit the course outline and project schedule to the FAA in draft form for review and approval. The contractor shall incorporate FAA comments and submit a revised draft of these materials.

The remainder of the course materials shall be submitted as a draft for FAA review. The contractor shall incorporate FAA comments and shall submit a revised draft of the course materials.

The contractor shall revise the revised course materials if the FAA considers them inadequate or inconsistent with the comments received during the FAA review.

Following revisions, the contractor shall present the course in part or in whole at FAA direction and revise the course materials based on comments received.

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6. Source Materials:

Sources for the training materials include, but are not limited to:

- TASA
- TDP
- Approved CDG
- Technical manuals
- FAA orders
- Operator's manuals
- Government furnished materials (existing TASAs)
- Other materials as identified.

7. Deliverables:

The deliverable is a completed Web-based training program with all required materials. The training package includes all items required to deliver the course through the Web with supporting materials:

- Course Outline
- Project schedule
- Instructor guide/facilitator guide
- Listing of and explanation of other media used and how it interfaces
- Auxiliary media, e.g., slides, videos, if required
- Student materials
- Job aids, if required, and
- Tests.

8. Content Requirements:

a. *Course Outline*. The course outline shall be prepared as a description of the proposed content of the course. The outline shall be prepared in accordance with the documents referenced in the contract and in the CDG.

b. *Project Schedule*. Time constraints are extremely important for Web-based synchronous training delivery. The synchronous delivery requires additional advanced planning to coordinate all parties that will be signing on for the course as well as coordination for the presenter of the course. There are two main parts of preparation times for synchronous delivery.

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8. Content Requirements (continued):

1. Pre-delivery. The contractor shall document all activities required prior to Synchronous Web-based delivery, such as:
   - Location of instructor, technical coordination for dial-ins
   - Reproduction and distribution of course materials participants
   - Rehearsals, including supplemental media
   - Technical coordination and plan to ensure proper operation and responsiveness to students.
   - Test administration and feedback of students

2. Course delivery. This includes:

   - Starting and ending times/dates of the course
   - Time allocations for major topics in the course (in minutes), including test administration
   - Major course topics, lessons, and test(s)
   - Supplemental activities such as CBEs, laboratory activities, etc.

c. *Instructor Guide/Facilitator Guide*. The Instructor Guide/Facilitator Guide is similar to the instructor guide for classroom delivery. The guide shall contain the following items:

1. How to Conduct the Course. The instructor guide includes guidelines for conducting the course. Any special activities should be explained. Information about the media should be included, with an explanation for using the media with specific course objectives. Sufficient description should be included to clarify:

   - Course flow
   - Which objectives are taught in which medium
   - How the instructor should transition from one medium to the other.

2. Lesson Activities. The instructor guide contains a detailed description of all activities to be accomplished in each class session and each laboratory session. An explanation of how the planned activities are to be achieved should also be included.

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8. Content Requirements (continued):

Instructor activities include:

- Lecture
- Demonstrations
- Description of personal experiences on the job
- Detailed explanations/examples to use for hard-to-grasp concepts
- Audiotape or videotape segments.

Student activities include:

- Practice exercises (written or hands on)
- Knowledge and performance tests
- Group discussions off-line, email,
- Group problem solving.

3. Lesson Plans. Lesson plans lay out the content of the course as specified in the CDG. See DID-8, Classroom Training, for lesson plan contents and format requirements.

4. Teaching Aids. The instructor guide should list all the teaching aids that will be used in the course. They may be listed all together toward the beginning of the guide, or listed as appropriate with each lesson or lab procedure.

   Listing all the teaching aids in the front of the guide will help the instructor plan ahead when long-term preparation is necessary. Listing teaching aids with each lesson or lab is helpful to remind the instructor of what will be needed while preparing for the class.

5. Student Handouts. If the CDG specifies student handouts, they are included in the instructor guide. For AF, all student material shall be included in the Student Guide.

d. *Instructor scripts*. If the CDG requires a script for the instructor, it shall be prepared as the "word for word" script for the presentation. All oral text is included and each presenter must be identified in the script.

e. *Participant Scripts*. If a script is required for participants or actors, participant scripts will be prepared. The scripts will be "word for word" and each participant shall be identified.

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8. Content Requirements (continued):

f. *Auxiliary media.* If auxiliary media is required, such as slides or video, the materials shall be prepared with FAA approval.

g. *Student materials.* If student materials are required, the materials shall be prepared in accordance with the CDG and approved by the FAA.

h. *Job aids.* If job aids are required, the materials shall be approved by the FAA.

i. *Tests.* Tests are used to measure and document a student's knowledge, cognitive ability, and performance of job tasks and skills. Tests are criterion referenced. See DID-7 for development of test items.

9. Format Requirements:

The format for *all* materials must be approved by the FAA. Each item submitted to the FAA for review and approval will:

- Have a cover page that specifies the course identification number, course title, a contract number, contractor name and address, and submission date
- Have a table of contents, if necessary, and
- Be delivered on paper and electronically.

10. Special Instructions:

The contractor shall ensure the developed training operates on the current infrastructure and Web access is available to the target student audience.

The contractor shall coordinate with the FAA service for which the training program is being developed to determine whether any templates or other specific information is available from the FAA.

This ends DID-13.

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DATA ITEM DESCRIPTION (DID)-14

1. **Title:** Contractor's Presentation

2. **Purpose:**
The purpose of this DID is to establish the minimum requirements for the contractor's presentation of training materials.

3. **Applies To:**
This DID is applicable to all contractors developing training for the FAA.

4. **Description:**
The contractor's presentation is a formal step in the validation of the training materials. During the presentation, the contractor presents a shortened version of each fully developed lesson, including draft test items. Each lesson is given in enough detail and depth so that the integration and effectiveness of the instructional materials, learning sequence, performance exercises, tests, and the time allocations can be fully assessed by the FAA.

5. **Process:**
The contractor prepares a brief plan for the presentation.

Fifteen to thirty days before the contractor's presentation, the contractor shall provide to the FAA all available draft training materials listed in the plan.

At the contractor's presentation, the contractor presents a detailed course schedule, detailed course outline, and all lessons and associated materials in draft form. The contractor makes revisions and continues to develop the training materials. The presentation may be repeated, if the FAA requires it.

6. **Source Materials:**
Sources for the contractor's presentation include, but are not limited to:

- TASA
- TDP
- CDG
- Contractor's developed training materials
- Technical manuals
- Manufacturer's instruction books
- Any required equipment to support the training.

Continued on next page.

7. Deliverables:
The deliverables for the contractor's presentation are:

a. Brief plan for conducting the contractor's presentation
b. Detailed course content outline and detailed schedule for the course
c. Drafts of all of the developed instructor and student materials

8. Content Requirements:
The contractor's plan for conducting the presentation shall include:

a. Location. The contractor's proposed location for conducting the presentation.

b. Participants. The personnel who shall attend the contractor's presentation:

- Contractor personnel with responsibility for the design, development, and technical accuracy of the course shall be available during the presentation to answer questions about the course. Available contractor personnel shall include instructor(s), if required; developer(s); and appropriate subject matter experts.

- FAA representatives as identified by the FAA.

c. Schedule. The contractor's schedule for the presentation.

d. Available materials. List of draft training materials associated with the course. The materials may include the course schedule, lesson plans, student materials, and media material.

e. Required equipment. List of equipment required by the contractor to conduct the contractor's presentation, if applicable.

9. Format Requirements:
The format for the deliverables must be approved by the FAA. Each deliverable will:

- Have a cover page that specifies the course identification number, course title, Contract number, contractor name and address, and submission date
- Have a table of contents, if necessary, and
- Be delivered on paper and electronically.

10. Special Instructions:
The contractor should coordinate with the service for which the course is being developed to identify any specific requirement for the contractor's presentation. The contractor's presentation may be considered a Technical Interchange Meeting.

This ends DID-14.

DATA ITEM DESCRIPTION (DID)-15

1. **Title:** Operational Tryout

2. **Purpose:**
The purpose of this DID is to establish the minimum requirements for the operational tryout of a course.

3. **Applies To:**
This DID is applicable to all contractors developing training for the FAA.

4. **Description:**
The operational tryout is part of the continuing validation of the training materials, during which the effectiveness of the instructional materials is assessed. Complete draft lessons are presented to representatives of the target population to determine if the instructional approach is appropriate and effective, test items and time allocations are appropriate, and the format of the materials is easy to use. Information obtained from the operational tryout(s) is used to revise and improve the instructional effectiveness of the materials prior to the first course conduct.

5. **Process:**
The contractor prepares a plan for the conduct of the operational tryout and conducts the tryout.

During the operational tryout the FAA compiles comments from both students and FAA subject matter experts and provides these to the contractor. The contractor performs test item analysis.

The contractor compiles all recommendations for revision, both FAA and contractor, and the contractor writes a report documenting the results and recommendations to be made, including a schedule for implementing the revisions.

The contractor submits the report to the FAA. On approval, the contractor makes revisions and continues to refine the materials for further FAA review, if necessary. The contractor may be required to conduct another operational tryout, if necessary, before the first course conduct.

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6. Source Materials:

Sources for the operational tryout include, but are not limited to:

- TASA
- CDG
- Contractor's developed training materials
- Technical manuals
- Manufacturer's instruction books, and
- Any required equipment to support the training.

7. Deliverables:

The deliverables for the operational tryout are:

- Brief plan for conducting the operational tryout
- All instructional materials
- Brief report documenting the operational tryout and required revisions, if any.

8. Content Requirements:

a. *Contractor's plan.* The contractor's plan for conducting the operational tryout shall include:

1. Location. The contractor's proposed location for conducting the operational tryout.

2. Participants. The personnel who shall attend the operational tryout:

   - Contractor personnel with responsibility for the design and development of the course shall be available during the operational tryout to answer questions about the course. Available contractor personnel shall include instructor(s), if required; developer(s); and appropriate subject matter experts.

   - FAA representatives as identified by the FAA prior to the operational tryout.

3. Schedule. The contractor's schedule for the operational tryout.

4. Available materials. List of all draft training materials associated with the course, including the course schedule, lesson plans, student materials, and tests.

Continued on next page.

8. Content Requirements (continued):

5. Required equipment. List of equipment, including test equipment, required by the contractor to conduct the operational tryout, if applicable.

b. *Instructional Materials*. At the operational tryout, the contractor shall provide to the FAA all available draft training materials listed in the plan.

c. *Operational Tryout Report*. After the operational tryout, the contractor will submit a report that includes:

1. Record of activity. The contractor records the activities that occurred during the operational tryout. The record shall include, but is not limited to:

- Date of the operational tryout
- Course identification number/course title
- Titles of lessons in the course
- Names, organizations, and phone numbers of all participants
- All activities that took place during the operational tryout
- Test item analysis results
- Assessment of the effectiveness of the course materials based on the participant performance
- Comments made by the FAA and contractor personnel.

2. Proposed revisions. The contractor includes proposed revisions to the course, listed by lesson title and number, and in the order in which the lessons were presented. The proposed revisions shall address, but are not limited to, the following areas:

- Course organization and content
- Instructional methods and media
- Instructional materials, including instructor and student materials
- Accuracy of course information.

3. Schedule for revisions. The contractor's schedule will include the time for accomplishing each proposed revision, with an indication of which revisions shall be completed before the next operational tryout (if necessary) or the first course conduct.

Continued on next page.

9. Format Requirements:

The format for the operational tryout plan, the instructional materials, and the report must be approved by the FAA. Each deliverable will:

- Have a cover page that specifies the course identification number, course title, contract number, contractor name and address, and submission date
- Have a table of contents, if necessary, and
- Be delivered on paper and electronically.

10. Special Instructions:

The contractor should coordinate with the service for which the course is being developed to identify any specific requirement for the contractor's presentation. For Airway Facilities, the contractor is required to provide one set of all required reference materials per student to be used in the operational tryout only.

The contractor may be required to submit training materials in advance in order to permit review for completion of previously identified revisions.

This ends DID-15.

DATA ITEM DESCRIPTION (DID)-16

1. **Title:** First Course Conduct

2. **Purpose:**
The purpose of this DID is to establish the minimum requirements for the first course conduct.

3. **Applies To:**
This DID is applicable to all contractors developing training materials for the FAA.

4. **Description:**
The first course conduct is the final stage in validation of the training materials. The course is conducted in its entirety in the intended training environment to the target population to ensure the course accomplishes the objectives required by the CDG. Information obtained from the operational tryout(s) is used to revise and improve the instructional effectiveness of the materials prior to the first course conduct.

5. **Process:**
Thirty days prior to first course conduct, the final TASA and CDG are delivered to the FAA, for validation of the course.

During the first course conduct the FAA compiles comments from both students and FAA subject matter experts and provides these to the contractor. The contractor performs test item analysis.

FAA determines if the course is valid, given that any identified revisions are completed.

The contractor submits a report documenting the results of the first course conduct, which includes comments from students and subject matter experts.

The contractor revises all course materials based on the comments

The contractor delivers final course materials to the FAA accompanied by a letter certifying the training materials are "bug-free" (if applicable) and free of all license and copyright encumbrances.

Continued on next page.

6. **Source Materials:**
Sources for the first course conduct include, but are not limited to:

- TASA
- CDG
- Contractor's developed training materials
- Technical manuals
- Manufacturer's instruction books
- Any required equipment to support the training.

7. **Deliverables:**
The deliverables for the first course conduct are:

- Complete course, including all media, student materials, and reference documentation
- Data collection package
- Report documenting the first course conduct
- Certificate of completion for all students.

8. **Content Requirements:**

a. *Completed Course Materials*. Prior to the first course conduct, the contractor shall make available to the FAA a complete package of course materials and documents (TASA, CDG, course outline). The package of materials will include all of the items referenced in the CDG. Examples to be provided include:

- Lesson plans
- Visuals
- Instructor guide
- Student guide
- Student manuals
- Supplementary student materials
- Tests and answer keys, and
- Electronic files of the course materials and other files as needed for the course.

b. *Data Collection Package*. Prior to the first course conduct, the contractor shall provide to the FAA all forms that will be used during the first course conduct to collect data on the course.

1. Lesson evaluation checklists. This checklist enables the course instructors or other appropriate representatives to evaluate each lesson as it is presented. The checklists shall be completed by the FAA representative during the presentation of each lesson and shall contain items of concern.

Continued on next page.

8. Content Requirements (continued):

2. Student assessment/critique sheets for each lesson. The student critique sheets enable the students who participate in the first course conduct to assess each lesson after it is presented.

   The contractor shall fill in the administrative information on the critique sheet for the students. The administrative information shall include the instructor name, course title and number, lesson title and number, and the date of the first course conduct.

3. Lesson time log. The lesson time log shall be used to document the start and stop times for each lesson presented.

4. Student assessment form for the course. The student assessment form enables the students who participate in the first course conduct to evaluate the total course.

   The FAA administers the assessment forms, reviews them, and identifies necessary changes to training materials based on student assessments. The contractor makes the specified changes.

   At any subsequent course offerings by the contractor, at the direction of the FAA, the contractor administers the student assessment of the total course and provides results of student evaluations to the FAA.

   Evaluation of training is an FAA function. The contractor is responsible only for the student assessment/critique at the first course conduct.

c. *First Course Conduct Report.* After the first course conduct, the contractor will submit a report that includes:

1. Introduction. The introduction shall include:

   a) Course number(s) and course title(s)
   b) Class number(s)
   c) Course description(s), including:

      - brief overview of the course(s)
      - total time scheduled for the new course(s)
      - course prerequisites by course number and title.

Continued on next page.

8. Content Requirements (continued):

2. Class data. The class data shall contain:

   a) Beginning and ending dates of the course(s)
   b) Class roster(s) (names of students in attendance)
   c) Number of students in attendance
   d) Number of students meeting course prerequisites
   e) Daily class schedule for resident classes.

3. Comments. The comments section shall include summaries of comments of students and FAA representatives attending the course.

d. *Test Data.* The Test Data section shall include information about each graded test presented in the course. The section shall be subdivided into two subsections:

1. Test Data Listing, in which each graded test is listed by name, with information concerning the:

   - Type of test for both written and performance tests
   - Class average (mean in percent) for students who meet course prerequisites and for students who do not meet prerequisites
   - Range of scores (in percent) for students who meet course prerequisites and for students who do not meet prerequisites
   - Individual student percent scores
   - Number of students meeting the passing criteria, if applicable.

2. Ease Index, i.e., the number of correct responses for an item divided by the number of students responding to the item.

3. Additional test analysis results, if required by the FAA.

e. *Recommended revisions.* This section shall contain a list of recommended revisions to the course, listed by lesson title and number and in the order in which the lessons were presented. Revisions that must be made prior to subsequent course deliveries or delivery of final materials shall be indicated. The date the revisions will be completed will also be specified.

f. *Supporting Information.* Supporting information shall include:

1. Listing, or summary, of all FAA representatives' comments
2. Listing, or summary, of all student comments
3. Recommended average time for each lesson.

Continued on next page.

9. Format Requirements:

The format for the instructional materials for the first course conduct and the report must be approved by the FAA. Each deliverable will:

- Have a cover page that specifies the course identification number, course title, contract number, contractor name and address, and submission date
- Have a table of contents, if necessary, and
- Be delivered on paper and electronically.

10. Special Instructions:

The contractor should coordinate with the service for which the first course conduct is being conducted, as the FAA may specify the required lesson evaluation checklist and student critique forms.

For Airway Facilities, the contractor is required to provide one set of all required reference materials per student to be used in the operational tryout only.

This ends DID-16.

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DATA ITEM DESCRIPTION (DID)-17

1. **Title:** Theory-of-Operation Examination

2. **Purpose:**
The purpose of this DID is to specify the minimum content requirements for the theory-of-operation examinations used in the Airway Facilities (AF) Maintenance Personnel Certification Program.

3. **Applies To:**
This DID is applicable to all theory-of-operation examinations developed for AF maintenance personnel.

4. **Description:**
AF theory-of-operation examinations are comprehensive examinations used to measure an examinee's knowledge of the theory and practical techniques required to diagnose and correct deficiencies of specific equipment or systems, as well as proper configuration, operation performance parameter checks, certification, starting procedures, system diagnosis, and other tasks of a non-routine nature.

5. **Process:**
The theory-of-operation examination materials shall be submitted as a draft for FAA review. The contractor shall incorporate FAA comments and shall submit a revised draft of the exam.

The contractor shall revise the revised exam if the FAA considers it inadequate or inconsistent with comments received during the FAA review.

6. **Source Materials:**
Source material for development of the theory-of-operation examination shall include, but not be limited to:

a. CDG
b. Available FAA course and lesson outlines, course examinations, and training objectives
c. FAA technical instruction manuals
d. System handbooks
e. Manufacturer's technical document
f. Where applicable, the FAA will provide reasonable access to the system or equipment to be covered by the examination.

Continued on next page.

6. Source Materials (continued):

g. FAA orders and specifications
   1. FAA Order 3000.10, Airway Facilities Maintenance Technical Training Program
   2. FAA Order 3400.3, Airway Facilities Personnel Certification Program
   3. FAA-STD-010, Graphic Symbols for Digital Logic Diagrams

h. Government publications
   1. MIL-STD-17, Mechanical Symbols (Other than Aeronautical, Aerospace, and Spacecraft Use)
   2. MIL-STD-27, Designations for Electric Power Switch Gear Devices and Industrial Control Devices

i. American National Standards Institute (ANSI) publications
   1. ANSI X3.5, Flowchart Symbols for Information Processing
   2. ANSI Y 10.19, Letter Symbols for Units Used in Science and Technology
   3. ANSI Y 14.15, Electrical and Electronic Diagrams
   4. ANSI Y 32.2, Graphic Symbols for Electrical and Electronic Diagrams
   5. ANSI Y 32.9, Graphic Electrical Wiring Symbols for Architectural and Electrical Layout Drawings
   6. ANSI Y 32-16, Reference Designations for Electrical and Electronic Equipment
   7. ANSI Z 210.1, Metric Practice Guide

j. IEEE Standard 255, Institute of Electrical and Electronic Engineers (IEEE) standard for Letter Symbols for Semiconductor Devices

7. Deliverables:

The deliverables for this DID include a study guide and three versions of the exam with instructions and an answer key.

a. A study guide that provides information for the student to assist in studying for the examination.

b. Three versions of the examination in the form of test items. The examination must be delivered on paper and as an electronic file.

c. Answer key with references to source material for each version of the exam, delivered on paper and as an electronic file.

d. Instructions for the examination, delivered on paper and/or electronically.

Continued on next page.

8. Content Requirements:

a. *Test items for the exam.* The language used in constructing test items for the examination shall be free of vague and ambiguous terms, and the contractor shall use the simplest words and phrases that will convey the intended meaning.

1. The test items shall cover the equipment within a system and the auxiliary equipment considered to be a part of the system. The test items for software operations shall cover utility, support, and diagnostic programs, as well as that part of operation programs, subprograms, routines, and subroutines that support the maintenance effort.

   Specific areas that may be covered include, but are not limited to, the following:

   - Principles and theory of equipment operation, including associated components
   - Sequential operation of controls and protective components during startup, normal operation, shutdown, and abnormal or fault conditions
   - Analysis of system abnormalities and determination of corrective action required
   - Safety precautions to be observed
   - Documentation required prior to performing maintenance
   - Use of special tools and test equipment
   - Criteria for removal, disassembly, inspection, evaluation, and repair or replacement of system components
   - Testing requirements and procedures
   - Sequence and standards for reassembly and checkout
   - Knowledge and use of technical documentation.

2. A minimum of three different versions of each test item of equal difficulty shall be developed. The same test item shall <u>not</u> be used to make the second and third questions. The number of test items shall be determined by the FAA.

Continued on next page.

8. Content Requirements (continued):

3. Grouping. When more than one test item requires the use of the same test aid, such as a schematic, those items shall be grouped together and not scattered throughout the examination. When possible, items should be sequenced to follow the same progression of tasks that the examinee encounters on the job.

b. *Examination instructions*. The contractor shall develop instructions for the examiner who administers the examinations. The examinations may be administered on paper or on the CBI platform, so the instructions must be suitable for these conditions. The instructions shall include, but are not limited to:

1. General and special instructions for the examinee
2. Materials required
3. Aids furnished or allowed
4. Examination time limit. The maximum time limit for the examination. Note that examinations will vary in length according to the complexity and scope of the system/equipment. The FAA will determine the time allotted for the exam.

c. *Answer key*. The answer key must include the:

1. Correct answer for each test item in the order in which the items appear on the student test copy and referenced to documentation for correct answer.
2. Reference source of the information from which each question was developed.

d. *Study guide*. The study guide shall contain containing instruction sheets that collectively provide the examinee with the following:

- objectives
- list of references or self-help materials
- reading assignments
- problems
- practical application job steps
- self-test items
- diagram sheets
- supplementary information helpful for studying for the objectives to be covered in the examination.

Continued on next page.

9. Format Requirements:

The format for all deliverables shall be approved by the FAA. The examination and any additional instructions shall be delivered on paper and as an electronic file.

The examination items shall be multiple choice type and shall be constructed according to the following:

- Only items which call for knowledge essential to the system and/or auxiliary equipment shall be used.
- Only words with precise meaning (working language) shall be used.
- Graphics, such as sketches, diagrams, and flowcharts should be used when they present more job-like situations than do words.

10. Special Instructions:

See DID-7 for general guidelines for constructing multiple-choice test items.

The contractor should contact the Airway Facilities Division at the FAA Academy for templates and format guidelines for theory-of-operation examinations.

This ends DID-17.

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DATA ITEM DESCRIPTION (DID)-18

1. **Title:** On-the-Job Training

2. **Purpose:**
The purpose of this DID is to specify the minimum content requirements for development of on-the-job training (OJT) materials.

3. **Applies To:**
This DID is applicable to all contractors developing OJT materials, including OJT as part of a course.

4. **Description:**
OJT is a function that enables FAA personnel to apply the skills and knowledge acquired in training at their job site, under the supervision of a certified OJT instructor. The OJT course serves to document the procedural tasks. For Airway Facilities, the OJT represents an integral step in the certification process.

5. **Process:**
All OJT course materials (instructor guide, student guide, etc.) shall be developed in accordance with the approved CDG, and shall be revised when the CDG is revised or at the direction of the FAA.

Course materials shall be submitted as draft for FAA review. The contractor shall incorporate FAA comments and shall submit a revised draft of the course materials.

The contractor shall revise the revised course materials if the FAA considers it inadequate or inconsistent with the comments received during the FAA review.

6. **Source Materials:**
Sources for the OJT training materials include, but are not limited to:

- TASA
- Approved CDG
- Technical manuals
- FAA orders
- Operator's manuals
- Government furnished materials (e.g., templates, existing course materials)
- Other materials as identified.

Continued on next page.

7. Deliverables:
The deliverable is a completed OJT package with all required elements, to include OJT instructor manual and student manual.

8. Content Requirements:

a. *Cover sheet (both manuals).* On the cover sheet, identify the course title, manual designation, the edition, printing and originating office and preparation date.

b. *Training Manual.*

- Course media and strategy, objective, overview, time required, required equipment, prerequisites, safety notice, and references
- Instructions to the supervisor
- Instructions to the OJT instructor
- Instructions to the trainee
- Lesson plans which provide step-by-step procedures for conducting the OJT and provide guidance for the student to prepare for each lesson
- Evaluation checklists
- A trainee progress chart.

c. *Student Manual.*

- Basic course information as listed above
- Instructions to the trainee which include responsibilities for the training and progression through the course
- Course lessons which include step-by-step procedures for performing the OJT
- Trainee progress chart.

d. *Procedure(s).* Include the following information about each procedure in the OJT.

- Name of procedure
- Outcome of procedure
- Applicable references
- When procedure is performed
- All steps in the procedure (including the results of each step/action and any notes)
- References to procedures outlined in applicable handbook, or as specified by the FAA.

Continued on next page.

8. Content Requirements (continued):

e. The chart below identifies the six tasks that must be covered in the course.

Tasks	*Description*
Safety and coordination	Should include: • equipment specific lockout-tagout • coordination with AT and AF personnel for removing equipment from service • effects on related equipment/systems/services.
Test equipment	Should cover the types of test equipment involved in the OJT and their operation, as well as diagnostic tools, if any.
System interfaces	Covers effects on other equipment/system/services in the NAS, both local and system-wide.
System operation	Should include: • bringing system online • configuration • normal operations • startup/shutdown • emergency procedures • facility reference data file (if applicable).
Maintenance	Should include: • alignments • adjustments • preventive • corrective • maintenance management system (MMS) logging if applicable.
Troubleshooting	Covers the systematic identification, isolation, correction and repair of system faults.

f. Other tasks that may be included in Airway Facilities courses include Aircraft Accident Procedures and Flight Inspection.

Continued on next page.

9. Format Requirements:

The format for *all* materials must be approved by the FAA. Each part of the OJT materials package will:

- Have a cover page that specifies the course identification number, course title, the edition, printing and originating office, and the preparation date.
- Have a table of contents, if necessary, and
- Be delivered on paper and electronically.

10. Special Instructions:

The contractor shall coordinate with the appropriate service to determine if there are FAA templates and materials available for use.

This ends DID-18.

DATA ITEM DESCRIPTION (DID)-19

1. **Title:** Performance Examinations

2. **Purpose:**
The purpose of this DID is to specify the minimum content requirements for the performance examinations used in the Airway Facilities (AF) Maintenance Personnel Certification Program.

3. **Applies To:**
This DID is applicable to performance examinations developed for AF maintenance personnel.

4. **Description:**
AF performance examinations present a typical work situation in which personnel being tested perform a practical task demonstrating the mastery of skills and "hands-on" knowledge required for job performance.

5. **Process:**
The performance examination materials shall be submitted as a draft for FAA review. The contractor shall incorporate FAA comments and shall submit a revised draft of the exam.

The contractor shall revise the revised exam if the FAA considers it inadequate or inconsistent with comments received during the FAA review.

After the FAA validates the examination, the contractor may be required to revise the exam.

6. **Source Materials:**
Source material for development of the performance examination shall include, but not be limited to:

- TASA or other job performance analysis data
- FAA technical instruction manuals
- System specifications and handbooks
- Manufacturer's technical document.

Where applicable, the FAA will provide reasonable access to:

- The system or equipment to be covered by the examination for job task analysis
- Personnel with knowledge of the equipment in order to conduct interviews.

Continued on next page.

7. Deliverables:
The deliverable for this DID is a performance examination checklist.

8. Content Requirements:
The content requirements for each of the deliverables are outlined below.

a. *Examination.* Each section of the performance examination consists of a list of operations and sub-operations for the step-by-step administration of the examination. Each operation has a corresponding space for listing appropriate references and for operation evaluation with regards to the use of test equipment, procedure, and results.

1. The performance examination shall be comprehensive, covering not only the equipment within a system, but also auxiliary equipment considered a part of the overall system. Specific areas that may be covered in a performance examination include, but are not limited to, the following:

- Skills associated with equipment operation, including related equipment components
- Sequential operation of controls and protective components during startup, normal operation, shutdown, and abnormal or fault conditions
- Analysis of system abnormalities and determination of corrective action required
- Safety precautions to be observed
- Documentation required prior to performing maintenance
- Use of special tools and test equipment
- Criteria for removal, disassembly, inspection, evaluation, and repair or replacement of system components
- Testing requirements and procedures
- Sequence and standards for reassembly and checkout
- Knowledge and use of technical documentation.

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8. Content Requirements (continued):

2. Critical operations. Any operation is designated as critical if performing it improperly would seriously affect system operation and job success. Failure to perform any critical operation (lockout item) adequately results in examination failure. Each task's criticality is identified as:

   - Critical tasks – tasks that if not performed to standard would seriously affect system operation and job success

   - Semi-critical tasks – tasks that if performed correctly, would lead to more effective job performance. The overall system effectiveness is not substantially degraded by failure to perform a semi-critical task correctly

   - Non-critical task – tasks that are not important to the successful performance of the job.

3. Grouped operations. Operations requiring a shutdown or disruption for servicing shall be grouped in the exam. When possible, items should be sequenced to follow the same progression of tasks that the examinee encounters on the job.

4. Examination time limit. The maximum time limit for the examination. Note that examinations will vary in length according to the complexity and scope of the system/equipment.

b. *Examination instructions*. The examination instructions provided by the FAA include directions for marking and grading the examination. The contractor shall provide any instructions which fall outside the scope of those provided by the FAA.

Continued on next page.

9. Format Requirements:

The format for the performance examination shall be specified by the FAA and have at a minimum:

- have a cover page that specifies the examination identification number, examination title, a contract number, contractor name and address, and submission date
- have a table of contents, if necessary
- be delivered on paper and electronically.

10. Special Instructions:

The contractor shall contact the Airway Facilities Division at the FAA Academy for templates and format guidelines for performance examinations.

This ends DID-19.

Appendix 2

GLOSSARY

Asynchronous Classroom. Distance learning classes led by an instructor, where the students are able to "attend" at their convenience.

Camera-Ready Copy. Format for the final submission of materials that allows for high-quality reproduction, as specified in the contract for training.

Certification Authority. Substantiation that an individual possesses the minimum technical knowledge and proficiency to determine if a system/subsystem/equipment or service is capable of providing the advertised services to the user and the ability to correct malfunctions.

Certification Responsibility. The assignment of accountability for the determination of the operational status of specific systems/equipment or services and the documentation in the official facility maintenance log.

CDRL (Contract Data Requirements List). List included in a contract that states the deliverables to be submitted, the submission date for each, and to whom the contractor shall submit them.

Cognition. The process of knowing, including both awareness and judgment.

Cognitive Task Analysis. A process for determining how someone thinks and makes decisions.

Commercial Off-the-Shelf Training Materials. Commercially available training materials that are already developed and produced.

Computer-Based Instruction (CBI). A term that refers to any generalized use of computers in the training process. CBI consists of a management component, Computer Managed Instruction (CMI) and a delivery component, Computer Assisted Instruction (CAI).

Condition (of Performance). What is provided or restricted from use in the work environment (for example, tools, equipment, time). The "condition" is generally stated at the beginning of a three-part objective.

Contracting Officer. The FAA Contracting Officer provides contractual approval of deliverables and authorizes modifications to the contract.

Contracting Officer's Technical Representative (COTR). The COTR is appointed by the Contracting Officer and provides technical oversight of the contract for the Contracting Officer.

Continued on next page.

Contractor's Presentation. A step in the course design process that is used to validate course materials.

Course Design Guide (CDG). The contractor's plan for laying out the various parts of a training course that accounts for training outcomes and each objective.

Course Schedule. Depicts, in a grid format, the time allocated for each major course topic and for each lesson for each week of the course.

Criterion-Referenced Test. A test whose score can be translated into a statement about what a person has learned relative to a *standard*, not scored relative to others taking the test.

Criticality. A characteristic that indicates how essential it is to perform the task or subtask.

Data Item Description (DID). A specification of the content and format requirements of training deliverables, or products.

Deliverable. A product developed by the contractor that is required by a line item in the contract.

Difficulty. A task characteristic that indicates how hard it is to perform the task or subtask.

Enabling Objective. A three-part statement, containing a condition(s), behavior, and standard(s) used during the learning process within the course. Enabling objectives support terminal objectives and are sometimes referred to as lesson objectives.

First Course Conduct. The first presentation of a course developed by a contractor to the student population. This is the last step in the validation process.

Flowchart. A graphic representation of the sequence of steps and decisions that make up a task, a "roadmap" of the task.

Frequency. A characteristic of a task that indicates the number of times per work period (for example, shift, weekly, monthly) a task or subtask is performed.

Infrastructure. The building and equipment, and their accessibility for training, i.e., the equipment and network connections are in place so that students can reach the Web.

Instructional Designer. Individual with expertise in all phases of the instructional systems design process, including analysis, design, development, delivery, and evaluation of training.

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Contractor's Presentation. A step in the course design process that is used to validate course materials.

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Instructional Designer. Individual with expertise in all phases of the instructional systems design process, including analysis, design, development, delivery, and evaluation of training.

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Instructional Materials. Any materials that are developed or obtained to support the instruction.

Instructional Strategy. The combination of specific techniques, methods, and media used to achieve a particular training outcome.

Instructional Systems Design (ISD) Specialist. This FAA specialist provides guidance on the application of ISD processes and procedures in accordance with this Standard and other applicable training orders.

Instructional Systems Specialist (ISS). This FAA specialist provides guidance on the application of ISD processes and procedures in accordance with this Standard and other applicable training orders.

Job. A set of positions that are similar enough in the activities performed by workers or in the goals they serve for an organization to call the positions by the same job titles.

Knowledge. The use of mental processes that enables a person to recall facts, identify concepts, apply rules or principles, solve problems, and think creatively.

Learning Behavior. The part of an objective that describes the action to be performed.

Lesson Plan. A plan for a lesson that provides detailed information and technical data necessary to assist the instructor in presenting the lesson material.

Master Reproducible. A high-quality, single-sided original of a document that permits reproduction of legible copies; first generation copy of a film or videotape that allows for high-quality reproduction.

Media. The means through which the content of a learning experiences are delivered to the student.

Milestone Chart. A graphic that specifies the format and items to be included in a timeline for the development and delivery of the course(s).

Module (of Instruction). Subdivision or a block of instruction that is complete within itself (i.e., "stands alone") and can be independently taught, measured, and evaluated.

Multimedia Approach. Coordinated use of more than one type of media as a vehicle for presenting the instructional objectives.

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Contractor's Presentation. A step in the course design process that is used to validate course materials.

Course Design Guide (CDG). The contractor's plan for laying out the various parts of a training course that accounts for training outcomes and each objective.

Course Schedule. Depicts, in a grid format, the time allocated for each major course topic and for each lesson for each week of the course.

Criterion-Referenced Test. A test whose score can be translated into a statement about what a person has learned relative to a *standard*, not scored relative to others taking the test.

Criticality. A characteristic that indicates how essential it is to perform the task or subtask.

Data Item Description (DID). A specification of the content and format requirements of training deliverables, or products.

Deliverable. A product developed by the contractor that is required by a line item in the contract.

Difficulty. A task characteristic that indicates how hard it is to perform the task or subtask.

Enabling Objective. A three-part statement, containing a condition(s), behavior, and standard(s) used during the learning process within the course. Enabling objectives support terminal objectives and are sometimes referred to as lesson objectives.

First Course Conduct. The first presentation of a course developed by a contractor to the student population. This is the last step in the validation process.

Flowchart. A graphic representation of the sequence of steps and decisions that make up a task, a "roadmap" of the task.

Frequency. A characteristic of a task that indicates the number of times per work period (for example, shift, weekly, monthly) a task or subtask is performed.

Infrastructure. The building and equipment, and their accessibility for training, i.e., the equipment and network connections are in place so that students can reach the Web.

Instructional Designer. Individual with expertise in all phases of the instructional systems design process, including analysis, design, development, delivery, and evaluation of training.

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Instructional Materials. Any materials that are developed or obtained to support the instruction.

Instructional Strategy. The combination of specific techniques, methods, and media used to achieve a particular training outcome.

Instructional Systems Design (ISD) Specialist. This FAA specialist provides guidance on the application of ISD processes and procedures in accordance with this Standard and other applicable training orders.

Instructional Systems Specialist (ISS). This FAA specialist provides guidance on the application of ISD processes and procedures in accordance with this Standard and other applicable training orders.

Job. A set of positions that are similar enough in the activities performed by workers or in the goals they serve for an organization to call the positions by the same job titles.

Knowledge. The use of mental processes that enables a person to recall facts, identify concepts, apply rules or principles, solve problems, and think creatively.

Learning Behavior. The part of an objective that describes the action to be performed.

Lesson Plan. A plan for a lesson that provides detailed information and technical data necessary to assist the instructor in presenting the lesson material.

Master Reproducible. A high-quality, single-sided original of a document that permits reproduction of legible copies; first generation copy of a film or videotape that allows for high-quality reproduction.

Media. The means through which the content of a learning experiences are delivered to the student.

Milestone Chart. A graphic that specifies the format and items to be included in a timeline for the development and delivery of the course(s).

Module (of Instruction). Subdivision or a block of instruction that is complete within itself (i.e., "stands alone") and can be independently taught, measured, and evaluated.

Multimedia Approach. Coordinated use of more than one type of media as a vehicle for presenting the instructional objectives.

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On-the-Job Training (OJT). Method of training delivered at a work site.

Operational Tryout. A step in the validation process for training materials.

Performance Examination. An examination that is designed to test the technical specialist's proficiency in measuring, evaluating, testing, and determining the accuracy and suitability of using a particular type system/subsystem/equipment or service.

Position. Duties and tasks established as the work requirement for one individual.

Post-test. A test administered at the end of a course or block of instruction to determine the mastery level of the students.

Prerequisite. A course(s) that must be successfully completed prior to enrollment, or an approved screening examination that measures the level of knowledge and skills equivalent to that which could have been achieved in the prerequisite course(s).

Pretest. A test administered before training occurs to assess entry level skills.

Progress Test. A test given during the course to indicate individual student and class progress toward mastery of the course material.

Response Item. Any oral or written question to which the student responds.

Simulator. Any training device that reproduces a desired condition or set of conditions synthetically.

Skill. Proficiency, ability, or dexterity in performing a task.

Standard (of Performance). The component of an objective that states the minimum level of proficiency.

Subject Matter Expert (SME). Person responsible for assessing the technical accuracy of the instructional materials.

Subtask. A step in the accomplishment of a task.

Synchronous Classroom. Distance learning classes where the instructor conducts the training in real-time.

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Systematic Training Development Process. A systematic process for planning, analyzing, designing, developing, delivering, and evaluating instruction.

Target Population. The persons, designated in the contract, for whom instruction is developed and delivered.

Task. A unit of work that constitutes a logical and necessary component of a job.

Task Analysis. A systematic process for identifying, analyzing, and documenting the components of each task associated with a job. The analysis determines the characteristics, such as criticality, frequency, and difficulty of a task, and results in the design and development of job-centered training.

Technical Specialists. A generic title that includes, but is not limited to, electronic technicians, airway transportation system specialists, engineering technicians, maintenance mechanics, environmental support technicians, and engineers.

Technical Training Advisor (TTA). For each service a TTA will be designated by the line of business and provides for review and approval of course materials.

Terminal Objective. A three-part statement, containing condition(s), behavior, and standard(s), that represents the expected behavior of a student at the end of training.

Theory-of-Operation Examination. An examination to verify that a technical specialist possesses the knowledge of principles and theory of operation for a system/subsystem/equipment or service. Successful completion of a theory-of-operation examination indicates a knowledge level equivalent to that of a graduate of an appropriate classroom training course (formerly known as bypass or concepts examinations).

Traceability. A systematic process that cross-references the tasks selected for training in the task and skills analysis with the terminal objectives and training outcomes in the course design guide.

Training Outcome. The performance required for a job as defined in the TASA.

Validation. A process where premises are set and from which conclusions can be drawn.

This ends Appendix 2.

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Appendix 3

ACRONYMS

AF	Airway Facilities
A/FD	Airport/Facility Directory
CA	Continuous Activity
CBA	Cost/Benefit Analysis
CBE	Computer-Based Exercise
CBI	Computer Based Instruction
CDG	Course Design Guide
CDRL	Contract Data Requirements List
CMI	Computer Managed Instruction
CMR	Course Materials Reviews
CMS	Curriculum Modernization System
CO	Contracting Officer
COTR	Contracting Officer's Technical Representative
COTS	Commercial Off-The-Shelf
CTA	Cognitive Task Analysis
CMR	Course Materials Review
DID	Data Item Description
EOSH	Environmental Occupational Safety and Health
FAA	Federal Aviation Administration
GFE	Government-Furnished Equipment

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HIV/AIDS	Human Immunodeficiency Virus/Acquired Immune Deficiency Syndrome
IAW	In Accordance With
IPR	In-Progress Review
IPT	Integrated Product Team
ISD	Instructional Systems Design
ISS	Instructional Systems Specialist
IVT	Interactive Video Teletraining
MIB	Manufacturer's Instruction Book
NAS	National Airspace System
OSHA	Occupational Safety and Health Administration
OJT	On-The-Job Training
PQR	Personnel Qualifications Report
SAT	Student Achievement Test
SME	Subject Matter Expert
SMO	Systems Management Office (AF)
TASA	Task and Skills Analysis
TDP	Training Development Plan
TIM	Technical Interchange Meeting
TIR	Training Initiative Request
TTA	Training Technical Advisor
WWW	World Wide Web

This ends Appendix 3.