



EA Career Development Guide

Section 1: Introduction

Human Resources Division

Workforce Development

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Section 1: Introduction

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Introduction

As part of our strategic goal to provide Texas with the most professional transportation workforce in the United States, participation in the Engineering Assistant Career Development Program (EACDP) is a condition of employment for those in engineering positions at TxDOT.

*Engineering Assistants **hired after September 1, 2008** are expected to participate in the Engineering Assistants Career Development Program unless otherwise waived in whole or in part and approved by the Human Resources Division (HRD).*

The Career Development Program consists of four components:

- *Training,*
- *Job Rotation Activities,*
- *Mentoring and*
- *Fundamentals of Engineering (FE) and Professional Engineer (PE) Test Preparation*

This guide will discuss these elements and provide advice and suggestions to ensure your success as a future TxDOT Professional Engineer.

It has been developed in accordance with current laws and TxDOT policies and procedures. It is subject to revision based on changes to laws, policies and procedures.

Purpose and Eligibility

Purpose

One of the strengths of the Texas Department of Transportation (TxDOT) is that TxDOT offers training and professional development opportunities to our valued employees. Becoming a licensed Professional Engineer should be a career goal for Engineering Assistants within the department. TxDOT is proud to offer a Career Development Program designed specifically to guide Engineering Assistants to accomplish this goal through training, job rotation, mentoring activities, and FE/PE exam preparation.

- Three career paths are supported by this program:
- Those with an engineering or related science degree who are preparing for the FE exam.
- Engineer in Training (EIT)Professional Engineer (PE)

Eligibility

Eligibility for this program is limited to those employees who have been classified in the TxDOT Engineering Assistant job family:

[Engineering Assistant I](#) , [Engineering Assistant II](#) , [Engineering Assistant III](#) , [Engineering Assistant IV](#) , [Engineering Assistant V](#)

Exceptions may be granted by the Human Resources Division.

Participation in the program occurs upon DE/DD approval. Requests for entry into the program are submitted through the supervisor to the DE/DD. Eligibility for participation in this program requires the Engineering Assistant to:

- Possess an engineering or related science degree; OR
- Obtain an Engineer in Training certificate waiver from the Texas Board of Professional Engineers (TBPE); OR
- Pass the FE exam; AND
- Be in good standing by at least achieving overall expectations on the latest employee evaluation;
- Received no written reprimand during the last six months; AND
- Complete and sign [Form 2151](#) “EA Career Development Program Agreement”, agreeing to the program requirements.
 - Employees who participate in the Engineering Assistant Career Development Program (EACDP) will sign a Program Agreement ([Form 2151](#)). This form outlines the participant’s commitment and program conditions. Failure to comply with the terms on the Program Agreement will result in reclassification.
 - For example, program participants who have incomplete Program Agreements (Form 2151) or declined to sign the Program Agreement results in non-compliance. The supervisor and DE/DD will review the employee’s status and coordinate with HRD to reclassify the employee to another job title that is appropriate for their assigned duties as well as future participation in EACDP. Exceptions may be generated by the DE/DD and approved by HRD.

Program Progress

Employees in the Career Development Program are expected to progress through the program within the following timeframes:

- **Engineer in Training (EIT)** – Participants must achieve certification from the Texas Board of Professional Engineers (TBPE) within 2 years of the date of hire OR within 2 years of entering the program for the EIT certificate.
- **Professional Engineer** – Participants must achieve a passing PE exam score within 2 years of the first PE exam attempt.

Service Time Commitment

The participant agrees to the following service time commitments for both the FE Exam Preparation and PE Exam Preparation courses:

- Participation in the FE Exam Preparation Course (EPC101) – one year from the date of passing the FE exam.
- Participation in the PE Exam Preparation Course (EPC102 and/or 103) two years from the date of passing the PE exam.

Service time begins upon passing the most recent exam (FE/PE). The service time commitment for FE Exam Preparation Course may run concurrently with the service time commitment for PE licensure. Similarly, the service time commitments for the EA Program may run concurrently with other service time commitments an employee has with the department.

- For example, if an employee is obligated to TxDOT for 1 year after participating in the tuition assistance programs, and 1 year for the Engineering Assistant Career Development Program, the employee is obligated to only 1 year with the department.

Failure to meet the desired goals within the time allotment defined in [Form 2151](#), “EA Career Development Program Agreement”, will require removal from the program and reclassification to another job title. Exceptions may be granted by the DE/DD in consultation with HRD.

Reclassification

- Reclassification will occur when:
 - An employee chooses not to participate in the EA Career Development Program or requests to leave the program after the Program Agreement has been initiated.
 - An employee is not compliant with the Program Agreement, including but not limited to, the program progress timeframes and the service time commitment.

- The Supervisor and the DE/DD will review the employee's status and coordinate with HRD to reclassify the employee to another job title that is appropriate for their assigned duties.

- The EA Career Development Program Agreement ([Form 2151](#)) remains in effect until the commitment is fulfilled. This obligation is the same for full-time employees and those converted to part-time.

- If employees fail to fulfil their commitment, they will be required to repay the department the entire cost of the training for exam preparation assistance provided from the date the current Program Agreement form was signed.
 - Costs related to the EACDP vary from year to year and even session to session. HRD is the authority for determining the cost associated with an individual employee's participation in the program. *Typical prices associated with this training range anywhere from \$2,500 for one training session to more than \$5,000 if you attend both the FE and PE exam preparation.* These prices are slightly higher than what an individual would pay for test preparation in the civilian marketplace because TxDOT pays premium pricing to ensure all participants have access to training and resources that are typically not available to individual customers of these programs.
 - **Exceptions to the repayment policy may be made based on an individual's personal hardship. Final decisions about hardships and the amount of money that TxDOT will seek repayment for will be made by HRD in consultation with District or Division leadership. The final signature must be obtained from the Executive Director to complete an exception to repayment due to hardship.**

Reinstatement

Reinstatement into the Engineering Assistant Career Development Program after failing to meet the program goals will be upon approval of the DE/DD after coordination with the HRD and Workforce Development.

- Participants, who have been removed from the program for not passing the Fundamentals of Engineering Exam (FE) in the time allotted by the program, may be reinstated to the program only after independently achieving certification as an Engineer in Training or with a waiver of the exam by the Texas Board of Professional Engineers.
- Participants, who have been removed from the program for not passing the Principles and Practices of Engineering (PE) exam in the time allotted, will not be reinstated to the program.
- Once they pass the PE exam and are licensed as a Professional Engineer, they may apply for Transportation Engineer positions and compete for available positions.

Repayment

If employees fail to fulfil their commitment, they will be required to repay the department the entire cost of the training for exam preparation assistance provided from the date the current Program Agreement form was signed.

The EA Career Development Program Agreement ([Form 2151](#)) remains in effect until the commitment is fulfilled. The total repayment amount includes tuition and eligible expenses paid by the department for the test preparation program. Employees are also liable for reasonable expenses incurred in obtaining repayments, including reasonable attorney's fees. Employees may be reported to credit agencies for failure to repay the department.

- Costs related to the EACDP vary from year to year and even session to session. HRD is the authority for determining the cost associated with an individual employee's participation in the program. ***Typical prices associated with this training range anywhere from \$2,500 for one training session to more than \$5,000 if you attend both the FE and PE exam preparation.*** These prices are slightly higher than what an individual would pay for test preparation in the civilian marketplace because TxDOT pays premium pricing to ensure all participants have access to training and resources that are typically not available to individual customers of these programs.

The voluntary or involuntary removal of an employee from the Agency does not remove the Program Agreement. The debt to the EACDP still exists for the employee and the repayment plan is approved by the DE/DD and HRD-Workforce Development. Please contact EACDP program administrators in HRD with the participant's program file and departure date.

Reduction or Cancellation of Debt

Requests for reduction or cancellation of debt or service requirements due to hardship must be submitted for processing and action to HRD. Debt is automatically cancelled upon completion of service time commitment. The debt is not reduced proportionally to service time commitment fulfilled.

- **Exceptions to the repayment policy may be made based on an individual's personal hardship. Final decisions about hardships and the amount of money that TxDOT will seek repayment for will be made by HRD in consultation with District or Division leadership. The final signature must be obtained from the Executive Director to complete an exception to repayment due to hardship.**

Employee Transfer

[Chapter 4: Compensation](#) of the **Human Resources Policy Manual** provides guidance related to lateral transfers.

The Engineering Assistant has signed the Agreement ([Form 2151](#)), the Agreement remains in place through the transfer.

- The former DE/DD will:
 - Provide to the new DE/DD the original, signed Agreement ([Form 2151](#)) and a copy of the current Training Plan
 - Notify HRD-Workforce Development of the transfer
- The new DE/DD will:
 - Develop an updated Career Development Plan
 - Provide a copy of the updated plan to HRD-Workforce Development

Program Activities

Job Rotation Activity (JRA)

Strengthening job performance through job rotation activities is required of all employees who are participating in the Engineering Assistant Career Development Program. Waivers for the JRA must be approved by HRD-Workforce Development.

- DE/DDs or designee will initiate and monitor the EA Career Development Program Training Plan, Form 2151 FE or PE, for each Engineering Assistant in the program.
- Both the immediate supervisor and the receiving supervisor are charged with tracking and documenting the employee's participation and progress in the program.
 - The employee's immediate supervisor will document participation in the program, identify each work assignment and its duration, and submit a copy of the plan to the HRO for the employee's personnel file.
 - A copy of the Training Plan and any modifications to the Training Plan will be the program documentation will be submitted to the HRD-Workforce Development within 30 days after signature by all parties.
- The employee's receiving supervisor will handle all other personnel matters for the employee.
- Job Rotation Activities will be assigned based on business needs of the employee's work unit and the professional needs and career development interests of the employee. Employee job performance and affirmative action objectives will be among factors considered in the selection of an employee for job rotation.
- Participation in a job rotation activity is a temporary assignment, designed to familiarize employees with a variety of activities. The plan may be adjusted depending on the scheduling needs of the participating employee and the needs of the department and to facilitate career advancement.
- Rotation from one D/D to another does not affect the payroll. Participating employees remain on their hiring office's payroll.

Mentor

DE/DDs will assign a Mentor to each Engineering Assistant to provide guidance and advice to facilitate the EA's development. The Mentor and the EA will meet regularly to discuss program progress.

Field Projects

EAs will participate in a variety of field projects that will provide opportunities to visit actual projects "on the ground" and gain insight into the real production of a transportation project.

Engineering Assistant Group (EAG)

Each District/Division will establish an Engineering Assistant Group that meets regularly to discuss activities, tour projects, receive presentations on new technologies, and participate in formal training activities. These EAGs provide opportunities for peer support and networking. The name of the chair of the EAG will be provided to HRD-WFD to enable efficient communications. Austin based divisions may collaborate to establish a joint EAG.

Participants are strongly encouraged to become actively involved with the local EAG. EAGs generally meet on a monthly or quarterly basis to discuss or investigate topics and may include:

- Tours of a project
- Presentations on new technologies
- Discussions with upper level management about department activities or policies
- A tour to the state headquarters or other Districts
- Presentations by a representative of Texas Board of Professional Engineers
- Formal training exercises in preparation for the Professional Engineer Exam
- Career development opportunities presented by the Professional Development and Contracts Office
- Individual and Group meetings with the Professional Development Advisor
- A presentation on the requirements for PE licensure

Engineering Assistants may be permitted to join Engineering Assistant Groups located in districts or divisions that are not designated as their “home” district or division should there be too few EAs locally to form an Engineering Assistant Group.

The Engineering Assistant Training Plan

Each EA will be advised upon assignment to the Engineering Assistant Career Development Program with regard to the scope and responsibilities associated with the program. A Training Plan will be designed specifically for each participant outlining the expectations for activities associated with career progression, training, and job rotation.

The Training Plan is a dynamic document that defines the coursework and training activities the EA is expected to attend over the term of the program. The training plan also includes job rotation activities. This plan is reviewed annually (at a minimum) and modified as circumstances and business needs change.

Training

HRD-Workforce Development will provide formal training to assist in the successful completion of the Career Development Program. Instructor-led classes and on-line classes are available as part of this program. WFD will also provide access to an Engineering Assistant Career Development SharePoint page where program information, resources, and advising will be available.

Exam Prep Courses

When discussing the Program Agreement, [Form 2151](#), the supervisor and employee will determine the best time to sit for the FE/PE exam. Once approved by the supervisor, the employee will be assigned to the most appropriate exam prep class(s) prior to the FE/PE examination.

- EPC 101 – Exam Prep for Fundamentals of Engineering Exam
- EPC 102 – Exam Prep for PE Breadth Exam
- EPC 103 – Exam Prep for PE Depth Exam

EAs must attend all preparation course sessions while in the Engineering Assistant Career Development Program, including repeating the exam prep courses when the EA has failed the prior exam. ***Exceptions or waivers from prep courses may be authorized only by the DE/DD.***

The preparation courses are intended for the Civil discipline. EAs requiring preparation for exams other than Civil Engineering will coordinate attendance through HRD-Workforce Development as approved by the participants DE/DD

Career Progress and Licensing

In Texas, the Professional Engineer license is awarded by the Texas Board of Professional Engineers (TBPE). Failure to become licensed may severely limit your potential career growth within the department, regardless of the scope of your experience. This program supports both your development as an Engineer in Training (EIT) and preparation for licensure as a Professional Engineer (PE).

Work experience and licensure as a Professional Engineer are key elements in achieving your engineering career goals at TxDOT. For the purpose of licensing, the key elements in determining the acceptability of your experience include:

- Experience that demonstrates a clear use of your engineering knowledge, engineering education, and engineering judgment to perform the task.
- Demonstrated progressive and an increasing standard of quality and responsibility.
- In most cases, someone doing civil engineering work would have to be doing so under the supervision of a PE unless they are in an exempt industry.

There is no requirement that the experience be in one discipline; however, it is expected that you would take the PE exam in the area in which you have practiced.

TxDOT Engineering Job Profiles

Career Paths: <http://crossroads.org/hrd/Jobs/Job-Profiles/main.asp>

Contact Information

Human Resources Division
Workforce Development
200 E. Riverside Drive, 2nd Floor
Austin, TX 78704

Professional Development Administration:

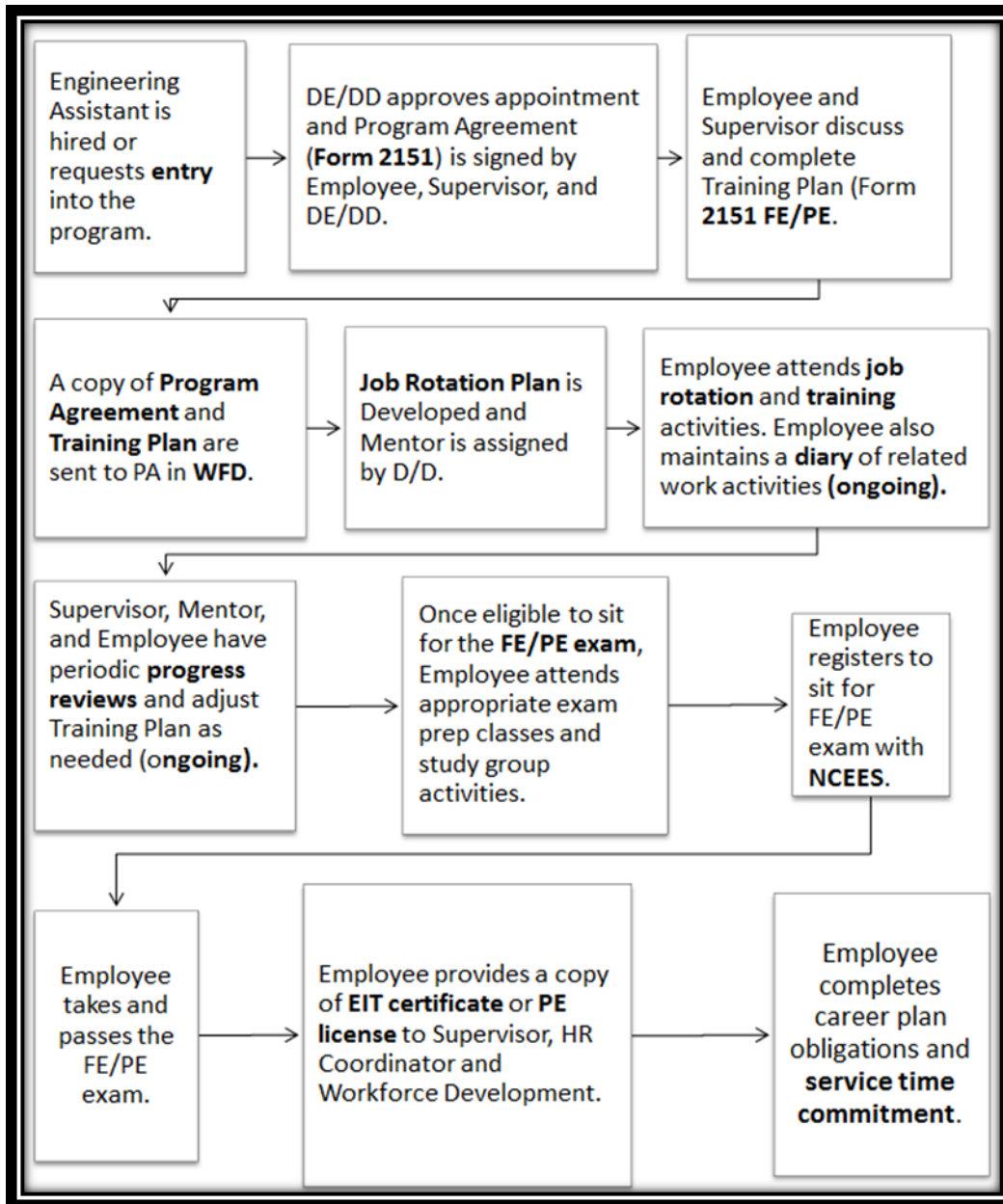
Please contact HRD-WFD staff listed below for information regarding Professional Development of EACDP

Lauren Miller, Program Administration	(512) 416-2000
Katie Salter, Training Operations	(512) 416-4628
Chris Young, WFD Director	(512) 486-5475

Terms Used in this Guide

Agreement	TxDOT Form 2151, FE/PE Engineering Assistant Career Development Program Agreement.
Career Development Program Training Plan	The TxDOT form that defines specific courses and activities in which the Engineering Assistant will participate throughout the career development program.
Community of Practice (CoP)	The process of social learning that occurs when those with a common interest in a subject or problem collaborate over an extended period of time to share ideas, find solutions, and build innovations.
DE/DD	District Engineer/Division Director
EA	Engineering Assistant (EA) is a designation used in the business job description for an employee performing engineering support duties for the department.
EAG	Engineering Assistant Group - Local group of EAs who meet on a regular basis for program updates, training, and networking.
EIT	Engineer in Training (EIT) is a designation by the Texas Board of Professional Engineers given to individuals who meet the educational requirements of the Board and have successfully passed the examination on the Fundamentals of Engineering. This certification does not entitle an individual to practice as a Professional Engineer.
Job Rotation Activity (JRA)	Activities and assignments that are included in the career development program used to strengthen job performance.
Mentor	Adviser or coach assigned to the Engineering Assistant to provide advice and counselling support during the program.
NCEES	National Council of Examiners for Engineers and Surveying http://www.ncees.org/ is a national non-profit organization of engineering and surveying <u>licensing boards</u> representing all states and U.S. territories. NCEES develops, scores, and administers the examinations used for engineering and surveying licensure throughout the United States. NCEES is an accredited standards developer with the American National Standards Institute (ANSI).
PDA	Professional Development Advisor
PE	Professional Engineer
SER	Supplementary Experience Record – Report included in the application for Professional Engineer examination that summarizes the Engineering Assistant’s experience.
TBPE	Texas Board of Professional Engineers - Agency overseeing licensure of engineers in Texas http://www.tbpe.state.tx.us/index.htm .
Training and Education	Used generally to indicate classes, on-line courses, and other activities to enhance the Engineering Assistants’ knowledge of particular topics related to engineering.
WFD	Workforce Development Section of the HR Division.

Engineering Assistant Career Development Guide Activity



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EA Career Development Guide

Section 2: Responsibilities

Human Resources Division

Workforce Development

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Section 2: Responsibilities

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Employee

Employees who participate in the Career Development Program will be classified as an Engineering Assistant (EA), unless otherwise designated by an exception by the DE/DD and HRD. While in the Career Development Program, EAs obtain a variety of opportunities like JRA, participation in field projects, EAG meetings, FE and PE exam preparation, training, mentoring, and professional development advice. While all of these tools and opportunities are available, EAs are ultimately responsible for their own professional growth.

- Employees who participate in the Engineering Assistant Career Development Program will be required to:
 - Sign a Program Agreement (TxDOT [form 2151](#)). The supervisor and DE/DD will also sign this Agreement.
 - Develop, with their supervisor, an individualized training plan (Form 2151 FE/PE) that defines training and job rotation activities.
- The Program Agreement outlines and summarizes the following:
 - The EA's commitment to attend all required training and job rotation activities.
 - The conditions for noncompliance with the terms of the Agreement Service time commitment.
 - The Engineering Assistant is required to attend all exam prep class sessions, mentoring appointments, and job rotation assignments defined in the Training Plan.
- Upon receipt of the FE/PE results, the Engineering Assistant will provide a copy to the supervisor, HRD Coordinator, and HRD-WFD
- The employee must maintain good standing with the department. Employees who fail to maintain eligibility may be suspended from the program. Reinstatement must be requested from and approved by the DE/DD.
- The EA must comply with the department's Ethics Policy, avoid the appearance of unprofessional behavior, and report any questions to the supervisor. The policy may be found on the TxDOT website at http://crossroads.org/hrd/ethics/ethics_policy-03282013.pdf
- The EA must work with the supervisor to initiate a new [Form 2151](#) for the PE exam within 30 days passing the FE exam.

Supervisor

The direct supervisor of an EA is critical to the development and timely progression of each EA. Supervisors of EAs should be in close contact with the EA and actively participate in the Engineering Assistant Career Development Program.

Below are some of the activities in which supervisors will take part:

- Meet briefly on a regular basis with their EAs to touch base with any issues, concerns or challenges that are immediately facing them.
- Meet formally on a monthly or quarterly basis with their EAs to review their progression in the EA program to include:
 - Escalating issues that need to be handled at a higher level.
 - Review the diary of the EA to ensure they are capturing the required documentation that will be needed for the preparation of their SER when applying to take the PE examination.
- Ensure EAs are attending regular meetings with their assigned Mentor.
- Ensure their EAs are attending EAG meetings and activities on a regular basis.
- Ensure EAs are enrolled in and attend the formal training that is required, including the exam prep courses scheduled prior to the FE or PE examinations. All sessions must be attended, including those required when the EA fails the prior exam.
- Perform a debrief with the EA when returning from a training event to assess their comprehension level of the material and to determine if additional on-the-job training may be delivered to augment the formal training.
- Provide opportunities for the EA to practice skills learned in formal training events.
- Meet quarterly with the Mentor to discuss EA's activities in the program.
- Work with the EA to initiate a new Form 2151 PE within 30 days of the Engineering Assistant's successful completion of the FE exam.

Mentor “A Trusted Counselor or Guide”

What is Mentoring?

Mentoring is an informal practice where someone that is more experienced shares experiences with those who are less experienced. You will find that you have greater rapport with some persons more than others. Therefore, you will probably develop mentoring relationships with several people during your years with TxDOT. And, in turn, you will probably serve as a Mentor to less experienced employees.

Each participant in the Career Development Program will be assigned a Mentor to support them during the program. The Mentor will be an experienced TxDOT engineer who has been trained to guide the Engineering Assistant through the program and provide insight into technical and professional situations that may arise over the course of a career in engineering. The Engineering Assistant - Mentor relationship is designed to serve as a foundation of trust and guidance.

In addition, informal mentoring is encouraged in the EA Career Development Program. Informal mentoring can take place through interaction with experienced senior staff, immediate Engineering and payroll supervisors, and fellow EAs.

Mentoring Opportunities

Following are some suggested opportunities for developing your career using a Mentor:

- **Experienced employees:** Recognize that the people around you have specific strengths, and you can learn from them. One of the best places to look for Mentors is among the senior engineering staff. Many of you will be assigned to work with a technician when you first arrive; there is a reason for this! Make note of the senior engineering technicians who have design, maintenance, construction, laboratory, or administrative expertise. Learn as much as possible from these people and respect the knowledge they have acquired through experience.
- **Immediate engineering supervisor and payroll supervisor such as the Area Engineer (AE):** Part of this person's job is to provide a learning and working environment for employees. This Professional Engineer can provide tremendous insight into the things that will help you progress within the department. As Mentors, they can also assess your work habits and help you make good career decisions.
- **Fellow EAs:** You will be amazed at how much information you can obtain from each other, especially when you share information from Mentors outside your immediate circle.

- **Formal Mentoring:** DE/DDs will develop formal mentoring programs within their organizations by appointing Mentors for each EA and establishing an Engineering Assistant Group (EAG). These EA groups usually include a sponsor, EAs, other employees potentially eligible for licensing as a Professional Engineer, and newly licensed (usually less than two years) engineers.

The mentoring component of the EA Career Development Program provides numerous benefits to the TxDOT organization including:

- Accelerated and improved on-boarding processes for new or inexperienced engineers.
- Improved morale and employee satisfaction via a positive and supportive organization that fosters personal and professional development.
- Enabled knowledge sharing, transfer, and retention.
- Broader understanding of roles, responsibilities, and expectations.
- Increased productivity and job performance through shortened learning curves and better prepared staff.
- Improved quality through consistent adherence to policies, procedures, and methods.
- The District/Division will appoint a formal mentor to each Engineering Assistant. An experienced engineer will be assigned to provide guidance and advice to facilitate the EA's development. The Mentor is not the Engineering Assistant's supervisor.
- The Mentor will meet regularly (usually monthly or quarterly) with the Engineering Assistant to discuss current projects and be available to respond to inquiries about the profession of engineering.
- Specific questions about projects are referred to the supervisor or project manager.
- The Mentor will maintain records to document discussions with the Engineering Assistant. These records will be made available to the EA, the supervisor, and to the DE/DD.
- The Mentor will meet quarterly with the EA's supervisor to provide progress reports and seek assistance and guidance as appropriate.

District Engineer/Division Director

The DE/DD is responsible for providing guidance and other support for the EA and their progression through their career development program. The DE/DD plays an active role in the program and must approve each EA's participation. Additionally, the DE/DD will approve program exceptions and waivers.

Workforce Development

The Workforce Development Section is responsible for providing program oversight and instructional support. WFD provides a variety of courses and other training opportunities that support the EA's advancement and ultimate success in the EA Career Development Program.



EA Career Development Guide

Section 3: Professional Development Advisors

Human Resources Division

Workforce Development

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Section 3: Professional Development Advisors

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Professional Development Advisors

Professional Development Advisors (PDAs) are engineers who will provide assistance through the engineer groups at the Districts and Divisions. They are available to review Supplementary Experience Records (SER), provide career advice, and act as coaches and Mentors for those who are pursuing engineering careers.

The PDAs provide the following support:

- Perform Supplementary Experience Record (SER) reviews.
- Individual and group coaching and guidance intended to provide a foundation for professional development of the Engineering Assistant.
- Meet with Engineering Assistant Groups and advisors to provide guidance and suggestions for activities.
- Provide guidance via e-mail or telephone to EAs' inquiries. Provide tutorial services for exam preparation.

PDA Assignments

Contact HRD-Workforce Development for the most current PDA assignments.



EA Career Development Guide

Section 4: Test Preparation Program

Human Resources Division

Workforce Development

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Section 4: Test Preparation Program

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Overview

Training is a crucial element in your progress as a TxDOT engineer. Training can best be defined as an activity that is designed to improve immediate TxDOT job performance by achieving specific learning objectives. In other words, training increases skills and competence and teaches the "how" of a job. It also prepares you for the Fundamentals of Engineering exam and/or the Principles and Practices Exam.

In-depth, instructor-led training to prepare EAs to take and pass the Fundamentals of Engineering (FE) examination or the Principles and Practices (PE) examination are included in the program.

Prior to the exam:

- EAs, who participate in the exam preparation classes, will be afforded a minimum of 2 hours of study time per week at their duty station for the 6 months prior to exam.
- EAs, who participate in the exam preparation classes, will be afforded 40 hours of study time at their duty station the week just prior to the exam.

A number of core courses that are appropriate for all employees in the Career Development Program have been identified. These courses range from ethics and homeland security to plans and specifications. Additional courses are intended to enhance performance for actual work as an Engineering Assistant; others are knowledge based courses that provide specific information related to a particular discipline.

It is recommended that EAs take 100 hours of training a year for the first four to five years at TxDOT.

Training vs. Education

Training should be distinguished from education. Education concentrates on global learning in a particular topic such as hydrology or structural design. Training may cover the same topics, but it focuses on teaching you the specific skills, such as calculating flow rates using HEC-1, or determining stresses in concrete beams using finite element analysis.

EAs new to TxDOT can adapt to the work environment more quickly by taking TxDOT sponsored training. TxDOT training courses are offered in specific areas such as planning, project development and design, construction, maintenance operations, traffic operations, management, and staff development.

PE Licensure

The preparatory training for the exam is needed to further prepare those employees who may have not been in an academic setting for several years. This preparatory training includes breadth-and-depth topics contained in the PE examination as test taking strategies and techniques. NCEES lists the topics covered by this exam. <http://www.ncees.org/>

In preparation for the FE exam, participants will take:

- EPC 101 – Exam Prep Course for the Fundamentals of Engineering Exam

In preparation for the PE exam, participants will take the following courses:

- EPC 102 – Exam Prep Course for the Principles of Engineering Breadth Exam
- EPC 103 – Exam Prep Course for the Principles of Engineering Specialty Exam or equivalent courses

Please visit TBPE website for more information.

Recommended Professional Development

Following is a list of TxDOT courses that may assist you in your continuing education while preparing for the Fundamentals of Engineering or the Principles and Practices of Engineering exams. The courses are listed by discipline and are defined as knowledge based or performance based courses.

Core courses are those that Engineers in Training should take (exceptions may apply depending on the individual career progression).

Knowledge based courses are those that provide a fundamental education related specifically to the discipline being studied.

Performance based courses are those that are concentrated on carrying out actual work.

It is recommended that you blend knowledge and performance based courses throughout your preparation for the exams and that you make a habit of continued learning throughout your career. Should you need assistance in selecting your courses, contact Workforce Development at training@txdot.gov

Some Districts/Divisions have developed training programs specifically for their operations, and every EA is given training in accordance with their Plan. Several factors, including course availability, course location, work load, course subject matter relative to your level of expertise, etc. may affect your supervisor's determination in this matter. It is recommended that you develop a plan with your supervisor to schedule and arrange for taking courses in your Training Plan. This will allow you to have a guideline and timeline to follow in taking TxDOT or other applicable training. Enrollment in any training course requires the approval of your supervisor.

TxDOT maintains a record of all training taken in ELM, and you may request your training history at any time from your training coordinator or email training@txdot.gov.

How to Enroll in Training Courses

1. Sign in to PEOPLESOFT, then Training & Development at <https://elm.txdot.gov>
2. Click on "Find Learning" under Quick Links
3. Search by Class Code
4. Click on "Enroll Now"
5. You will receive a confirming email after your supervisor approves the course

Course Listings

The following tables include a listing of those courses that may be helpful for you during your preparation for the Fundamentals of Engineering exam. You should work with your supervisor to select those courses that best fit your career goals. The courses should be included in your Training Plan.

Core Courses	
DES109	Plans, Specifications & Estimates Package
DES111	Introduction to Roadway Design
DES116	Introduction to Highway Project Development
DES730	GEOPAK I
EL2172	Business Ethics
GEO101	Basic Geotechnical Engineering for Roadways
MNT400	Homeland Security Training
TRF203	Risk Management and Tort Liability
TRF502	Designing Work Zone Traffic Control Plans
CON116*	Critical Path Scheduling – Construction*
SFH401	Focus on Safety IV
To be taken prior to exam preparation cycle or Testing for PE Exam:	
<i>DES102</i> <i>(5 months before)</i>	Design Concepts from AASHTO
<i>TRF110</i> <i>(5 months before)</i>	Highway Capacity
<i>TRF701</i> <i>(5 months before)</i>	Roadside Design

All Disciplines			
Knowledge		Performance	
EL1105	Storm Water Pollution Prevention	DEV216	Leadership One
DEV415	Introduction to Project Management	EL7477	Customer Service: Building Rapport in Customer Relationships
DEV416	Managing Multiple Priorities	DEV300	Enhancing Your Presentation Skills
DES116	Introduction to Highway Project Development	EL7614	Negotiating with Your Customer
ENV103	Storm Water Pollution Prevention Plan	CTR106	Negotiating TxDOT Contracts
EL4006	ENV Reporting Training – Community Impacts	EL7305	Forming Peer Relationships and Alliances
TRF520	Work Zone Traffic Control	EL7596	Building Relationships Through Understanding
ENV300	Stormwater Erosion & Sediment Control - Day 1	EL2172	Business Ethics
ENV301	Stormwater Erosion & Sediment Control - Day 2	EL3516	Customer Interactions
ENV402	Public Involvement in Transportation Decisions	EL7481	Customer Service Confrontation and Conflict
		EL7241	Working with Difficult People: Identifying Difficult People
		EL7242	Working with Difficult People: How to Work with Aggressive People
		EL7243	Working with Difficult People: How to Work with Negative People
		EL7244	Working with Difficult People: How to Work with Procrastinators
		EL7245	Working with Difficult People: How to Work with Manipulative People
		EL7246	Working with Difficult People: How to Work with Self-Serving People
		EL7247	Working with Difficult People: Dealing with Micromanagers

All Disciplines (cont.)			
Knowledge		Performance	
	EL7531	Writing for Business	
	DEV116	7 Habits of Highly Effective People	
	EK7531	Writing for Business	
	DEV119	Training Basics for Trainers	
	EL3061	Collaborating and Sharing Presentations in PowerPoint 2010	
	EL7229	Communicating a Shared Vision	
	EL7320	Leading Teams: Building Trust and Commitment	
	MNT123	Maintenance Section Supervisors Course	

Lead Worker and Up in Classification			
Knowledge		Performance	
		DEV115	Practical Supervision
		DEV220	Progressive Discipline
Fundamentals of Engineering			
Knowledge		Performance	
MNT414	Construction Thin Asphalt Overlay		

The following table includes a listing of those courses that may be helpful for you during your preparation for the Principles and Practice Exam, including the specialty exam.

Construction			
Knowledge		Performance	
DES102	Design Concepts from AASHTO	TRF502	Design Work Zone Traffic Control Plans
DES601	Basic Hydrology and Hydraulics	TRF520	Work Zone Traffic Control
DES116	Introduction to Highway Project Development	DES730	GEOPAK I
CON116	Critical Path Scheduling – Construction	DES731	GEOPAK II
DES111	Roadway Design	GEO201	Drilled Shafts - NHI course
DES109	Plans, Specifications and Estimates Package	TRF203	Risk Mgmt. and Tort Liability
DES608	Culvert Design	GEO101	Basic Geotechnical Engineering for Roadways
GEO101	Basic Geotechnical Engineering for Roadways	PLN210	Plan Work Zone Traffic Control
DES602	Urban Drainage Design	DES110	ROW Considerations During Project Dev & Design
DES108	Urban Street Design	CON105	Intro to CST / MNT Inspection
TRF201	Introduction to Traffic Operations	CON118	Construction Contract Administration
DES106	Freeway Design and Operation	CON303	Bridge Deck Workshop
DES119	Preliminary Design Process	GEO202	Soils and Foundations Workshop
TRF110	Highway Capacity Analysis	CON500	Site Manager Inspector Field Reporting
TRF301	Traffic Signal Design	CON501	Site Manager Contract Administration
CON128	PMIS Basic Concepts		
MNT123	Maintenance Section Supervisor Course		
MNT414	Const Thin Hot Mix Asp Overlay		
CON411	Inspect of Flexi Base & Embank		

Design			
Knowledge		Performance	
EL5010	Curb Ramps/Blended Transitions	DES122	Designing for Pedestrian Access
EL5011	Handrail Essentials	DES606	Watershed Modeling Using HEC- HMS
DES106	Freeway Design and Operation	CTR615	Consultant Management/Administration
DES108	Urban Street Design	DES731	GEOPAK II
DES110	Right of Way Considerations	GEO201	Drilled Shafts - NHI course
DES119	Preliminary Design Process	DES738	GEOPAK Drainage
DES601	Basic Hydrology & Hydraulics	DES739	Intro to ArcGIS – ArcView
DES602	Urban Storm Drain Design	DES740	GPS / RTK Survey
DES604	Culvert Analysis and Design	DES803	Fracture Critical Inspection
DES607	Urban Drainage Design from NHI	TRF701	Roadside Safety Design
DES608	Culvert Design from NHI	PLN302	Highway Program Financing
DES808	Practical Highway Hydrology	GEO202	Soils and Foundations Workshop
TRF318	Intersection Section Workshop		
DES816	Design of Mechanically Stabilized Walls		
DES804	Safety Inspection of In-Service Bridges		
DES805	Stream Stability / Scour at Highway Bridges		
DES807	Stream Scour Instability – Countermeasures		
DES802	HEC-RAS River Analysis System		
PLN210	Planning Work Zone Traffic Control		
TRF201	Intro to Traffic Operations		
MNT703	Seal Coat Planning and Design		

Structures and Bridge			
Knowledge		Performance	
DES804	Safety Inspection of In-Service Bridges	DES803	Fracture Critical Inspection
DES805	Stream Stability / Scour at Highway Bridges	MNT801	Bridge Maintenance Training – NHI
DES807	Stream Scour Instability – Countermeasures	CON303	Bridge Deck Workshop
DES802	HEC-RAS River Analysis System		
BRG100	Bridge Construction Inspection		
BRG200	Bridge Inspection Refresher Training		
GEO201	Drilled Shafts - NHI course		

Maintenance			
Knowledge		Performance	
PLN210	Planning Work Zone Traffic Control	MNT702	Seal Coat Inspection & Applications
MNT703	Seal Coat Planning and Design	MNT801	Bridge Maintenance Training – NHI
		TRF701	Roadside Safety Design

Traffic			
Knowledge		Performance	
PLN210	Planning Work Zone Traffic Control	TRF701	Roadside Safety Design
TRF301	Traffic Signal Design	PLN302	Highway Program Financing
TRF201	Intro to Traffic Operations		

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EA Career Development Guide

Section 5: TxDOT EA Job Rotation Activity

Human Resources Division

Workforce Development

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Purpose

The Job Rotation Activity(JRA) is a documented part of the Career Development Program and is required of all participants in the Career Development Program; exceptions or waivers of JRAs must be approved by the Executive Director or designee.

The Job Rotation Activity is intended to provide exposure to a variety of realistic job activities that engineers are likely to encounter throughout their career. Supervisors and EAs work together to define those job rotation activities that best fit with the overall career goals and the business needs of the department. The Mentor also provides recommendations to the DE/DD who is implementing the JRA.

EAs may be hired in Districts and Divisions. Experience and work activities vary significantly between the assigned DE/DD. The following procedures are presented separately as typical District assignments as well as those at the Divisions. Individual DE/DDs may modify the JRA to combine parts of the District and Division model in order to maximize the program's benefits when those opportunities are available.

The job rotations are in addition to training and mentoring activities and are intended to prepare the Engineering Assistant to pass the PE exam and to be a good TxDOT Engineer.

The JRA is not a contract of employment. It is a program for TxDOT leadership to use in developing EAs through varied job assignments that provide progressively responsible engineering assignments.

Program Description

The DE/DD that hires the employee shall be responsible for implementing the JRA. A senior staff member may be assigned to monitor and implement the JRA for the DE/DD; however, the DE/DD will remain responsible for implementation and effectiveness of the JRA. DE/DDs that do not have a Deputy, may assign the staff member who is responsible for the DE/DD in their absence as the implementing officer.

- EAs that become licensed by the TBPE as a Professional Engineer (PE) while they are employed at TxDOT are expected to continue in the JRA until completion of their Career Development Program.

Participation in the JRA requires that the JRA participant work toward maximizing the benefits of the program while the DE/DD and Mentor work together with the Engineering Assistant toward supporting the benefits. The DE/DD, the participant, and the Mentor work to accomplish business needs during the entire JRA time period.

Engineering Assistant Job Rotation and Mentor Program Procedures

Assignment descriptions and durations in the JRA presented in this guide should be considered as recommendations. The JRA will be implemented at the time of assignment to the position and regularly monitored by the DE/DD to ensure that business needs are met and the JRA participant's experience is accomplished as effectively as possible. The JRA should maximize the effectiveness of participant's experience and professional development. It should also be used to accomplish business needs considering activity levels and assignments that are available at the participant's district or division during the participant's assignment to the JRA.

The JRA assumes that participants will continue in the JRA for up to 24 months after receiving their PE license. Mentors and DE/DDs are encouraged to consider assignments after PE licensure that maximizes professional engineering development opportunities. They may also consider sending participants back to assignments they experienced before PE licensure. Assignments after PE licensure have the potential to provide a significantly different experience by the JRA participant than those assignments made before receiving their PE license. Assignments before PE licensure are more likely to provide knowledge and work in support of experienced personnel. Assignment after PE licensure may open important opportunities for more complex and more responsible experience levels.

Experience

Preferred Departmental Experience (Job Rotation)

To prepare for a career in transportation, EAs should pursue experience opportunities in several areas of operations. It is difficult to formulate a single job rotation program that applies equally for EAs in large Districts, small Districts and Divisions. Workload, size of the work group, and distance between work areas also impact job rotation models. However, the following summary may be used as a guide. In an AE's office, this experience may be accomplished through diversified assignments within a single office.

Design and Analysis Experience

Most experience acceptable for licensing purposes falls into one of two categories: Design or Analysis. The common denominator in **Design** is the selection and use of recognized engineering principles and methodology to determine a solution to a problem. Examples of these experiences include:

Geometric design	Hydraulics design
Geotechnical design	Structural design
Plans, Specifications, & Estimates (PS&E) preparation for highway construction plans	Construction Maintenance Change Orders
Traffic operations design (signal, signing, striping, etc.)	Pavement design
Traffic Control Plans	Earth and roadside design
Bridge layouts	Rest Area design

Common features of **Analysis** activities include the use of mathematical modeling and data collection techniques to assess a problem or improve a process, and the act of making a learned recommendation based on analytical findings. Examples of this type of experience include:

Evaluation of hydraulic studies, traffic studies, structures analysis	Congestion or pavement management activities
Interpretation or laboratory results	Safety or accident analysis
Review of plan work for appropriateness of design and conformance with standards	Maintenance
Repair Analysis	

Other Experience Acceptable for Licensing

Although design and analysis activities are the most common activities for licensing purposes, there are other types of experience acceptable to the PE Board. These include: **construction inspection, maintenance operations, planning, and laboratory activities**. Although these activities are beneficial to your career development, these duties are often performed by technicians.

Supervisory Work

Supervisory work is great experience and should help you advance in the department, but it is not necessarily engineering. **Only the practice of engineering activities** that are related to design and analysis are considered engineering. **However**, supervisory experience **may** be acceptable to the PE Board. The Engineering Practice Act requires that an applicant be "competent to be placed in responsible charge of engineering work". The best way to show that you are capable of this responsibility is to have been in charge of such work. When submitting your application to the Board, you should mention when you are in a supervisory role, but emphasize those activities that focus on design and analysis.

District Job Rotation Activities

The sequence of job rotation activities is not required to follow any specific order. The order of assignments should consider business needs, DE/DD activity levels, project schedules, and prior experience of the JRA participant. The minimum duration of an individual assignment should be the time it takes to accomplish the recommended experience activities.

Summary of Job Rotation Activity Durations

Following is a summary of recommended job rotation activities while enrolled in the Career Development Program. These recommendations are suggestions based on years of experience at TxDOT and serve as an avenue for successful preparation for the exams.

	Core	Elective	Recommended DURATION
Construction & Lab	X		12 - 24 Months
Maintenance Operations	X		6 - 12 Months
Design (Project Development)	X		12 - 24 Months
Traffic Operations	X		6 - 12 Months
Administration**		X	0.5 - 2 Months
Total			34 - 57 Months Total*
**may be completed after licensure as a PE			<i>*Minimum 36 Months Total</i>

Administration and Support Areas

	Recommended	Elective	Comments
Budgeting	X		
Voucher System		X	
Human Resources	X		
Purchasing		X	
Warehousing		X	
Information Systems	X		
Public Information Office	X		

2 weeks to 2 Months in duration.

Administration experience may be most beneficial either close to the time the EA takes the PE exam or shortly after licensure. This assignment may take place during or concurrent with another rotation assignment because it is short in duration. It should take place after the EA has gained approval of their SER from the TBPE so that the duration of this assignment does not hinder or delay award of PE license.

Participants should gain experience in the administration and support area. The EA will be exposed to budgets, contracts, vouchers, human resource activities, purchasing, warehousing, information systems, public information, open records, and the equipment shop.

Recommended Training Topics:

- Budget related
- Policy
- Human Resources
- Management
- Contract Management

Construction and Laboratory

	Recommended	Elective	Comments
Inspection	X		Should include an assignment as Chief Inspector
Record Keeping	X		Should include exposure to Site Manager
Daily Diary	X		
Lab	X		May be at District or Area Office Lab

12 – 24 Months in duration. Includes approximately 3 Months in Lab.

EAs should be assigned to construction projects in an Area Office for 12 to 24 months, including assignment to the Laboratory for approximately 3 months. Personnel assigned to the District Headquarters should be reassigned to an Area Office for their construction experience. During this assignment the EA will obtain experience in both construction inspection and construction records keeping. Record keeping activities should include experience using SITEMANAGER in (a) Daily Work Reports (DWR), (b) the estimate process, (c) change order process, and (d) tracking material sources. The EA will keep a diary on a project and possibly serve as a Chief Inspector. The EA should participate in basic certifications of TxDOT Inspector Development Program.

During this assignment, the EA may spend up to 3 months in the laboratory. This can be done at either the Area Office or the District laboratory. Accomplishment of certifications that are preferred but not required include Nuclear Density Certification and Concrete Certification for inspectors.

Desired Materials Testing Experience:

Assist in Hot Mix Testing

(AC Content, Gradation, Lab Molded Density, Roadway Density);

Soils and Aggregate Testing

(Wet Ball, Atterberg Limits, Triaxial, Soundness, Gradation);

Concrete Testing

(Slump, Air Entrainment, Unit Weight, and Strength)

Recommended Training Topics:

Inspections

(Concrete, Hot Mix, Bridge, etc.)

Construction/Maintenance Project Management

Administration

Materials Engineering and Soil Technologies

Site Manager

Design (Project Development)

	Recommended	Elective	Comments
Roadway Design	X		
Environmental	X		Should include exposure to Findings of No Significant Impact (FONSI), Categorical Exclusion (CE), nationwide permits, and Stormwater Pollution Prevention Plans if possible.
Bridge Design		X	
ROW/Utility	X		May include researching property owner records, determining type of property interest, assist in valuation process Assist in some aspects of eminent domain activities. This experience should also include exposure to the development and/or monitoring of projected and actual ROW budget expenditures
Advanced Planning	X		The EA should develop schematics, preliminary estimates, be involved in the TIP process, participate in public involvement and write a Feasibility Study if possible
Consultant Management	X		
Surveying		X	

18 – 24 Months in duration.

Project Development experience is broken into several activities with recommended areas of assignment and experience. The sequence of assignments in the Project Development area should be made to maximize the experience and exposure of the EA to the variety of transportation activities while also accomplishing business needs.

Environmental – The EA should prepare, assist with the preparation, or otherwise be exposed to environmental documents that include: Categorical Exclusion (CE), Environmental Assessment (EA), Environmental Impact Statement (EIS), Nationwide permits, Municipal Stormwater (MS4) Permits, and Storm Water Pollution Prevention Plans (SW3P).

Right of Way (R/W) – The EA may be involved in the following elements during their R/W experience: Assist with researching property owner records; determine what type of property interest exists; assist in the valuation or review appraisal process; and prepare R/W documents such as metes and bounds, parcel plats, and R/W maps.

The EA may also assist in some aspects of eminent domain activities. This experience may include exposure to the development and/or monitoring of projected and actual R/W budget expenditures.

Utility Adjustment Process - The EA should receive experience in determining the need for a utility adjustment; developing options to avoid or minimize conflicts; determining the need and appropriate level for a Subsurface Utility Engineering surveys; preparation and review of maps for a proposed utility; determining reimbursable adjustments; and developing reimbursement ratios; reviewing plans, specifications, and estimates to ensure compliance with TxDOT policy; preparing documentation for approval of work before adjustment can begin; monitoring the adjustment process for compliance to the Utility Accommodation Policy.

Boundary Surveying – If the opportunity exists, the EA may be assigned to assist in analyzing information and determine deed lines and ROW lines; stake ROW; and prepare ROW maps (plats and property descriptions).

Construction Surveying – The EA may be assigned to obtain design plans, locate control points, calculate control layout, shoot grades, reduce grades, mark layout stakes, check layout stakes to verify against proposed plans and take cross-sections of channels or roadways.

Advance Planning – The EA should be assigned to develop a schematic (geometric layout), prepare preliminary estimates, be involved in the TIP process, participate in public involvement and write a Feasibility Study.

Engineering Consultant Contracts – The EA should be involved in the price negotiation or the consultant selection processes.

Bridge – The EA should be involved in one or more of the following elements when available: bridge layout, retaining wall layout, structural analysis, shop drawing review, consultant plan review, bridge detail review, geotechnical report, core logging, and BRINSAP inspections.

Roadway Design – The EA should be involved in pavement designs on various types of facilities. This training should include obtaining and analyzing FWD data as well as road cores, investigating road conditions including site visits and using applicable design methods. The EA should be involved in preparing several PS&E submittal packages, developing vertical and horizontal alignments, preparing suggested sequence of work, and project scheduling using CPM. The EA should also perform earthwork design and calculations, design and analysis of culvert, channel, and bridge hydraulics. The EA should develop or review the following: drainage area maps, hydraulic data sheets, and parallel or side road drainage studies. The EA should attend several plan reviews and should be responsible for leading a plan review meeting and answering questions during plan review of a set of plans that the EA developed.

Recommended Training Topics:

Basic Roadway Design, Pavement Design, Hydraulics
 Right of Way, PS&E Package, GEOPAK I and II, HEC-RAS, Microstation SoftTutor (computer based training), and AASHTO Geometric Design of Streets and Highways (within 2 months before PE exam if Transportation is the afternoon specialty choice).

Maintenance Operations

	Recommended	Elective	Comments
Office Operations	X		Maintenance Office
Stock Management		X	Maintenance Section
Develop Daily Work Assignments		X	
12 Month Maintenance Plan	X		
Budgeting	X		
Maintenance Contracts	X		
TCP Selection	X		
Tailgate Safety Meetings		X	

6 – 12 Months in duration.

EAs should gain experience in the maintenance area. This experience should come after their first year with TxDOT. Assignment to Maintenance Operations would provide engineering experience that supports the EA's SER. The EA will usually be assigned to a particular maintenance section or the Office of the Director of Maintenance. Assigned responsibilities should provide opportunities where the EA will work with the maintenance supervisor and be actively engaged in every facet of the maintenance operations. They should be involved in engineering aspects of the maintenance operation as well as office operations, such as stock management, development of daily work assignments, developing and/or monitoring of the 12 month maintenance plan, budgeting, selection of TCPs for daily operations, conducting Tailgate safety meetings, and other aspects of maintenance supervision. The EA will most likely develop contracts or maintenance design for contracts. EAs will work closely with District Maintenance Operations to gain an understanding of the overall District maintenance function.

Facilities Management Section (2 months suggested for each functional area)

Safety Rest Area (SRA) and Capital Improvement building programs:

- Structural - design, analysis, PS&E production, and construction administration activities
- Mechanical - design, analysis, PS&E production, and construction administration
- Electrical - design, analysis, PS&E production, and construction administration
- Plumbing - design, analysis, PS&E production, and construction administration
- Water and Waste Water Systems - design, analysis, PS&E production, and construction administration
- Building Civil - design, analysis, PS&E production, and construction administration

Maintenance Section (1-2 months total)

- Maintenance Contracts - plans and specifications
- Texas Maintenance Assessment Program (TxMAP) - quality control evaluation of state roadway system
- Review Construction Plans for Rest Areas
- Pavement management activities

Vegetation Management Section (1 week total)

- Herbicide research trials
- Research of pesticides used on state's right-of-way
- Specifications for soils, seeding, sodding, vegetative watering and erosion control

Recommended Training Topics:

Maintenance Section Supervisor course

Traffic Operations

	Recommended	Elective	Comments
Development of TCPs	X		
Illumination Design		X	
Signs & Pavement Markings Design	X		
Speed Studies	X		
Signal Warrants	X		
Rail Road Crossing Design		X	
Pedestrian Facilities Design		X	
Transportation Management Systems (ITS)		X	

6 to 12 Months in duration.

EAs should gain 3 to 6 months experience in traffic related design and plan development. Traffic related experience may be obtained at the Area Office or District Traffic Section or District Transportation Operations.

Traffic related experience should consist of the following areas: Traffic Control development, illumination layout and design, sign and pavement marking design and layout, and SIGNCAD. When available, EAs should acquire experience in traffic studies for signal warrants, speed, and pedestrian traffic. Additional experience should include Traffic Signal design, Traffic Impact Analysis, Traffic Management Systems, railroad issues, and successful interaction with public complaints.

*Duration and categories vary across the districts.

Division Job Rotation Activities

Each Division manages its own JRA assignments. They may, however, coordinate with other DE/DDs to accomplish a combined rotation program with assignments in two or more DE/DDs. The job rotation activity durations listed below are prepared with the intent that each Division is managing its own rotation program with sufficient flexibility to accomplish business needs and support professional development of the EA.

Field rotation assignments to other DE/DDs are listed at the end of the Division Job Rotation Activity section. They may be used as needed or as opportunities present themselves.

Bridge Division – 36 to 60 Months

Job rotation in the Bridge Division consists of recommended and elective activities to accomplish Job Rotation activities in BRG. Durations will vary and will typically be longer for EAs that will be assigned in that area after completion of the JRA than for activities in areas in which the EA will not be assigned after completing the JRA. Sequence of activity assignments and their duration will support business needs and be as effective as possible to support the EA's professional development needs.

Construction Division – 36 to 60 Months

Job rotation in the Construction Division will consist of recommended and elective activities. Durations will vary and will typically be longer for EAs that will be assigned in that area after completion of the JRA than for activities in areas in which the EA will not be assigned after completing the JRA. Sequence of activity assignments and their duration will support business needs and be as effective as possible to support the EA's professional development needs.

Construction Section

- Letting process
- Change order process
- Field Engineering

Claims and Disputes

- Claims and disputes process

Construction and Materials Information Systems

- CIS
- Site Manager

Materials and Pavements Section

Laboratory Branches

Asphalt

- Specifications and tests for PG binders
- Specifications and tests for asphalt emulsions
- Specifications and tests for cutback asphalts
- Specifications and tests for misc. lab responsible materials

Chemical

- Specifications and tests for lime
- Specifications and tests for epoxy materials
- Specifications and tests for construction fabrics
- Specifications and tests for misc. lab responsible materials

Flexible Pavement

- Specifications and tests HMAC
- HMAC design
- Specifications and tests for misc. lab responsible materials

Geotechnical, Soils, and Aggregates

- Specifications and tests aggregates
- Aggregate Quality Monitoring Program
- Specifications and tests base material
- Petrographic Analysis
- Specifications and tests for misc. lab responsible materials

Pavements and Materials Systems Branch

- Pavement analysis and forensics
- Pavement Management Information System and data collection
- Pavement Evaluation Equipment
- Pavement Design
 - Rigid pavement design
 - Flexible pavement design

Rigid Pavements

- Specifications and tests for concrete
- Quality Monitoring Programs for cement, flyash, and chemical admixtures
- Specifications and tests for steel items
- Specifications and tests for misc. lab responsible materials

Structural Inspection Branch

- Precast Concrete Fabrication and Inspection
- Structural Steel Fabrication Inspection
- Miscellaneous Products Fabrication Inspection

Traffic Materials

- Specifications and tests for sign sheeting
- Specifications and tests for traffic markings and markers
- Specifications and tests for concrete and steel coatings
- Specifications and tests for misc. lab responsible materials

Design Division – 36 to 60 Months

Job rotation in the Design Division will consist of recommended and elective activities. Durations will vary and will typically be longer for EAs that will be assigned in that area after completion of the JRA than for activities in areas in which the EA will not be assigned after completing the JRA. Sequence of activity assignments and their duration will support business needs and be as effective as possible to support the EA's professional development needs.

Consultant Contract Section

- Review of contract scopes
- Look at different payment types
- Negotiated fee schedules
- Develop a scope and fee schedule (example)

Field Coordination Section

- Review design summary report and compare to Roadway Design Manual
- Review typical section and bridge layout
- Write a specification and review specification lists
- Perform highway capacity analysis (example problem)
- Calculate road user cost
- Handle access management dispute resolution

Landscape Design Section

- Work with Registered Landscape Architect on a District landscape design
- Review of landscape programs
- Review of the transportation enhancement program
- Discuss context sensitive solutions and flexibility in design (in conjunction with Roadway Design)

Letting Management Section

- Letting schedules and funding
- State letters of authority
- Federal project authorization agreements
- Notices to contractors and advertisements

Plan Development Section

- Calculate horizontal and vertical alignment (example problem)
- Experiment with Plan Development tips/tricks
- Design ADA improvements at an intersection (may include field visit)
- Comparison of design alternatives using quantitative safety analysis

Roadway Design Section

- Perform basic hydraulic computations (i.e., drainage area, flow, size a culvert)
- Project site in relation to FEMA floodplain
- Calculate metal beam guard fence length of need
- Review crash tests of roadside safety hardware
- Work on standard detail sheet

Environmental Affairs Division – 36 to 60 Months

Job rotation in the Environmental Affairs Division will consist of recommended and elective activities. The following activities will be used to accomplish Job Rotation activities in ENV. Durations will vary and will typically be longer for EAs that will be assigned in that area after completion of the JRA than for activities in areas in which the EA will not be assigned after completing the JRA. Sequence of activity assignments and their duration will support business needs and be as effective as possible to support the EA's professional development needs.

Hazardous materials remediation, petroleum tank removals, SPCC plans.

- Field visits of tank pulls in progress
- Other remediation actions
- Review of SPCC plans

Expose trainees where possible, to potential pollution problems that require action to mitigate impacts to projects.

Regulations

- Section 106, National Historic Preservation Act and
- Section 4(f) of the Department of Transportation Act

Stormwater

Design decisions related to avoidance, minimization, permitting, etc.

This exposure can provide insight in to how designers can achieve a more symbiotic relationship between environmental issues and project design decisions.

Maintenance Division – 36 to 60 Months

Job rotation in the Maintenance Division will consist of recommended and elective activities. The following activities will be used to accomplish Job Rotation activities in MNT. Durations will vary and will typically be longer for EAs that will be assigned in that area after completion of the JRA than for activities in areas in which the EA will not be assigned after completing the JRA. Sequence of activity assignments and their duration will support business needs and be as effective as possible to support the EA's professional development needs.

Traffic Operations Division – 36 to 60 Months

Job rotation in the Traffic Operations Division will consist of recommended and elective activities. The following activities will be used to accomplish Job Rotation activities in TRF. Durations will vary and will typically be longer for EAs that will be assigned in that area after completion of the JRA than for activities in areas in which the EA will not be assigned after completing the JRA. Sequence of activity assignments and their duration will support business needs and be as effective as possible to support the EA's professional development needs. Traffic related experience should consist of the following areas:

- Traffic Control development
- Illumination layout and design
- Sign and pavement marking design and layout
- SIGNCAD
- Traffic Signal design
- Traffic Impact Analysis
- Traffic Management Systems
- Railroad issues
- Successful interaction with public complaints

When available, EAs should acquire experience in traffic studies for signal warrants, speed, and pedestrian traffic.

Field Rotations

Job Assignments in specific District Sections or Area Offices

Area Office

- Project inspection

District Construction Office

- Construction Recordkeeping
- Project Acceptance

District Design

Traffic Engineering

- Traffic control plans
- Signs and Markings installation and inspection

Management Summary

The EA's supervisor will conduct an annual performance review of JRA participants. During these reviews, the supervising engineer and the EA will complete the Management Summary for inclusion with the participant's annual performance review.

The Management Summary should indicate the following:

1. A summary of completed experience
2. The supervising engineer's recommended plan for the next 12 months
3. The EA's career goals for the next year

The Management Summary will be delivered to the DE/DD or his designated person who is managing the JRA for the DE/DD for review and implementation in the JRA.

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EA Career Development Guide

Section 6: The Supplementary Experience Record (SER)

Human Resources Division

Workforce Development

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Section 6: The Supplementary Experience Record (SER)

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The Supplementary Experience Record

One of the most critical parts of your application for professional licensure is the Supplementary Experience Record (SER). The Board will use it not only to evaluate your experience, but also to determine your communication skills, your honesty and integrity, and your general knowledge of the professional aspects of your chosen profession. Failure to adequately prepare your SER can very easily derail your application. By asking yourself if you can describe your activity in terms such as *“I calculated..., I designed..., I analyzed..., I recommended...”* your experience is likely acceptable for licensing.

Planning and Preparing your SER

- I. **First**, you should be prepared to thoroughly communicate the engineering work that you have performed over your career.

The best method of doing this is to keep a journal. The journal should contain:

- A record of your activities;
- Identification of the project;
- The scope of the project;
- The engineering activities that you personally performed;
- The starting and ending dates of the project(s) on which you worked;
- Name and address of each supervisor, job title(s); and
- The name, present addresses and phone numbers of the engineers and other persons with whom you personally worked who can serve as references to substantiate your experience.
- A sample journal page is included in **Appendix A**.
- **The importance of keeping this record cannot be overstated.** Without this information, as time passes, it becomes more difficult to remember the details of a project. Submitting quarterly reports to your supervisor is recommended as another way to insure that your job experience is being kept up to date.

- II. **Second**, you need to begin the process of writing your experience in the SER format.

- The SER is to be written in the first person.
- The SER describes in active engineering verbs the engineering work you specifically designed, calculated, evaluated, analyzed, etc...

- The final SER should range from about six to twelve pages and describe the engineering activities that you performed in your entire engineering career, starting with your first engagement.

III. **Third**, you must follow the physical layout provided in the Board's application packet. The application packet may be obtained in paper copy from the Board or downloaded from the Board website: www.tbpe.state.tx.us/downloads.htm. Information may be entered online, printed, and mailed to the Board.

IV. **Fourth**, you should strive for overall clarity in your Supplementary Experience Record (SER). The engagement number should match the applicable section of the application. Introduce the experience with when, where, and what. Follow with type or description of work. State in detail what you personally performed.

For example, suppose you have worked for TxDOT your entire career and you have been assigned to two separate offices, working on two projects in each office. Your SER might look like the following example:

Engagement Example

Engagement No. 1.

From: October 1, 1997

To: March 1, 2002

NAME OF EMPLOYER AND LOCATION: Texas Department of Transportation

ASSIGNMENT NO. 1: Anarene Area Office, Anarene, Texas

ENGINEERING SUPERVISOR'S NAME: Waldo Q. McGlurk, P.E.

Project No. 1: Drainage structure improvements on SH 79 from Anarene to Olney

From: October 1, 1997

To: December 31, 1998

Upon beginning work, I was assigned to design and prepare the plans for this project. I began by performing a hydrological study on the drainage basins for 7 of 12 culverts that crossed SH 79. I calculated...

Project No. 2: Bridge replacement at the Little Wichita River

From: January 1, 1999

To: September 30, 1999

On this project, I designed the...

ASSIGNMENT NO. 2: Ringgold Area Office, Ringgold, Texas

ENGINEERING SUPERVISOR'S NAME: Willie McGlurk, P.E., & D. P. Stick, P.E.

Project No. 3: Construction of urban arterial on new location

From: October 1, 1999

To: April 30, 2001

On this project, I calculated...

Project No. 4: Design of four intersections with signalization

From: May 1, 2001

To: March 1, 2002

This was the first job where I supervised plan preparation. This project consisted of the design and reconstruction of four existing intersections in greater metropolitan Dundee. Attachment B to this guide shows an actual completed SER that was submitted and approved by the Licensing Board.

V. **The fifth task** in the completion of the SER is to address the relationship between your selected references and the text of your SER.

- You must have a reference for each engagement, and that reference must be personally familiar with the technical aspects of your work.
- Make certain that the references know that they are only responsible for signing the work with which they are personally familiar.

Appendix B includes examples of Supplementary Experience Record reports.

SER Review

It is recommended that you have your supervisor or a co-worker review your SER before submittal to the PE Board. Through the Professional Development and Contracts Office, the Professional Development Advisor is also available to review SERs.

In summary, your career hinges upon the experience gained by participating in the various project assignments at TxDOT. Consider each new assignment an opportunity to build your experience base in a manner that will benefit your progression at TxDOT and apply toward your professional engineering license.



EA Career Development Guide

Section 7: Continuing Education and Professional Organizations

Human Resources Division

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Section 7: Continuing Education and Professional Organizations

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Continuing Education Requirements Overview

The 78th Legislature passed a bill requiring continuing education to maintain your professional engineering license in Texas. Fifteen (15) professional development hours (PDH) will be required annually to renew your license. TxDOT engineers have many opportunities to obtain their continuing education requirements through conferences, seminars, training courses, and other technical presentations.

- One contact (or clock) hour of training is equivalent to one PDH.
- The qualifying course or activity must have a clear purpose and objective to maintain, improve, or expand the skills and knowledge relevant to the license holder's field of practice – e.g. engineering related.
- One hour must be in professional ethics. PDH units carried forward may not be used to count to meet the professional ethics requirements. If you take an 8-hour ethics course with TxDOT, the other 7 hours may be counted towards your 15 hour PDH requirements.
- A maximum of 14 PDH units may be carried forward into the subsequent renewal period. PDH may not be used for more than one renewal period.
- If requested, the license holder must submit certification that the requirements have been met. These records must be maintained for a period of three (3) years by the license holder.
- New license holders are exempt for their first renewal period.

Professional Organizations

Your participation in professional organizations provides opportunities for professional development. These groups often have technical presentations acceptable for continuing education in their regular meetings. Examples of typical organizations include:

- American Society of Civil Engineers
- Institute of Transportation Engineers
- Society of Women Engineers
- Texas Society of Professional Engineers
- American Society of Highway Engineers



EA Career Development Guide

Section 8: Putting it All Together

Human Resources Division

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Section 8: Putting it All Together

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Summary of Expectations

Now that you've had an opportunity to look at the various aspects of professional development for the engineering graduate, let's see how mentoring, experience, training, education, and licensure will serve as building blocks for a career as an engineer at TxDOT.

The table below is a summary of recommendations for the first four years:

Building Block	Year 1	Year 2	Year 3	Year 4 through licensure
Mentoring and Experience	Mentor is assigned; join Engineering Assistant Group if available. Perform distinct job assignments from design, construction, traffic operations, maintenance, or laboratory.			
Training	Exam Prep Course when applicable & Recommended training courses.	Exam Prep Course when applicable & Recommended training courses.	Exam Prep Course when applicable & Recommended training courses.	Exam Prep Course When Applicable & Recommended training courses.
Certification and Licensure	Keep a journal of work experience. Take FE prep course & FE exam if applicable. Take PE prep course & PE exam if applicable.	Keep a journal of work experience. Take PE prep course & PE exam if applicable.	Keep a journal of work experience and begin to work on the SER . Take PE prep course & PE exam if applicable.	Complete the SER. Apply for license. Take PE prep course, & PE exam if applicable.

Your career with TxDOT is flexible; however, you should make every attempt to meet or exceed the minimum requirements and guidelines shown above so that you will be prepared to take on the professional challenges that await you.

Establishing Career Goals

This document can only serve as an outline for you to follow as you plan your future at TxDOT. You must decide for yourself during these first few years where you would like to see yourself in the years to come and begin establishing career goals.

- **The first step** is to determine the best sources of information to guide you in the process. As soon as you begin working at TxDOT, seek assistance from your supervisor and Mentor. Discuss with them your options for career development and solicit their assistance in achieving your personal and professional goals.
- **The second step** is to take advantage of as many varied opportunities as you can so that you gain experience in a wide variety of job assignments. These experiences will provide you with a solid understanding of TxDOT activities.
- **The third step** is to embrace the challenges of each new assignment. Training through formal education and a variety of job assignments are essential to your preparation as an engineer.
- **The fourth step** is to continually evaluate your progress. Assess your experience, your training, and the coaching you have received. Determine if you are headed in the right direction – take corrective action early and seek guidance to help you make decisions.

As you can see, the building blocks of our Career Development Program for Engineering Assistants fit together to help provide you with the information, experience, training, and education necessary to make solid career decisions.

Find ways to balance your career with other essential elements in your life: family life, social needs, personal changes, etc. This is a continuous process. A successful TxDOT engineering career is based on continual self-appraisal and a clear vision.

Remember:

- Take full advantage of the resources available.
- Challenge yourself and your department to take it to the next highest level.
- Take someone along on the journey – become a Mentor to another EA.

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EA Career Development Guide

Section 9: Beyond the PE License

Human Resources Division

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Section 9: Beyond the PE License

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After Earning Your PE License – Next Steps in Career Development

Become a Professional Engineer is a considerable achievement, but it won't be your last. Part of ensuring that Texas builds and maintains the best transportation network in the world includes your growth as a professional. In addition to taking training that will maintain your license, there are numerous growth opportunities available at TxDOT through a continued focus on mentoring, experience, formal training, advanced education, and other professional certifications.

To further support your career goals and development, TxDOT has a [Career Development Program](#) that provides you with the opportunity to explore your career interest's and focus on your individual development needs. The program's goal is to facilitate career development so that you can identify opportunities for advancement and become better qualified to compete for new positions.

The Career Development Program provides a foundation for all employees to have the opportunity to have a [career conversation](#)—an open and honest conversation with supervisors regarding interests in new roles or additional duties, experience and knowledge gaps, current ability to compete for a position, and realistic steps to gain needed competencies.

Employees are encouraged to work with supervisors to develop individual career development plans, which document action items to help build desired skills, gain relevant experiences, and prepare for career goals. Your supervisor should be asking you about your career development and where you want to be. If that's not happening, then you need to come to your boss and ask to discuss your future.

Career growth is ultimately each employee's responsibility so you should continue to identify and take advantage of available development opportunities that may benefit your growth. The below table outlines a possible schedule that corresponds with the experience you can expect to earn as you progress with TxDOT.

Years 1-4	FE/PE Preparation and Examination
Year 5	Certified Texas Contract Manager (CTCM); Practical Supervision (and other supervisory classes)
Year 6	Project Management Professional (PMP) certification
Year 7	Six Sigma Yellow Belt (SSYB); Leadership One
Year 8-12	MS/MBA degree; PEPS Lead
Year 13	AE Program

CPA – Certified Texas Contract Manager (CTCM)

The CTCM training offered by TxDOT through the State Comptroller allows a TxDOT engineer to understand the fundamentals of state contract management and purchasing, contract provisions, and vendor accountability. TxDOT engineers work on and lead several diverse types of projects that require a strong focus on knowing the contract process and working with vendors.

Topics covered include project management overview, contract management and process, and negotiation strategies.

The CTCM certification requires the completion of 4-day training, application, and a final exam. For more information, please contact Workforce Development.

TxDOT's Supervisory Classes

TxDOT Engineers are encouraged to participate in the supervisory series to gain additional knowledge when working and leading others on projects. Each of the classes below provides individuals with the knowledge, skills, and abilities to practice management and understand important TxDOT policies.

To enroll in any supervisor classes, please access the PeopleSoft Training and Development portal and search for upcoming classes offered throughout the State.

Course Code	Course Name
DEV115	Practical Supervision
DEV220	Progressive Discipline
DEV240	Recruiting and Hiring
DEV267	Substance Abuse
DEV281	Workplace Violence

Project Management Professional (PMP) Certification

The PMP Certification Support Program is designed to support individuals interested in pursuing a self-paced process to obtain certification as a Project Management Professional (PMP), as administered by the Project Management Institute (PMI). The program is coordinated by the Project and Portfolio Management section of the Transportation Planning and Programming Division (TPP).

Since the Certification Support program is a self-paced process, there is a variation in timing across participating individuals. As a result, the support program runs on a continuous cycle with no start and end dates. An individual can join at any time. The program promotes a mentor/mentee relationship to help with application compilation, exam support, and promotes taking advantage of existing TxDOT project management learning content (online e-learning and instructor-led classes). In addition, an open session is held monthly where

participants can share references to useful materials, ask questions, and get advice about the certification process from other members of the TxDOT PMP community.

Below are the instructor-led classes provided to TxDOT employees.

Course Code	Course Name
DEV415	Introduction to Project Management
DEV417	Project Management – Risk Assessment
DEV418	Project Management – Resource Management
DEV419	Project Management – Scheduling
DEV420	Project Management – Cost Estimate
PMD Series	TxDOT Project Management Courses

Six Sigma Yellow Belt (SSYB)

The Six Sigma Yellow Belt certification is aimed at those new to the world of Six Sigma who have a small role, interest, or need to develop foundational knowledge. Yellow belts can be entry level employees who seek to improve their world or executive champions who require an overview of Six Sigma and define, measure, analyze, improve and control model (DMAIC).

For more information regarding available trainings, please contact training@txdot.gov.

TxDOT Leadership One

Leadership One (L1) is a three-month program designed specifically to develop leadership skills at all levels of the organization. Participants will gain the skills, competencies and values necessary to lead employees effectively, achieve personal mastery and promote a meaningful culture within TxDOT.

Leadership at TxDOT plays a paramount role in the success of the organization. TxDOT stands committed to providing resources to help develop emerging leaders in our organization.

The curriculum concentrates specifically on highly needed skills for managers to enhance current job performance and to prepare for future career opportunities, incorporating team building, leadership and personal mastery. Participants will be engaged through a blend of instructor-led classes, book assignments, and guest speakers. Participants are selected through an application process.

The L1 program will allow participants to practice the following skills:

- Team building
- Decision-making
- Planning

- Organizing
- Problem solving
- Communication
- Interpersonal relationships

Additional benefits to the participant include:

- Increased visibility in leadership circles across TxDOT which could lead to opportunities for career advancement.
- Development of highly marketable leadership skills.
- Opportunity to make a difference to the employees and the culture of TxDOT.

To participate in the L1 program, you must complete Form 2486, Leadership One Application and submit the application to the Leadership One Program Administrator at training@txdot.gov.

After receiving your application, the L1 Program Administrator will forward it to the approval committee. Following the application's review, you will receive an email from the L1 Program Administrator with the results.

Tuition Assistance Program (TAP): Pursue a Graduate Degree (MS/MBA)

Eligibility:

The Job Related Master's Degree Program is available for regular full-time employees who are considered in "good standing" with the Department and who have been employed by the Department for at least four years if they have a professional engineering license from the State of Texas, or for at least five years for those without this license. Candidates are selected by the TAP Selection Committee.

Forms to Complete:

- [Form 1917, Tuition Assistance Program Request](#) (required each semester)
- [Form 1941B, Job Related Master's Program Agreement](#)
- [Form 2561, Career Development Form](#)
- [Form 2562, Tuition Assistance Program Application](#)

How to Apply:

Complete the forms listed above and submit to your DE/DD. Also submit a degree plan from the institution you wish to attend. Your application will be competitively considered by the

TAP Selection Committee. The committee selects no more than 10 employees into the overall Tuition Assistance Program each year.

The Department will pay tuition and mandatory fees up to a maximum of \$5,000 per semester. At the start of each semester, participants will be responsible for 30% of the tuition and mandatory fees, and the Department will pay the remaining 70%. After that semester's courses are completed with a passing grade of a "C" the 30% portion of the tuition and fees paid by the participant will be reimbursed. This maximum payment excludes books, supplies, and other expenses.

- To request more information about the Job Related Master's Degree Program, TAP Administrator, at 512/486-5455.

TxDOT's Area Engineering Program

This course provides TxDOT engineers with a foundation of essential concepts needed in the Area Engineer role. Each cohort meets for four two-day sessions scheduled over a six month period. While in the program participants also engage in team projects. The class begins with an overview of the general duties of an Area Engineer. The curriculum is a combination of technical, managerial and leadership topics.

Below is a list of topics covered in the course.

- Duties and Responsibilities
- Safety
- Human Resources
- Budget
- Leadership
- Design Functions
- Maintenance Functions
- Planning and Programming
- Traffic
- Public Relations
- Presentation Skills
- Critical Conversations
- Construction Functions
- Construction Contract Administration
- Generational Diversity

For more information regarding available trainings, please contact training@txdot.gov



EA Career Development Guide

Appendices

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Appendix A Sample Journal

Your Name			
Project Title			
Project Limits	Project Costs	Project Type	
Date Started		Date Ended	
Location	Highway Number	County	CSJ
Provide a summary of the project giving details of exactly what parts you performed. Describe your activity in terms such as <i>"I calculated... I designed... I analyzed... I recommended..."</i>			
Project Description and Scope			
Engineering Techniques Used			
Name and Title	Address	Phone	
Project Supervisor			
Project Manager			
Contractor or Consultant			

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Appendix B

Examples of Supplementary Experience Record (SER)

The following examples of SERs are excerpts from applications submitted to the Texas Board of Professional Engineers by TxDOT Engineering Assistants:

Examples of Presenting Hydraulic Study Work

Hydraulic Study Example #1

This FM 1909 project consisted of designing a new location farm-to-market road in Lynwood County. When I began work on the project the preliminary alignment and typical roadway template had been established.

My first task was to design all the hydraulic structures for this project. Using the United State's Geological Survey contour maps and on-site investigations, I established the drainage areas and location for all the culverts that were required. I determined the time of concentration and runoff terrain and anticipated the proposed future use of the land. From this information, I calculated the design discharges using the rational method for drainage areas under 200 acres. For larger drainage areas, I used the USGS regional regression equations to calculate the design discharges. Based on the type of roadway and its anticipated use, I decided on a 10-year design frequency for the main culvert crossings. I then examined the 100-year flood headwater and tailwater elevations to determine if adjacent property would flood.

I designed the size and type of hydraulic structures needed to control the design storm and insure that the allowable headwaters and velocities were not exceeded.

The outlet channels were designed to insure acceptable tailwaters with minimal velocities. For each design, I compared the values for the culvert headwater, tailwater, flow capacity and velocity for various circular and box configurations in order to determine the most economical, hydraulically efficient design.

An excessive velocity could not be avoided through conventional means at one location. To solve this problem, I designed a broken-back culvert. This type of culvert slows the excessive velocity to an acceptable non-erosive velocity by developing a hydraulic jump within the culvert. To assure that the hydraulic jump would develop in the culvert, I designed the upstream end to be of short length and steep slope and the downstream end to be of long length and mild slope. This would allow the flow to go from supercritical to sub-critical within the culvert, thus forming the hydraulic jump and dissipating the excessive velocity.

I performed the hydraulic design for six multiple box culverts and 65 culverts consisting of reinforced concrete pipe. To encourage the lowest bid by the contractor, I designed and provided an alternative of corrugated metal pipe at locations where it was feasible.

Hydraulic Study Example #2

I assembled and analyzed drainage area maps for Interstate Highway 27 north of Lubbock. Using these maps I calculated runoff using the drainage area size, nature of the terrain, soil classification, and land use and designed the small single pipe and large multiple box structures.

I analyzed existing structures and designed more applicable structures to support or replace them. Allowable headwaters were checked as well as tailwater conditions and allowable outlet velocities before a design was considered complete.

I calculated steel and concrete quantities for the structures and prepared plan sheets for construction. When the hydrological studies were complete, my recommendations were given to the District Design Engineer for inclusion in tile contract plans.

Hydraulic Study Example #3

I designed a large culvert replacement on SH 163 in western Val Verde County. The existing culvert was structurally inadequate and imposed load restrictions on the road. I determined the contributing drainage area and computed the runoff taking into account the slope, soil, and vegetation composition. I then determined the required size of the structure based on the channel cross-section and the computed run-off.

The sizing process was complicated because the structure had to fit within a limited right-of-way and could not disturb several significant archaeological sites and a wetland site. These requirements lead me to design a sheet-pile retaining wall with special walers and tie-backs, as well as size a structural plate pipe arch to serve as the culvert. For the design I also calculated the forces to be resisted and sized the tie-backs, waler, and sheet-pile.

Hydraulic Study Example #4

I designed a 1750' curb and gutter and storm sewer system on the north end of the project to eliminate the problems occurring because of a right-of-way restriction. I determined the necessary drainage areas, time of concentrations, and runoff coefficients to calculate the flood runoff for each curb inlet. With these calculations, I designed 1500' of storm sewer pipe, seven curb inlets, four grate inlets, and one junction box. I designed the system utilizing two existing inlets near the outfall. This design was reviewed and accepted by the District design engineer.

Example of Presenting Traffic Control Plan Work

Traffic Control Plan Example

I developed a detailed traffic control plan to facilitate the safe handling of the Loop 175 traffic during construction of the two bridges on Loop 175. My traffic control plan entailed constructing the frontage roads and ramps at the proposed interchange and detouring the traffic around the bridge construction on these ramps and frontage roads.

I developed a safe and economical plan with the aid of the Texas Manual on Uniform Traffic Control Devices (TMUTCD). In order to improve the safety aspects of the detour section, I suggested the placement of luminaries and delineators to guide traffic through the detour at night. This traffic control plan was approved by the District safety review team and was incorporated into the plans.

Example of Presenting Bridge Layout Work

Bridge Layout Example

I developed the bridge layouts for three overpass structures. I recommended the use of pre-stressed concrete beams on all three structures. One bridge spanned US 59 and the Southern Pacific Railroad, while the other two structures were on Loop 175 spanning Loop 463. The US 59 and railroad overpass consisted of 2-75' spans, 3-80' spans, 2-90' spans, 2-95' spans and 1- 120' span for a total bridge length of 880'.

I designed this bridge layout to allow for a 25' clear zone at the railroad and a single span over the 78' wide US 59. In order to reduce the amount of soil of the south header bank, I used a type C pre-stressed concrete beam over the railroad which is the shallowest pre-stressed beam available for the specified span lengths. I designed the Loop 175 bridge layouts using 3-120' spans to allow for future turnarounds at each end of the bridges. To increase roadway safety, I recommended T501 concrete bridge railing on all three bridges. I designed the vertical grade on the bridges allowing for a 16.5' clearance over the highways and a 23.5, clearance over the railroad. All of my recommendations and designs on these bridges were reviewed and accepted by our bridge Division in Austin.

Example of Presenting Traffic Related Work

Speed Studies Example

In performing speed studies I first constructed a strip map of the project. I located the proposed speed zone on the map and noted the number and location of accidents in the zone. I researched geometric design criteria and placed the roadbed widths, pavement surface widths and types, grades, and curves on the map and noted any ball bank or advisory speeds currently in effect. I noted special design considerations, such as residential, school, or business land use and checked sight distances to obstructions and intersecting roads. After completing the strip map I conducted the speed survey in the field and calculated the 85 percentile speed for use in determining the speed to be posted. I then performed a test run on the site, completed my calculations and design, and forwarded it to the traffic engineer who reviewed the design and sent it to the Safety and Traffic Operations Section in Austin. When speed zones involved a section of road which was not located in a city limit, I prepared a Minute Order for the State Highway Commission to consider in their regular meeting. Otherwise the city or town with jurisdiction was responsible for passing an ordinance establishing the speed zone.

Guide Signs and Pavement Markings to Change Geometrics Example

Guide signs and pavement markings are used by the engineer to maximize the roadway capacity within the existing confines of the roadway to better meet the current traffic volumes. A thorough understanding of the content and intent of the Texas Manual on Uniform Traffic Control Devices (TMUTCD) is needed to properly perform this task. Signing projects required me to select the types and sizes of signs required on the project, design the sign layout, and select the type of support and proper foundation for each sign.

I used pavement markings to change the geometric configuration of existing intersections to provide better traffic flow. Using traffic study data at each location I studied geometric

changes that might improve traffic flow at the intersection. Upon approval of my design, I used my knowledge of the TMUTCD to lay out the required changes for each project. An example of my work in using pavement markings to solve traffic problems is a project on SH 114 at Trophy Lake. The site is at the merger of southbound IH 35 and the exit ramp of westbound IH 635. My analysis of the traffic data showed that traffic volume on the ramp exceeded that on the main lanes on IH 35.

I proposed a design that called for the modification of the ramp from one lane to two lanes and the corresponding reduction of IH 35 from three lanes to two lanes at this location. To make this design work I had to merge the two left lanes of IH 35 together. I calculated the required taper lengths and pavement markings based on the design speed and sight conditions. I also determined which warning signs were needed and where they should be located. This project was completed using state maintenance forces so I checked the work to insure it met all design considerations.

Example of Presenting Construction Supervision Work

Construction Example

I continuously evaluated the erosion control system created for this project. The runoff from this project drains into the Edwards Aquifer. A lawsuit could have arisen because of excessive silt runoff or because of damage to the local vegetation. In order to protect this aquifer, the local wells, and existing vegetation, I directed the placement of all haul roads, filter fences, bay bales, and the rivet mattresses and gabions.

The contractor hired the Anchor Crane and Hoist Service Company to provide a Double Girder Gantry Crane System to span these creeks so that the beams, panels, and slabs could be placed from above. It was my responsibility to ensure that the erection of this system in no way structurally damaged the existing columns and caps. An important phase came when the gantry system was removed. The 88" x 30" x 55'7" end-to-end beams were pulled off from one end of the bridge by a dozer. Once the end of the gantry beam cleared the end of the cap, the beam would cantilever back to the next cap. If the beam was pulled too fast, it could cause a moment that could damage the cantilever cap. I directed the removal of all gantry parts as a result.

I directed the construction of all embankments and the placement of the flexible base material. The embankment was placed using the Ordinary Compaction method which utilized sprinkling and rolling at the direction of the engineer. This method does not require a minimum density for the embankment. Therefore, I had to use my engineering judgment to determine if each embankment lift had been placed properly and then instruct the contractor to proceed with the next lift or compact the lift further or remove the lift and begin again. Once a suitable sub-grade had been achieved, I directed the contractor to place the flexible base before detrimental conditions could occur to the sub-grade. The flexible base was density controlled on this project so I had to develop a nuclear density schedule to properly test the placed base material. Along with this, a base sampling schedule had to be implemented so that the base could be tested according to our specifications. I implemented both schedules. If the base did not meet density requirements, I requested the relaying of the base until it met the required density.

I then directed the contractor to proceed with the process of placing emulsified asphalt into the top one inch of the base for base stabilization purposes. I instructed the contractor as to the rate and the locations to cover. As soon as the emulsion was completed, I made a final determination as to whether the final product was acceptable prior to the placement of the surface treatment.

Using the engineering judgment that I obtained from my previous construction projects, I used the same techniques for directing the placement of the two course surface treatment on this project. Again, due to prior experience, I was able to apply my knowledge of asphalt concrete pavement to this project. As on my other overlay projects, I adjusted the design of the concrete pavement based upon my engineering Judgment. Prior to the placement of the asphaltic concrete pavement, I surveyed all major roadway tie-ins. From this, I calculated all of the grades for the tie-ins along with the volume of materials to be placed in the tie-ins. Upon completion of the placement of the pavement, I directed the placement of all striping, jiggle bars, and pavement markers. Good engineering judgment and knowledge of the TMUTCD were a necessity since the plans did not specify the placement of these items.

I adjusted the roadway profiles to solve problems of inadequate cover over the reinforced concrete pipes. These adjustments did not restrict the flow of water through the pipe systems.

By using my engineering knowledge obtained from earlier projects, I designed the Traffic Control Plan and directed the proper traffic control methods that would enable the traveling public to safely drive through my project.

Another critical portion of this project was the construction of the retaining wall option chosen by the contractor. The type of earth retaining selected was the recast segmented option provided by a manufacturer named VSL. These panels were set on top of each other forming a vertical wall. A form of wire mesh was fastened to the back of each of the panels. Select backfill was placed on this mesh. I directed the placement of this backfill in proper lifts and ensured that it was compacted in the proper manner being careful not to let the compacting mechanism damage the mesh or pull the wall out of plumb. I verified that the proper mesh and proper rolling procedures were provided. I ensured that the walls were within vertical tolerances and that the line of the wall was correct. Any segment of wall that I found to be out of tolerance was removed and properly replaced.

I calculated all post lengths for the various signs to be used on this project. I accomplished this by either surveying the exact location for the post or by using the typical sections for the project.

I directed the placement of the guard rail. I deleted from or added to the lengths of guard rail as indicated in the plans. I determined the guard rail needed at the locations based upon department safety guidelines and my engineering judgment. I also dictated the location for the illumination foundations placed on this project. By directing the placement of the foundations, I ensured that breakaway capacity of the light poles would not be hindered by the foundations being placed at the wrong height above the ground.

As Project Supervisor for this Job, I assessed all time charges, kept the daily records of all work performed, recorded all materials received and prepared the monthly estimates for the monthly payments to the contractor.

After acceptance by the state of this completed project, I calculated the final estimate, finalized the pay folders, explained the overruns and under-runs to the original contract, and officially helped close the books on this job from the standpoint of paperwork.

No major problems have been encountered on this project since its completion. The above projects have enabled me to greatly increase my knowledge in the engineering field. Upon transferring to the District 14 Design Office in February 1987, I was able to immediately apply this information to my design projects.

Upon completion of the Loop 1 project, I was transferred to the District Design Office so that I would gain additional knowledge in the area of roadway design. During this time period, I applied the knowledge that I had gained from the years that I had spent in both design and construction.

Example of Presenting Plan Review Processing Work

Plan Review Process Example #1

My initial assignment involved a detailed study of the department's Standard Specifications, Highway Design Division Operations and Procedures Manual, and various handbooks related to the design and construction of highways. A complete working knowledge of these documents was necessary to allow me to determine the best possible design criteria for the variety of projects I would be working with.

I assisted engineers in revising and redesigning several sets of plans before they were finalized for construction. When my knowledge of highway plan requirements was sufficient, I was given the assignment to do a review of Project MQ 0 17(2) which was Spur 421 in Bexar County from Zarzamora Street west to Bandera Road. I verified the project contained all necessary items of work to accomplish the drainage design at the appropriate grade, to place and compact base material to achieve the desired density, and to overlay the prepared base with asphaltic concrete pavement. The work I did was verified by my supervisor and no major errors were found. The project was estimated at \$6.9 million and the low bid resulted in an under-run of only 8.5 percent.

I evaluated preliminary bridge layouts to ensure that they conformed to the latest geometric standards. My engineering knowledge of lane widths, shoulder widths, median separations, and horizontal and vertical clearances allowed me to analyze the sections for vehicular safety and engineering economics.

I evaluated engineering field change requests. Field changes are changes in the plans or specifications after the project is under construction. My experience in estimating construction materials and plan design allowed me to make a thorough evaluation of these field changes in a short period of time, thus avoiding delays in construction at the project site.

Plan Review Process Example #2

I analyzed plans, specifications, and estimates to insure compliance with state and federal design standards. Some projects were small in scope, such as bringing a roadway up to current safety standards. On these projects the proposed geometric alignment was analyzed to see that horizontal and vertical curvature criteria were met. Using the proposed design speed, I analyzed the sight distances and stopping distances for safety. Using the latest design advancements from the Texas Transportation Institute at Texas A&M University and the Center for Transportation Research at the University of Texas, I verified that the proposed designs included appropriate guard fence to protect vehicles against solid roadside objects or steep side slopes. I worked on bridge rehabilitation projects which depend heavily on the latest design advancements to improve highway safety. I also checked drainage structure design to see that the ends of pipes and culverts represented as little hazard as possible.

I processed and analyzed larger projects which involved a variety of design features and the coordination of a wide range of construction items to insure a safe roadway section. I analyzed the pavement design of projects to determine if the pavement structure could withstand the anticipated loads. Some roadway projects I worked on carried in excess of 100,000 vehicles per day. Some pavement sections were rigid pavement designs such as reinforced concrete pavement while some involved flexible pavement designs such as asphaltic concrete pavement. I evaluated the hydraulic design in conjunction with the Bridge Division to insure that the structure was appropriate for the anticipated runoff expected, the traffic volumes served, and the roadway section which included the structure. I evaluated soil conditions and material sources to see if appropriate depths of base were used or if the sub-base should be treated with lime or cement to increase stability.

One example of a project of this type was Project F 1025(12) which was US 77 at the Victoria and Refugio County line. This project involved considerable regrading and new structures over the San Antonio River. I worked with the District in establishing construction items to provide lime treatment for both sub-grade and base material. Some base material required asphalt stabilization. The careful analysis of construction items I did with the District resulted in the project low bid being \$10.3 million, which was originally authorized for construction expenditures.

During this engagement, I evaluated and finalized approximately 90 sets of plans with accompanying specifications and engineering estimates. This experience allowed me to study different design situations and practices from several areas of the state of Texas. I found that I was able to offer design options to many Districts which had not previously been used in that area because my varied experience had introduced me to a similar design situation in some other area of the state.

Plan Review Process #3

I transferred within the department to the Highway Design Division on May 1, 1987. During my initial assignment, my responsibilities were to perform detailed evaluations and analyses of the plans, specifications, and estimates (PS&E) to ensure compliance with the department's standards. I analyzed geometries to assure design speed and safety clearances were met. I evaluated traffic control plans with respect to minimizing delays and hazards to the traveling public. I also calculated the quantities of materials necessary for construction utilizing the cross-sections and plan and profile sheets in the plans. With the quantities verified, I estimated the cost of the project and compared my cost to the District's estimate to ensure accuracy.

After quantities and unit prices were verified, I researched the project's authorization and financing to verify that the proper funds were available for the project. If a project overran its original authorized funding, I would arrange for additional finances through the administration. I then evaluated the specifications and general notes for validity and compatibility by using my previous experience and engineering judgment.

After completing my evaluation, I coordinated my findings with the District involved and the Federal Highway Administration (FHWA), if federal funding was utilized, and made all necessary revisions to the PS&E before processing them to letting. I also analyzed and made recommendations on field changes submitted to the Design Division during construction by verifying that all items of work were necessary for the work to be performed and for proper accounting.

As a liaison between the Highway Design Division and District 26, I analyzed schematics, bridge layouts, and typical roadway sections to resolve any geometric design problems. This requires sound engineering judgment and a working knowledge of current geometric design standards and practices. I analyze the proposed designs to ensure compliance with the department's standards, with the safety and economics of the project being of primary concern. I also perform Level of Service (LOS) analysis on schematics. For example, on west Loop 304 in Hottentot County, CSJ 5224-1-41, from SH 61 to US 92, I calculated the LOS on the main lanes, frontage roads, ramps, and interchanges to verify that the number of lanes could accommodate the projected traffic and to locate weaving areas to eliminate possible lane change problems.

This schematic proposed the construction of approximately 11 miles of four lane freeway through the Fort Sumpter Military Reservation to complete the Loop 753 bypass of downtown Fairfield. In my analysis of the schematics, I found an overpass and several crest and sag curves that did not meet 70 MPH design speed requirements. I also noted that a residential street was located at the gore of an on ramp from the Rodman Drive interchange. This presented a sight problem for the traffic on the city street. I recommended corrections for these deficiencies. Since the roadway traversed a military reservation, the majority of the freeway had no access. I recommended placement of three turnarounds, with appropriate acceleration and deceleration lanes for emergency vehicles and errant motorists. The District concurred and incorporated my proposals into the plans. I also performed a LOS analysis on the Rodman Drive interchange and ramps to Loop 753 to ensure the facility being provided would handle the projected traffic.

Miscellaneous Plan Review Summary Example

In addition, I evaluate preliminary environmental assessments. I ensure that appropriate engineering criteria are included, which may entail right-of-way, roadway clearances, and cross section widths. Environmental clearance is necessary before a project can go to contract. Therefore, complete and correct engineering criteria are vital.

The knowledge and experience gained in Engagement 1 has been utilized extensively during this engagement. I have evaluated and finalized over 90 sets of PS&E ranging in cost and scope from a \$47,000 safety project on US 99 in Bush County to a \$49.5 million reconstruction project on IH 11 in Alamo County.

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Appendix C

Cost and Time Charge Policy

Purpose

Cost and time charges are directed by policy where assistance is provided by the department in support of examination preparation training for employees seeking to become licensed professional engineers in the state of Texas.

Following is a summary of costs paid by the department as conditions of the EACDP:

- The department pays tuition/fees for training classes and exam refresher courses.
- The department pays travel costs to training classes, exam refresher courses, and exam locations.
- The department will not pay for certification and license examination fees.

Training, Refresher, or Exam Preparation Courses

The department pays for the FE (EPC101) and PE (EPC102, and EPC103) examination preparation courses as long as the Engineering Assistant remains in the career program. Any additional exam preparation courses beyond the EPC101, EPC102, and EPC103 courses must be paid by the employee unless pre-approved by HRD-WFD. Payment by HRD-WFD is made upon receipt of a class roster and a vendor's participant invoice.

EAs requiring preparation for FE or PE exams other than the Civil Engineering exam may be authorized to attend exam prep courses when authorized by the DE/DD and pre-approved by HRD-WFD. Expenses related to these courses will be paid by HRD-WFD only with pre-approval.

See the section regarding Travel of this Appendix.

- The DE/DD may authorize paying tuition for other training or exam refresher courses including workshops offered by state universities or private companies that offer group classes from their overhead accounts.
 - The department will not pay for any individual one-on-one classes, or tutoring.
 - The DE/DD may allow an employee to attend these sessions during official work hours.
 - Any tuition, travel, per diem, or compensatory time required may be authorized for reimbursement by the DE/DD as with any out-of-agency training.

Cost and Time Charges

Participants will use the following cost codes for EACDP expenses related to training:

Tuition fees, group study time, and exam preparation course attendance time:

PS Bus Unit:	Project #:	Activity	Source Unit:
60171	533402	IND	025

Course Travel Time:

PS Bus Unit:	Project #:	Activity	Source Unit:
60171	533402	IND	027

Travel

When travel distance from work location to class is more than 50 miles, the department pays hotel and meal expenses in accordance with the **Travel Manual** for the examination preparation training classes while the EA is in the program.

The department **does not pay** for mileage for personal vehicle. Employees may use a state vehicle when travel is needed and approved by the DE/DD.

Expenses for Exams

Participants are responsible for all costs associated with taking the certification or licensing exam, including exam fees and travel.

If approved by the DE/DD, these items may be paid from the DE/DD overhead account:

- Exam travel time
- Exam time
- Travel expenses when taking the FE or PE exam

Work Schedule and Comp Time

For FE/PE classes supervisors and participants will use these guidelines to avoid excessive accumulation of overtime:

- Participants will adhere to department policies for reporting absences, tardiness, using leave, and recording time worked and paid leave taken on their time sheets.
- Participants may earn compensatory time for course attendance and travel time over 8 hours per day.

Supervisors may adjust work schedules to minimize compensatory time. Contact HRD-WFD for further assistance and guidance.

Reimbursement & Repayment

Employees must reimburse the department for tuition, hotel, meal, and other expenses, excluding time charges, when they fail to adhere to the program training requirements as outlined in Form 2151, FE/PE Engineer Career Development Program Agreement. Employees are eligible for reconsideration to participate in the FE/PE Training Program after reimbursing the department.

Employees who leave EACDP and do not remain with the department for the required service time commitment outlined in Section 1 will be required to reimburse the department for costs associated with the exam prep courses taken while in the program. Should the employee remain with the department and fulfill their service time commitment, no reimbursement is required.

Support Resources and Reference Materials

DE/DD's may allocate support resources or purchase reference material to share among participants. These may include, but are not limited to:

- The formation of study groups and making available time, equipment, and facilities for groups to meet and study together. The amount of individual or group study time allowed during normal work hours is at the discretion of the DE/DD.
- Appointment of a seasoned PE to Mentor and coach study groups or individuals.
- Purchase of reference materials used for study and preparation of FE or PE exams.
- Designating a central depository for past and current exam preparation materials.
- Computer-based or online training courses to prepare students for the FE or PE examination.
- Use of equipment.

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Appendix D Engineering Assistant Program Forms

These forms are associated with the Engineering Assistant Career Development Program and used to document activities and progress.

Form #	Form Title		Required	Optional	File location
2151	EA Career Development Program Agreement for FE	EA Career Development Program Agreement for PE	X		E-Forms - template HR File - original WFD Employee D/D Supervisor
2151	EA Career Development Program - Training Plan for FE Exam	EA Career Development Program - Training Plan for PE Exam	X		E-Forms - template HR File - original WFD Employee D/D Supervisor
2151mn	Mentor Contact Report (EA Career Development Program) mentor contact report			X or as required by supervisor or D/D	E-Forms - template HR File - original WFD Employee D/D Supervisor

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Appendix E

Test Taking Strategies

Test Masters Information

From Dr. Haku Israni,

1. **Please arrive early on the date of the exam**
2. **Bring these items with you to the exam:**
 - a. Admission ticket from the PE Board
 - b. Your ID
 - c. TWO approved calculators into the exam
 - d. One or two page summary sheets of formulas, conversion factors etc. for each subject.
3. **Read all questions carefully**
 - a. Prioritize and do them according to your comfort level.
 - b. Rate them 1 (easy), 2 (medium), 3 (hard and have no idea how to do).
 - c. First do all easy questions. Then medium and only in the end hard questions.
 - d. Every question is worth only one point.
 - e. Initially, never waste time on hard questions.
4. **Select the depth exam in the afternoon session, very carefully**
 - a. Work with your Mentor and Supervisor and Professional Development Advisors when making the selection.
 - b. Make sure that you have concentrated some of your study efforts on the depth subject.
5. **Keep track of time**
 - a. By the end of the first two hours of each session you must answer at least twenty questions.
 - b. Never... never... never get bogged down on any one question.
 - c. Remember, every question in each session is worth only one point.
6. **Be very careful about the calculations and units**
 - a. If you don't make any calculation or unit mistakes, you should pass the exam.
7. **Do not waste time**
 - a. Unless you must, never redraw the figures.
 - b. Also, do minimum writing.
8. **Use the last ten minutes**
 - a. To check that you have answered all the questions.
 - b. No points are deducted for incorrect answers.
9. **When proctor calls out the time, you must stop**

If you don't, your test paper may be voided.
10. **Leave your mobile phone or other electronic devices in your car**
 - a. You are not allowed to bring them in the exam room.
 - b. You will be asked to leave if you have a cell phone or pager in the exam.

Good Luck on the
Examination!!

Test Taking Strategies – Santa Clara University

- **Plan your arrival so that you have plenty of time.**
- **Be sure to check your test taking material prior to leaving for the exam.** (Showing up for an exam late or without a pencil is a sure way to focus unfavorable attention to yourself.)
- **Read all directions.** Underline key words in the directions that give indication as to how your answers are to be recorded and how they should be worded.
- **Budget your time.** Survey the test to determine the type and number of questions to be answered. Determine where you will start on the test. Check yourself at 15 or 20 minute intervals to determine if you are progressing at an acceptable rate.
- **Be aware that you may have problems remembering from time to time.** If you find yourself blocking, move on to the next question.
- **Ask for help** in interpreting test questions which you do not understand.
- **Be aware of any negative statements you are telling yourself about the test.**
 - Such statements as "I'm failing, I didn't study for this, and the test is too hard for me" are sure ways of increasing anxiety.
- **Do not be concerned with what the other students are doing.** (Another sure way of increasing anxiety is to tell yourself you are the only one having trouble or are the only one taking the exam.)
- **As a general rule answer the easy questions first.**

Answering Different Exam Questions

Multiple- Choice

- Pay attention to qualifying words (e.g., always, never)
- Do not look for patterns.
- Read through the questions with the answer.
- Estimate the alternatives.
- Look for clues (e.g., grammar, tenses)
- Guess if you don't know the answer.
- Work backwards - read the answers, then the question.
- Choose the best alternative (more than one answer may be correct).

Matching

- Matching is an exercise in recalling memorized information. The tests are divided into two columns. Items on the left side are usually matched with responses on the right side.
- Ask if you can use alternatives more than once.
- Do not match if you are not sure.
- Take each entry in turn in the left column and try to think of the answer before reading the choices.
- Choose the best answer and mark the answer sheet according to the directions
- Narrow down the field, by completing those answers you know are correct.
- Avoid changing answers.

Fill-in-the-Blank

- This test item also requires recalling specific types of information. Unlike multiple choice or matching questions, you must supply the appropriate word or number to complete the entry.
- Look for clues (e.g., grammar, tenses)
- Use common sense.
- Choose the best word.
- Pay attention to the length of line given or to the number of lines.
- Read through after you answer to make sure it sounds right.

Essay

- Essay questions are analytical in nature. Your instructor is interested in determining how well you relate course material and class discussion to the particular question under consideration.
- Read directions carefully (i.e., Do you have to answer every question or just three out of five?).
- Re-read questions. Pay attention and know the meaning of key words (e.g., explain, contrast, compare).
- Outline your answer.
- Include an introduction, middle, and conclusion to your essay.
- Include details.
- Be general when you aren't sure of the exact detail (e.g., It is better to write "late fourteen hundreds" rather than 1493 if the true date is 1492).

Short Answer

- Pay attention to grammar.
- Answer within the context of the course.
- Use terms the instructor used.
- If you are having a problem, answer by giving an example.
- Beef up your answers if you have time.

True/False

- Pay attention to qualifying words (e.g., always, never).
- The answer is false if any part is false.
- Do not look for patterns.
- Guess if you don't know.
- Stick with your first answer unless you are sure you are wrong.
- Problem-Solving.
- Read the question.
- Re-read getting important information.
- If there is a multiple option, estimate your answer.
- Work backwards (e.g., $2 + 3 = 5$, $5 - 2 = 3$).
- Watch for careless errors.

Important Words in Essay Questions

The following terms appear frequently in the phrasing of essay questions. You should know their meaning and answer accordingly. (*This list and the sense of definitions are adapted from C. Bird and C. M. Bird, Learning More by Effective Study, Appletom Century Crofts, New York, 1945, pp. 195-198.*)

- **COMPARE** – Look for qualities or characteristics that resemble each other. Emphasize similarities among them but in some cases also mention differences.
- **CONTRAST** – Stress the dissimilarities, differences, or unlikeness of things, qualities, events, or problems.
- **CRITICIZE** – Express your judgment about the merit or truth of the factors or views mentioned. Give the results or your analysis of these factors, discussing their limitations and good points.
- **DEFINE** – Give concise, clear and authoritative meanings. Don't give details, but make sure to give the limits of the definition. Show how the things you are defining differ from the things in other classes.
- **DESCRIBE** – Recount, characterize, sketch, or relate in sequence or story form.
- **DIAGRAM** – Give a drawing, chart, plan, or graphic answer. Usually you should label a diagram. In some cases, add a brief explanation or description.
- **DISCUSS** – Examine, analyze carefully, and give reasons pro and con. Be complete, and give details.
- **ENUMERATE** – Write in list or outline form, giving points concisely one by one.
- **EVALUATE** – carefully appraise the problem, citing both advantages and limitations. Emphasize the appraisal of authorities and to a lesser degree your own evaluation.
- **EXPLAIN** – Clarify, interpret, and spell out the material you present. Give reasons for differences of opinion or of results, and try to analyze causes.
- **ILLUSTRATE** – Use a figure, picture, diagram, or concrete example to explain or clarify a problem.
- **INTERPRET** – Translate, give examples of, solve, or comment on a subject, usually giving your judgment about it.
- **LIST** -- As in "enumerate," write an itemized series of concise statements.

- **OUTLINE** – Organize a description under main points and subordinate points, omitting minor details and stressing the arrangement or classification of things.

Other Test-Taking Resources

Answering Essay Exam Questions - Tulane University
Answering Essay Questions - University of Victoria
Answering Multiple-Choice Exam Questions - Tulane University
Big Test Tomorrow - George Washington University
Common Words Used in Essay Questions - George Washington University
Conquering Your Finals - Texas A&M University
Decide What You Need to Do to Prepare - George Washington University
General Remarks About Exams - Michigan State University
General Strategies for Objective Tests - George Washington University
General Strategies for Taking Essay Tests - George Washington University
General Suggestions for Taking Tests - Texas A&M University
How to Keep Calm During Tests - Texas A&M University
How to Take Tests - Brooklyn College
"I Know the Material, but When I Take the Test I Go Blank!" - Kansas State University
Learn Strategies for Multiple Choice Questions - George Washington University
Learn Strategies for True-False Questions - George Washington University
Managing Your Test Anxiety - University of Western Ontario
The Multiple Choice Exam - University of Victoria
Multiple Choice Exams - University of Guelph
Multiple-Choice Exams - University of Western Ontario
Preparing for Essay Style Exams - York University
Preparing for Exams – University of Waterloo
Preparing for Multiple Choice Exams - York University
Reducing Exam Anxiety and Improving Concentration - York University
Some General Rules About Exams - Tulane University
Strategies for Matching Columns - George Washington University
Strategies to Use with Difficult Questions - Virginia Polytechnic Institute
Suggestions for Test-Taking - Michigan State University
Test Anxiety - Hampden-Sydney College
Test Anxiety - Mary Washington College
Test Anxiety - SUNY at Buffalo
Test Anxiety - Texas Woman's University
Test Anxiety - University of Florida
Test Anxiety - University of Illinois
Test Anxiety - University of Oregon
Test Anxiety - University of Texas at Dallas
Test Anxiety Tips - University of California, Irvine
Test-Taking Strategies - Edinboro University
Test Taking Strategies - University of North Carolina
Top Ten Tips for Increasing Test Strategies - George Washington University
Top Ten Tips for Reducing Test Anxiety - George Washington University
Use Test Time Wisely - George Washington University
Writing Exams - University of Waterloo
The Writing of a History Essay Examination - University of Victoria

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