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**National Center
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Summary Report: Assessment Instrument for the Certified Transit Technician Program

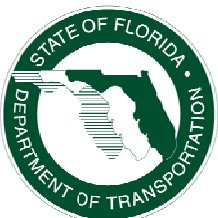
October 2010

Final Report



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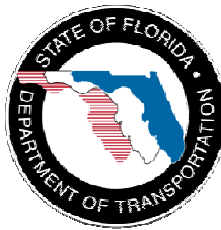
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Summary Report: Assessment Instrument for the Certified Transit Technician Program

Final Report

Prepared for



State of Florida Department of Transportation

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METRIC/ENGLISH CONVERSION FACTORS

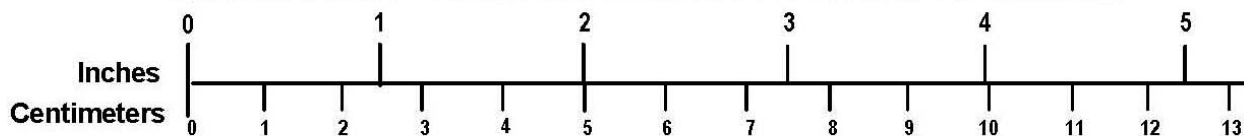
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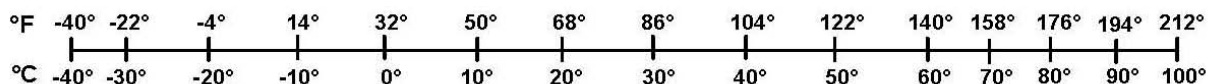
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Executive Summary

The objective of this body of work is development of a program assessment instrument to assist the Transit Maintenance Analysis and Resource Center (TMAARC) in determining the value of the recently established Certified Transit Technician (CTT) program. The CTT program is designed to train employees toward certification, prepare current transit technicians for National Institute of Automotive Service Excellence (ASE) testing and certification, and encourage the development of specialized skills necessary to foster retention and future advancement within Florida's transit agencies.

TMAARC anticipates using the results of the program assessment instrument to fine tune the curriculum, teaching methodologies, and administration of the program.

CTT program candidates must be employed as transit technicians at one of Florida's 32 public transit agencies and are recommended for participation by their respective home agency. Technical instruction is provided by a TMAARC instructor through Hillsborough Community College (HCC) via a curriculum established by the Florida Transit Maintenance Consortium (FTMC) that meets Post Secondary Adult Vocational (PSAV) training requirements and is structured as a planned sequence of three programs, providing a total of 15 modules of instruction. Each module requires classroom and on-the-job (OJT) training. TMAARC coordinates program participation, classroom instruction, OJT mandates, program logistics, and maintains a database that contains data relevant not only to the CTT program but also to the performance of transit technicians both within the classroom and on-the-job.

Two types of student performance standards are delineated within the HCC curriculum. The first type of performance standard requires that instructional strategies for the curriculum include methods that require students to organize, work cooperatively, and understand social, organizational, and technological systems as well as methods to improve students' personal qualities and higher-order thinking skills. The second type of performance standard is based on technical competency. The curriculum is designed specifically to teach students in a classroom setting the knowledge necessary to understand the basis of highly technical principles, which when combined with hands-on training, yields a technically competent transit technician.

Specific outcome-based performance measures gleaned from recommendations across the industry, within the parameters of the HCC curriculum, from Florida maintenance managers, and contained in the project outline focus on efficiency and effectiveness. An objective, i.e., a target for acceptable performance, identified for each measure of performance, was based on current program goals. Operating indicators were identified to supplement performance measures in evaluating and monitoring performance. A data collection template for calculating actual performance measures and operating indicators was developed and is included in the report.

In addition to an evaluation of actual program performance through the use of established performance metrics and operating indicators, the assessment tool, as developed, includes a discussion of program adherence to established policies and procedures along with a description of actions undertaken to achieve program mandates. While the structure of the CTT program was well-defined early on, actual implementation of most programs often requires some type of adjustment that can range from minor

tweaking to major shifts in the actual application of the program. The program assessment instrument contains a summary of the development, purpose, and activities of the program during the past year, including important program milestones such as the selection of participants, official HCC admission dates, and class schedule. Efforts undertaken to achieve statutory compliance, coordinate with program partners, and implement program mandates also are detailed along with significant highlights that occurred during the year.

The rationale and basis for new initiatives are discussed in terms of problem resolution or enhancement of a successful endeavor. A summary of program metrics that describes the breadth and impact of the program assists in providing an understanding of the significance of the program and the benefits derived. The final component of the program assessment tool is a detailed description of improvements planned for next year's program, followed by a general overview of the program presented as a summary of findings. The assessment tool, as designed, can be used on an annual basis to evaluate the CTT program.

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Background

Since 1990, the Transit Maintenance Analysis and Resource Center (TMAARC), housed within the Center for Urban Transportation Research (CUTR) at the University of South Florida (USF), has developed and implemented the curriculum for transit technician maintenance training through contract trainers to foster a skilled workforce capable of maintaining the public transportation vehicle fleet in Florida. TMAARC recently expanded transit technician training through the creation of a new program, the Certified Transit Technician (CTT), which is specifically designed to prepare students for employment in the transit industry, train employees toward certification, prepare current transit technicians for National Institute of Automotive Service Excellence (ASE) testing and certification, and encourage the development of specialized skills necessary to foster retention and future advancement within Florida's transit agencies.

CTT program candidates must currently be employed as transit technicians at one of Florida's 32 public transit agencies and are recommended for participation in the program by their respective home transit agency. Technical instruction is provided by a TMAARC instructor through Hillsborough Community College (HCC) via a curriculum established by the Florida Transit Maintenance Consortium (FTMC) that meets the requirements for Post Secondary Adult Vocational training. The curriculum consists of a planned sequence of three programs of instruction, consisting of a total of 15 modules of study, with each requiring classroom instruction and on-the-job training (OJT). The three programs are delineated as transit technician levels I, II, and III. OJT requirements are completed at each student's home agency under the oversight of assigned supervisors and are certified by both the maintenance supervisor and transit agency director upon completion. TMAARC coordinates program participation, classroom instruction, OJT mandates, and program logistics for participants as well as their home agencies. In addition, TMAARC maintains a database that contains all data relevant not only to the CTT program but also to the performance of the transit technicians both within the classroom and on-the-job.

The CTT program is a complex undertaking with a variety of components. It is anticipated that the CTT program will assist transit groups in fostering and maintaining a highly skilled maintenance workforce. Students will receive vital feedback on performance, which will allow the educational program to be tailored to individual areas of need, and, over the long term, advanced skills developed as a result of this project are likely to produce a positive impact on overall transit maintenance performance throughout Florida's transit agencies. It is important to assess the overall effectiveness of the new maintenance training program to evaluate the curriculum, determine the value of the technical instruction, and identify enhancements introduced to improve the program over time.

TMAARC collaborated with the National Center for Transit Research (NCTR) on a project entitled "Research and Develop a Program Assessment Instrument for the Certified Transit Technician Program" for evaluation of the program and analysis of trends. The first students enrolled in the program will be tracked as they progress through the entire curriculum. The program assessment instrument intends to determine the value of the program as it relates to sound maintenance practices and enhancing

efficiency and effectiveness at the property level. In addition, TMAARC anticipates using the results of the program assessment instrument to fine tune the curriculum, teaching methodologies, and administration of the program.

A project team was assembled and tasked with reviewing existing programmatic and course materials to ensure familiarization with all aspects of the CTT program and curriculum, followed by a review and research of existing assessment methods that are employed in the transit area, educational arena, and in related industries. The project team was also tasked with the conduct of a literature review, conversations with transit managers and HCC education specialists, and interviews with at least three Florida agencies, including a large, mid-sized and small agency to gain some diversity in consultation.

The project team developed a survey tool (Appendix A) in order to explore and identify scheduled participants' attitudes and perceived abilities prior to entry into the program. The survey tool was administered prior to the start of the program and will be administered after completion of the first five program occupational completion points (OCP). Post-participation survey results will be compared not only with pre-participation survey results, but also with actual performance to assist in the program assessment process.

Based on findings assembled, the project team developed and formalized an approach to assessing the CTT program, which was reviewed, modified and approved by the TMAARC program manager. The approach addresses: HCC evaluation criteria (student performance measures); participant outcomes; movement of participants through the program; level of interest in program participation; remediation requirements; requests for additional instruction; participant survey results; and, relevance of course content to technician job duties.

The implementation phase includes selection of an existing set of parameters for inclusion in the assessment instrument in addition to integration of these parameters into the CTT tracking database.

This report chronicles the development of the CTT program assessment instrument and is organized to provide a detailed description of the transit technician training program, an overview of the FTMC/HCC Curriculum Framework, as approved by the Florida Department of Education (FDOE), a review of literature regarding evaluation criteria used within other maintenance training programs, selected measures of performance, and highlights the program assessment instrument.

The report also includes select survey instruments and other assessment materials developed during the course of the research effort. Electronic versions of the data templates developed for calculation of survey results and performance metrics as well as the assessment tool will be provided to the TMAARC program manager and are not included in this summary report.

Certified Transit Technician Training Program

In cooperation with HCC, the CTT curriculum is a planned sequence of three programs of instruction, consisting of a total of 15 modules (referred to as occupational completion points or OCPs) of study, with each requiring classroom instruction and OJT. The three programs are delineated as transit technician levels I, II, and III. Each tier contains five OCPs. Transit technician I and II are prerequisites for transit technician III, and, ultimately, transit technician certification. All candidates entering the program begin instruction with the first module of tier one and are presumed to possess a level of technical knowledge. Candidates are expected to develop skills, progress through the course of study, and successfully fulfill all certification requirements. The courses may be taken in any sequence within a respective tier, but tiers must be taken sequentially, starting with tier 1, followed by tier 2, and ending with tier 3. Prior to advancing to the next tier, students must complete the five corresponding OCPs for each technician level and are required to demonstrate proficiency in a tier. Modules are designed to conform to national training standards to ensure that the appropriate content is presented as bus maintenance certification is tied to successful completion of Automotive Service Excellence testing.

In March 2009, FDOE approved a two-tiered curriculum for a CTT training program that provides apprenticeship certification and meets the requirements for Post Secondary Adult Vocational (PSAV) training. HCC approved the following PSAV program pursuant to a Memorandum of Understanding with USF in December 2009, and classes were approved to begin during the spring 2010 semester.

Post Secondary Adult Vocational education

- i. 15 modules
- ii. Classroom + hands-on for each module
- iii. High school students
 - A. Can enroll
 - B. Can earn credit
 - C. Receive hands-on from a technical school or a willing agency
- iv. 33 hours towards Associate in Applied Science (AAS) degree

TMAARC established an official training site located at the Pinellas Suncoast Transit Authority (PSTA), finalized scholarship funding, formalized training modules, and published student workbooks. Transit agencies were tasked with developing unique selection criteria for screening and selecting transit technicians interested in participating in the program. At one of the smaller agencies, the maintenance manager determined that the agency could afford to have a maximum of two technicians participate in the initial program, given the level of commitment required not only in terms of classroom requirements, but also in terms of the OJT mandates. Technicians were selected based on an overall evaluation of the workforce. Critical factors in the determination included employee performance, motivation, and commitment to the agency moving forward. Seniority was not a factor in the selections. The maintenance manager personally functions as the participants' supervisor, and the shop foreman is the designated mentor for the two CTT program participants.

The maintenance manager of a mid-sized agency with a strong union presence and an in-house training department used a more structured selection process than was the case with the smaller agency. All

aspects of the selection process were coordinated not only with the agency's union but also with the agency's Human Resources (HR) division. A working group, consisting of representatives from maintenance, the union, and HR, was organized to outline a selection process that included participant qualifications and a structured interview process. The interview panel scored each employee's written submission and response to interview questions, ranked candidates according to the highest score, and selected the top four employees for participation in the program. Two back-up employees were also identified. In-house training staff mentor CTT program participants and shadow classes and hands-on training to ensure consistent application of the training curriculum at the agency.

The maintenance manager, in conjunction with the executive director and the union, of the larger agency surveyed determined that a total of four employees would be allowed to participate in the program. Since the agency operates three individual shops in addition to a support services area, the agency determined an employee from each of the areas would be allowed to participate (one employee from each area). The primary criteria used for selection was seniority, followed by attendance. The agency placed special emphasis on attendance, not only because attendance was viewed as a sign of dedication but also because class attendance is mandatory. The maintenance manager, who will serve as the mentor for the four participants, met with each of the successful candidates to review program details and paperwork, provide them with feedback on their participation, and to confirm the schedule and requirements.

A total of 8 of the 32 Florida transit agencies selected 16 employees to participate in the CTT program. Most of the participating agencies (7 of 8) directly operate fixed-route bus service and function as large or mid-sized agencies within Florida that operate more than 40 vehicles in maximum service. The number of program participants from each agency ranged from one to four. The technicians selected by individual agencies and accepted by TMAARC to participate as students in the program registered on-line through the HCC Website from January 4 through January 8, 2010. Students also established a homepage on the TMAARC Website, as each student is given the opportunity to have an account maintained at the TMAARC Website that is capable of providing information related to his/her enrollment status and progress in the program through a database developed and maintained by TMAARC.

The Test of Adult Basic Education (TABE test), required by HCC for admission into the program, was administered on January 15, 2010. Sixteen applicants successfully completed all admission requirements and participated in their first class at that time.

Prior to the start of the first class, participants completed the Transit Technician Program Participant Survey (Appendix A) developed by the project team to explore and identify participants' attitudes and perceived abilities prior to entry into the program. Pre-participation survey results will be compared with actual performance after the first five program OCPs to assist in the program assessment process.

All students are provided the same classroom instruction. Modules are programmed by TMAARC and are primarily administered at the PSTA training site by a TMAARC instructor, who is credentialed by HCC. Each module is generally 3 to 5 days, and the home transit agency pays the students' normal wages and

travel to and from the training site. Payment of tuition is made through a scholarship fund established by the Florida Public Transportation Association (FPTA) at the time of registration. The cost of each 5 module curricula is approximately \$1,400 with a total PSAV cost of \$4,200. TMAARC pays lodging, per diem, and administrative costs in addition to the instructor's salary. Because the program provides the instructors, the curriculum, and the facility, most tuition costs are recouped by back-charging HCC, at which time the FPTA scholarship account is reimbursed.

TMAARC identified three distinct methodologies to evaluate the performance of CTT program participants. The first measure focuses on the classroom and includes two comprehensive tests with one test administered prior to the start of each module and the other test following completion of the classroom instruction provided within the module. Positive change in the post-test score is defined as improvement, and the degree of change indicates the significance of the improvement. The post-test comprises subject matter included in the pre-test but mirrors the format of the ASE exam and is standardized to ensure integrity of the instruction and training as well as to ensure fairness and represent reasonable assurance of knowledge gained. Students are required to achieve a satisfactory qualifying score of 75 percent on the post-test, which is administered to all participants by TMAARC staff.

The second methodology is based on the hands-on training that students complete in the form of OJT as required in each of the modules. Students receive college credit for the highly technical OJT that is typically performed at the student's property. The unique structure of the program allows for OJT to be conducted in a variety of formats, while still maintaining the standards set forth by the CTT program. Pre-approved "task lists" for each subject area are used by students and supervisors to ensure continuity of instruction across the various property instructional and supervisory formats. OJT instructors can be different, based on the agency's contract or supervisory situation; nonetheless, final "work orders" verify that the required tasks are actually completed and must be retained and made available for verification of the training. Upon completion of all tasks, the OJT documentation form must be verified and signed by the maintenance supervisor and the home transit agency director. The signed OJT documentation form is forwarded to the TMAARC program director, and the student's progress is updated on the TMAARC Website.

Upon successful completion of classroom instruction and OJT mandates for each module, students are required to sit for the relevant ASE exam.

Students are eligible for articulation after successfully completing three curricula (15 modules). HCC will grant 33 hours of college credit toward an AAS degree (60 hours). The student registers with HCC, presents the PSAV certificate, and the 33 college credit hours are then awarded upon enrollment in the AAS degree program. The first two of the nine remaining classes (for 6 of the 27 additional credit hours) must be completed on-line or in person at HCC in order to establish residency. The remaining seven classes (21 additional credit hours) can be completed on-line or at a community college of the student's choosing and then transferred to HCC. The anticipated cost per course is approximately \$300, with the expected cost of the degree in the range of \$2,700.

The three courses that were presented during the spring 2010 semester are as follows:

January 25 – 29, 2010	Course #DIM0810 – Transit Equipment Preventive Maintenance Technician
March 15 – 18, 2010	Course #DIM0813 – Transit Diesel Engine Preventive Maintenance Technician
May 3 – 7, 2010	Course #DIM0814 – Transit Steering and Suspension Technician

Career and technical evaluation program course standards are established pursuant to Section 1004.92, Florida Statutes, for school districts and community colleges, and State Board of Education Rule 6A-6.0571 (criteria for qualification of special technical education program courses) provides the basis for the development and dissemination of curriculum frameworks. As a result, the CTT program course standards are composed of two parts: curriculum framework (major concepts/content, laboratory activities, special notes, and intended outcomes) and student performance standards listed for each intended outcome. Following is the approved HCC curriculum framework.

Hillsborough Community College Curriculum Framework

Curriculum Title:	FTMC Certified Transit Technician
Curriculum Type:	Job Preparatory
Occupational Area:	Industrial Education
Components:	3 Programs, 15 Occupational Completion Points
Career Curriculum:	Transportation, Distribution and Logistics
Grade Level:	Secondary: 9-12, 30, 31 / PSVA: 30, 31
Facility Code:	203
Career & Technical Organization:	SkillsUSA
Co-op Method:	Yes
Apprenticeship:	Yes

Purpose

The purpose of the FTMC Certified Transit Technician curriculum is to prepare students for employment as transit technicians, to train existing employees to become FTMC certified transit technicians, and to prepare existing technicians for the ASE series of transit bus tests (certification).

Course Content

In addition to technical content related to transit maintenance, repair, and safety, students receive instruction in communication, human relations, and employability skills. Course content is outlined as follows.

- Maintaining and repairing diesel engines
- Performing diesel engine and bus preventive maintenance inspections (PMI)
- Maintaining and repairing Americans with Disabilities Act accessible lifts and ramps
- Maintaining and repairing basic electrical systems
- Maintaining and repairing steering and suspension systems
- Maintaining and repairing hydraulic systems
- Maintaining and repairing electrical systems

- Maintaining and repairing heavy duty bus drive-train systems and components
- Maintaining and repairing brake and air systems
- Maintaining and repairing transmission and cooling systems
- Maintaining and repairing digital multiplex electrical systems
- Overhauling diesel engines and bus transmissions
- Maintaining and repairing heavy duty (10 ton) A/C systems and components
- Maintaining and repairing alternative fuel vehicles and components
- Troubleshooting, maintaining, and repairing electronic computer controls and sensors and advanced electrical systems
- Training in communication, leadership, human relations, transit safety awareness, Material Safety Data Sheets, employability skills, and safe efficient work practices

Curriculum Structure

The HCC curriculum consists of a planned sequence of three programs of instruction consisting of 15 OCPs. The recommended sequence allows students to complete specified portions of the program for employment or to remain for advanced training. A student who completes the applicable competencies at any OCP may continue with the training program, or terminate as an occupational completer. It is recommended that students complete the five OCPs for each technician level before advancing to the next tier. Transit technician I and II are prerequisites for the transit technician III, and ultimately, the FTMC transit technician certification. Courses may be taken in any sequence within their respective tier, but tiers must be taken sequentially, starting with tier 1, then tier 2, and ending with tier 3. Students must demonstrate proficiency in the preceding tier prior to advancement to the next higher tier.

Course Credit

1. TRANSIT TECHNICIAN 1 (Tier 1) (620 hours)

- Transit Bus Service 1 [200 hours] OCP – A – Transit Equipment Preventive Maintenance / PSAV DIM 0810 – 6.6 credits – An introductory course into transit maintenance, which includes identifying shop organization, management, and safety requirements. Students will demonstrate the use of hardware and fasteners, basic tools and equipment; perform transit bus and forklift preventive maintenance, tire service identification and repair; and, demonstrate workplace communication skills and qualifications for employment. This class was offered on January 25 through January 29, 2010 at the PSTA training facility.
- Transit Bus Service 2 [120 hours] OCP – B – Basic Transit Electrical / PSAV DIM 0811 – 4 credits – This is the introductory electrical systems course that explains the theory and nature of electricity, basic electrical terminology and symbols, solving problems using Ohm's and Kirchhoff's laws, and understanding and analyzing electrical circuits and components.
- Transit Bus Service 3 [60 hours] OCP – C – Transit Wheelchair Lift/Ramp System / PSAV DIM 0812 – 2 credits – Students will learn how to troubleshoot and repair wheelchair lifts, pumps, hoses and components; wheelchair ramps and associated hardware; bus kneeler systems and components; and, related hydraulic and electrical systems.
- Transit Bus Technician 4 [120 hours] OCP – D – Diesel Engine Preventive Maintenance / PSAV DIM 0813 – 4 credits – Students will identify types of bearings, seals, gaskets, and fasteners and their uses; identify power train components and functions; identify threaded fasteners by size, type, thread series, thread class, material hardness, and compatibility;

and, demonstrate the ability to remove correctly an oil sample for analysis. This class was presented on March 15 through March 18, 2010 at the PSTA training facility.

- e. Transit Bus Technician 5 [120 hours] OCP – E – Transit Steering & Suspension / PSAV DIM 0814 – 4 credits – Students will troubleshoot and repair conventional steering systems, front and rear-axle suspensions, and hydraulic steering systems. Students will also service tires and wheels, bearings, hubs and seals, align bus frames and adjust height. This class was held on May 3 through May 7, 2010 at the PSTA training facility.

2. TRANSIT TECHNICIAN 2 (Tier 2) (620 hours)

- a. Transit Bus Service 6 [60 hours] OCP – F – Transit Hydraulics / PSAV DIM 0820 – 2 credits – This course details the basic principles of hydraulics, identifies and explains the operating components of hydraulic systems, and enables students to locate and identify hydraulic units by their symbols on a diagram. Maintenance and reconditioning of lines and reservoirs, pumps and motors, control valves and cylinders are also included.
- b. Transit Bus Service 7 [120 hours] OCP – G – Diesel Electrical and Diesel Engine Electronics / PSAV DIM 0821 – 4 credits – This is a mid-level course that examines, explains, and troubleshoots the charging and starting systems, examines regulators, rectifiers, AC and DC motors, batteries, instruments and gauges. Students will also identify, diagnose, remove and replace electronic sensors and analyze electrical circuits related to the engine.
- c. Transit Bus Service 8 [120 hours] OCP – H – Transit Bus Drive-train / PSAV DIM 0822 – 4 credits – This course explains power train operating principles and identifies components; troubleshooting shift patterns; clutch servicing; driveline and power take-off servicing; and, service and repair of differentials.
- d. Transit Bus Service 9 [120 hours] OCP – I – Intermediate Transit Electrical / PSAV DIM 0823 – 4 credits – This mid-level electrical course explains the principles of operation and purposes of transistors, relays, and switches found on transit equipment. Common electrical components are tested and troubleshot. Equalizer and diode tests are explained. The ATEC circuit simulator is introduced and circuits are built. Complex schematics and charts are introduced.
- e. Transit Bus Service 10 [200 hours] OCP – J – Transit Brakes/Air System / PSAV DIM 0824 – 6.6 credits – This course is a comprehensive examination of air brake systems and their supporting components. Principles of operation, servicing, troubleshooting and repairing of the following systems/components are included: air, brake, parking, ABS, Wedge, S-Cam, air compressors, hydraulic booster, shoes, pads, kits, valves and lines. The brake board is utilized.

3. TRANSIT TECHNICIAN 3 (Tier 3) (680 hours)

- a. Transit Bus Service 11 [120 hours] OCP – K – Transit Alternative Fuels System / PSAV DIM 0830 – 4 credits – This advanced course explores current alternative fuels technology with detailed descriptions and troubleshooting of the EP40 parallel hybrid system. Components include: ESS energy storage system, DPIM dual power inverter module, and TCM/VCM. Torque blending theory, fuel cells, ULSD, PC-10 and CJ-4 oils, and alternative fuels are also presented.
- b. Transit Bus Service 12 [120 hours] OCP – L – Advanced Transit Electrical / PSAV DIM 0831 – 4 credits – This advanced electrical course builds on the ATEC circuit simulation modules, examines programmable logic controllers (PLC), multiplex systems and their components, ladder logic charts, various electrical instruments, and various type of sensors. Students will

learn how to identify and troubleshoot multiplex electrical system and read and understand complex electrical schematics and charts.

- c. Transit Bus Service 13 [140 hours] OCP – M – Transit Bus HVAC / PSAV DIM 0832 – 6.6 credits – This advanced course is a detailed, comprehensive examination of the modern HVAC system utilized on a transit bus. All areas and components are covered, including EPA requirements, refrigeration, recovery and reclaim, inspection, and troubleshooting. 608 certification testing is included.
- d. Transit Bus Service 14 [120 hours] OCP – N – Transmission Diagnosis, Rebuild and Repair / PSAV DIM 0833 – 4 credits – In this advanced course, the student will: identify the basic transmission components and functions, identify principles of operation, assemblies, and systems of transmission operation, troubleshoot and repair transmission systems, rebuild transmission assemblies, and rebuild/troubleshoot retarder assembly.
- e. Transit Bus Service 15 [120 hours] OCP – O – Diesel Engine Diagnosis, Rebuild and Repair / PSAV DIM 0834 – 6.6 credits – In this advanced course, the student will: identify principles, assemblies, and systems of engine operation, apply math skills and scientific principles common to diesel technology, troubleshoot and repair engine systems, rebuild a cylinder-head assembly, remove and replace camshaft assemblies, and build a block assembly.

Safety guidelines in the student performance standards are based on those recommended in the ASE Program Certification Standards administered by the National Automotive Technicians Education Foundation (NATEF). Classroom, shop, and laboratory activities, which are an integral part of the curriculum, include instruction in the use of safety procedures, tools, equipment, and materials based on processes used in the industry. The designated Career and Technical Student Organization (CTSO) for providing leadership training and for reinforcing specific career and technical skills is SkillsUSA, Inc. CTSO is an integral part of the career and technical instructional program, and CTSO activities are defined as part of the curriculum in accordance with Rule 6A-6.065, Florida Administrative Code. Vocational credit is awarded to the student on a transcript in accordance with Section 1001.44(3) (b), Florida Statutes (F.S.).

Cooperative training (also referred to as OJT) is a primary component of the program, and each student must be provided with a training plan, signed by the student, instructor, and employer, that identifies instructional objectives; provides a list of on-the-job and in-school learning experiences; designates a workstation that incorporates equipment, skills and tasks that are relevant to the transit technician; and, compensates the student for work performed.

Minimum basic-skills grade levels required for completion include Mathematics 9.0, Language 9.0, and Reading 9.0. These grade-level numbers correspond to grade-equivalent scores obtained on one of the state-designated basic-skills examinations. If a student fails to meet the basic-skills level required for completion of the program, remediation must be provided concurrently through Vocational Preparatory Instruction (VPI).

Federal and state legislation require accommodations for students with disabilities to meet individual needs and ensure equal access. Adult students with disabilities are required to self-identify and request such services. When a secondary student with a disability is enrolled in a vocational class with

modifications to the curriculum framework, the particular outcomes and student performance standards, which the student must master to earn credit, must be specified on an individual basis.

In order to accomplish the Secretary's Commission on Achieving Necessary Skills (SCANS) competencies, instructional strategies for this curriculum include methods that require students to identify, organize, and use resources appropriately, work with each other cooperatively and productively, acquire and use information, understand social, organizational, and technological systems, work with a variety of tools and equipment. Instructional strategies must also incorporate methods to improve students' personal qualities and higher-order thinking skills. The standard program length for transit technician tier 1, 2, and 3 is 620, 620, and 680 hours, respectively.

CTT Program Evaluation Criteria

Researchers reviewed potential evaluation criteria, including HCC curriculum-based student performance standards, evaluation criteria employed industry-wide in maintenance training programs, performance criteria proposed by select Florida maintenance managers, and a program assessment methodology as described in the CTT program assessment project.

HCC Curriculum-based Student Performance Standards

Student performance standards are clearly delineated within the curriculum and, generally, consist of two types of standards. The first type of performance standard relates to SCANS competencies, which requires that instructional strategies for the curriculum include methods that require students to organize, work cooperatively, and understand social, organizational, and technological systems as well as methods to improve students' personal qualities and higher-order thinking skills. The following student performance standards are considered to be SCANS-related competencies.

1. Demonstrate infection control procedures and general shop safety
2. Demonstrate workplace communication skills
3. Shop organization, management, and safety requirements
4. Work habits of successful employees concerning:
 - a. Quality of work
 - b. Work hours and schedule
 - c. Actions, initiative, teamwork, dependability, and responsible decision-making
 - d. Self-control, responses to criticism, relationships with customers and supervisors
 - e. Time management, cost effectiveness, and fair pricing
 - f. Personal hygiene, health habits, and professional appearance
 - g. Driving records, drug-free workplace, and industry policies
5. Obtain information about training/licensing requirements, equipment needs, responsibilities, pay, benefits, work conditions, risks, opportunities for advancement
6. Knowledge of the "Right-to-Know" law, as recorded in 29 CFR-1910.1200

The second type of performance standard is based on technical competency. The curriculum is designed specifically to teach students in a classroom setting the knowledge necessary to understand the basis of

highly technical principles, which when combined with hands-on training, yields a technically competent transit technician. Technical performance standards are outlined below.

1. Application of math and science principles
2. Demonstrate the use of hardware and fasteners, basic tools and equipment
3. Perform transit bus and forklift preventive maintenance
4. Perform tire service, identification and repair
5. Demonstrate qualifications for preventive maintenance
6. Maintain and repair transit bus electrical systems and components
7. Maintain and repair transit bus wheelchair lift/ramp systems and components
8. Perform diesel engine preventive maintenance
9. Maintain and repair steering and suspension systems
10. Maintain and repair hydraulic system components
11. Identify and apply electrical principles related to diesel technology
12. Identify and apply electronic principles related to diesel technology
13. Maintain and repair electrical systems
14. Maintain and repair transit bus power train systems and components
15. Maintain and repair transit bus intermediate electrical systems and components
16. Maintain and repair brake systems
17. Maintain and repair alternative fuel systems
18. Maintain and repair transit bus advanced electrical systems and components
19. Maintain and repair air-conditioning and heating systems
20. Maintain, diagnose, repair, and rebuild transit bus transmission assemblies
21. Identify principles, assemblies, and systems of engine operation
22. Apply math skills to diesel technology tasks
23. Apply scientific principles common to diesel technology operations
24. Troubleshoot and repair engine systems
25. Rebuild a cylinder-head assembly
26. Remove and replace camshaft assemblies
27. Rebuild a block assembly

Industry-wide Performance Evaluation

In an attempt to identify industry-wide maintenance training program evaluation criteria, researchers conducted an extensive review of current bus maintenance training programs designed to provide training to employees of public transportation systems with special emphasis on the types of metrics used to evaluate the value of the training. Based on the review, researchers concluded that transit technician training opportunities generally focus on enhancing the skill level of the workforce. Training programs tend to be subject specific, are often designed to enhance a defined skill or develop a thorough understanding of a delineated task, are made available to most technicians employed by the agency, and are frequently made available to the workforce in order to provide a mechanism for advancement within the agency. While several mechanisms designed to assess the value of a specific training program were identified, in many cases, it was assumed that the training was effective and

minimal evaluation of the effectiveness of the training was conducted or considered in the development of future training programs.

The CTT program, as designed by TMAARC, appears to be the first of its kind within the arena of maintenance training. While myriad training opportunities are available to public transit maintenance employees throughout the United States, none mirrors the structure of the CTT program, which combines an established college curriculum with agency-based OJT and culminates in the potential matriculation of the participating transit technicians.

Researchers identified the following tools that were employed to evaluate the effectiveness of bus maintenance training at select public transit agencies.

Surveys

The use of a survey to monitor participants' levels of satisfaction with training is a primary tool of evaluation used by a number of programs, including partnerships in Pennsylvania (through statewide Keystone Training Partnerships), Utah, upstate New York, and northern California, where training is sponsored by both the Transportation Learning Center (TLC) and the Southern California Regional Transit Training Consortium (SCRTTC), which comprises 14 public transportation agencies and 12 community colleges located in Southern California. The survey is the sole mechanism used by SCRTTC for evaluating the significant number of courses it provides. SCRTTC's survey tool focuses on the participant's level of satisfaction with the instructor, training materials, facilities and location as well as the overall course. Participants are also asked if the program meets expectations and if they would recommend the program to another transit technician. The CTT program has incorporated the use of a survey at the end of each module that addresses participants' levels of satisfaction with the instructor.

Post-test Score versus Pre-test Score

Keystone Transit Career Ladder Partnerships and Project Empire Transit Career Ladder Partnership, both sponsored by TLC, test participants prior to training and then, again, after training has been completed. Positive change in the post-test score is defined as improvement, and the degree of change indicates the significance of the improvement. The CTT program has also established the use of a post-test and a pre-test for each training module; however, unlike the Keystone Partnerships, the CTT program post-test comprises subject matter included in the pre-test but mirrors the format of the ASE exam and is standardized to ensure integrity of the instruction and training as well as to ensure fairness and represent reasonable assurance of knowledge gained. Students are required to achieve a satisfactory qualifying score of 75 percent on the post-test, which is administered to all participants by TMAARC staff.

Practical Exam

Southeastern Pennsylvania Transportation Authority (SEPTA) requires employees to pass a hands-on test after completing training to demonstrate knowledge and skills necessary to do the job. TriMet and the Amalgamated Transit Union, Local 757, have incorporated a final examination for their joint apprenticeship program that includes both written and competency-based processes for formal and self-study courses that must be passed with a minimum grade of 70. Within the CTT program, one

factor for successful module completion is achieving a satisfactory qualifying score of 75 percent on the comprehensive post-module test that is administered by TMAARC staff to all participants at the end of each module.

Return on Investment Analysis

SEPTA evaluated the cost savings generated from its training investment and concluded that return on investment for a program of significant size is a worthwhile evaluation tool for agencies of significant size. SEPTA further indicated that data limitations preclude the use of quantitative studies for assessing the impact of training for smaller properties.

Mean Distance between Failures (MDBF)

The Capital District Transportation Authority (CDTA), a member of the Project Empire Career Ladder Partnership in New York State, measured the increase in mean distance between failures to evaluate training opportunities.

Reduction in Bus Defects

CDTA also measured the number of bus defects before and after training to evaluate the impact of training initiatives.

On-time Preventive Maintenance Inspections (PMI)

Improvement in on-time preventive maintenance inspections was also tracked by CDTA to evaluate its preventive maintenance training.

Performance-based Instruction

Based on a telephone survey of the transit industry conducted as part of a Transit Cooperative Research Program (TCRP) project, performance-based instruction that focused on demonstration of skills, observation and practice, and mastery was used by 63 percent of respondents in training initiatives.

Florida Transit Agency Performance Evaluation

Interviews were conducted with three Florida maintenance managers to gain input on the CTT program, selection methodology, program structure, and a potential program assessment methodology. The transit agencies included a large, mid-sized, and small agency to ensure diversity in consultation. In determining the value of the CTT program from an agency perspective, maintenance managers identified the following measures of performance.

Quantity of Work

Maintenance managers from the small, mid-sized, and large agencies indicated that CTT program participants will be expected to achieve agency required preventive maintenance inspections and repairs. The managers recommended that both activities should be tracked to determine the technician's level of proficiency.

Quality of Work

Maintenance managers concurred that improvement in the quality of the work accomplished by the technicians must be evaluated in addition to the number of maintenance activities performed by the technicians. Metrics recommended by the managers to evaluate quality of work included tracking

recalls within five days of a preventive maintenance inspection to evaluate the quality of preventive maintenance activities performed and identifying the number of repeats/comebacks and component failures per repair to provide an assessment of repair quality. Quality of work is a SCANS-related competency.

Quality of Written Work Orders

The managers anticipate that CTT program participants will perform at a professional level in their production of written reports and identified four criteria for determining the quality of written work orders prepared by the technicians. The criteria include: legibility, completeness, accuracy, and timeliness.

Communication Skills

Maintenance managers suggested evaluating the nature of CTT program participants' interactions with peers and supervisors to assess their development of good communication skills. Demonstration of workplace communication skills is an established SCANS-related competency.

Contribution to Team

The managers generally agreed that CTT program participants should actively contribute to the bus maintenance team and recommended evaluating their contribution in terms of shared knowledge and lesson learned. Teamwork and the participants' relationships with supervisors are also established SCANS-related competencies.

Level of Participation

The managers also agreed that CTT program participants should actively participate in the bus maintenance team and recommended evaluating their level of participation in terms of their patterns of regular classroom and on-the-job attendance as well as arrival for class and work on-time. Work hours and schedule are also established SCANS-related competencies.

Work Habits

Maintenance managers anticipate that CTT program participants will exhibit professional work habits, free of occurrences and disciplinary actions not only within the classroom but also on-the-job. Work habits are established SCANS-related competencies.

Hands-on Practical Exam

One of the maintenance managers recommended that a hands-on practical exam be conducted by the mentor or supervisor after on-the-job training to verify that the CTT program participant developed the appropriate skills through the OJT.

Assessment Approach

The formalized approach outlined in the project scope for assessing the CTT program was designed to address the following factors.

1. HCC evaluation criteria (student performance measures)
2. Participant outcomes
 - a. Enrollment

- b. Attendance
 - c. Advancement
 - d. On-the-job training
- 3. Movement of participants through the program
- 4. Level of interest in program participation
- 5. Remediation requirements
- 6. Request for additional instruction
- 7. Participant survey results
- 8. Relevance of course content to technician job duties

CTT Program Assessment

The CCT program is a sophisticated amalgamation of college-based instruction and technical training for transit technicians employed by public transit agencies from throughout Florida. The significant partners responsible for the development and delivery of the CTT program include Hillsborough Community College, Florida Department of Transportation, Florida Transit Maintenance Training Consortium, Florida Public Transportation Association, Florida's public transit agencies, Pinellas Suncoast Transit Authority, Transit Maintenance Analysis and Resource Center, and the Center for Urban Transportation Research. Each partner plays a critical role in the provision of the CTT program.

Assessment of this complex program must be sensitive to the variety of components that are integrated to provide education and technical training for a group of public transit technicians employed at multiple public transit agencies. The first step in the annual assessment process to evaluate the program and its effectiveness in achieving its defined goals is a review of what the program actually looked like during the first year, including a discussion of critical components. While the structure of the CTT program was well-defined early on, actual implementation of most programs often requires some type of adjustment that can range from minor tweaking to major shifts in the actual application of the program. The assessment should provide a summary of the development, purpose, and administration of the program during the past year, including important program milestones such as the selection of participants, official HCC admission dates, and class schedule. Efforts undertaken to achieve statutory compliance, coordinate with program partners, and implementation of program mandates should be reported in detail along with significant highlights that occurred during the year.

TMAARC should provide a summary of efforts undertaken during the past year in coordination of program activities with CTT program partners, including Hillsborough Community College, Florida Department of Transportation, Florida Transit Maintenance Consortium, Florida Public Transportation Association, Florida Transit Agencies, and the Pinellas Suncoast Transit Authority. TMAARC should also detail specific actions taken to achieve program mandates related to admission criteria, classroom instruction, curriculum, on-the-job training, program logistics, and the CTT tracking database.

Changes in policies and procedures that were introduced during the first year of the program should be reviewed, with special emphasis on actions required to resolve any structural deficiencies identified within the CTT program as originally designed.

New initiatives that were introduced should be discussed in terms of the rationale and basis for the new actions in terms of an attempt to correct a problem or to enhance a successful endeavor.

A critical piece of the assessment process is the incorporation of performance measures and management objectives that establish best practices for the CTT program, which is specifically designed to prepare students for employment in the transit industry, train existing employees toward certification and prepare current transit technicians for National Institute of Automotive Service Excellence testing and certification in order to enhance the delivery of transit services throughout Florida.

Performance Measures & Objectives

A summary of program metrics that describes the breadth and impact of the program assists in providing an understanding of the significance of the program and the benefits derived. The following measures were gleaned from recommendations across the industry, within the parameters of the FTMC/HCC curriculum, from Florida maintenance managers, and contained in the project outline, which have been detailed throughout this report. The recommended measures are outcome-based and focus on efficiency and effectiveness in four primary areas: the classroom, the curriculum, the instructor, and on-the-job. An objective, i.e., a target for acceptable performance, identified for each measure of performance, was based on current program goals. Recommended performance measures and management objectives are presented in Table 1. The data collection instrument for calculation of performance measures is included in Appendix B.

Table 1
Certified Transit Technician Program
Summary of Performance Measures
Year:

	<i>Performance Measure</i>	<i>Detail</i>	<i>Objective</i>	<i>Actual Results</i>	<i>Meets Objective X or ✓</i>
Classroom	Quality of learning	Post-test score versus pre-test score	Post exceeds Pre		
	Level of learning	Post-test score	≥70%		
	Quality of facilities/location	Level of satisfaction	4.5 of 5.0		
Curriculum	Quality of course materials	Level of satisfaction	4.5 of 5.0		
	Course meets expectations	Level of satisfaction	4.5 of 5.0		
Instructor	Training materials and handouts	Level of satisfaction	4.5 of 5.0		
	Quality of presentations	Level of satisfaction	4.5 of 5.0		
On-the-Job	Quality of repairs	Number of repeats, comebacks, and failures	<10% of Total		
	Quality of PMIs	PM-related recalls within 5 days of PMI	<10% of Total		
	Quantity of OJT hours	OJT hours performed versus required	≥90%		
	Work habits	Zero occurrences/disciplinary actions (not miss-out related)	Zero		
	Safety	Zero accidents, injuries, or safety violations	Zero		
	Regulatory	Zero CDL, drug, and alcohol violations	Zero		
	Technical ability	ASE exam	ASE Scores ≥70%		

Each measure of performance should be discussed in terms of achievement of program goals. Special efforts undertaken to achieve performance measures should be highlighted and any necessary adjustments made to the performance metrics moving forward should be identified along with the rationale for the modifications.

Operating Indicators

Unlike performance measures, which are outcome-based, operating indicators represent outputs and, while not tied to performance objectives, do reflect trends and performance over time. In contrast to performance measures that gauge outcome or the relationship between a set of variables, outputs report accomplishments. The performance measure identified as “quality of repairs” provides a good

example of an outcome versus an output. TMAARC tracks the number of repeats, comebacks, and failures. Should the number of the repeats increase, the established target is most likely missed. If, however, the number of repeats falls below the target, success is achieved. The actual change in the number of repeats fails to measure performance. What is missing in understanding the outcome of the actual number of repeats is the context in which those repeats occur. The rise and fall in the number of repeats says little about performance, because it fails to account for fluctuation in the pool of repairs or the overall size of the pool. Nonetheless, operating indicators do provide meaningful information about the program that supplements performance measures in evaluating and monitoring performance. Recommended operating indicators are presented in Table 2. The data collection instrument for calculation of operating indicators is included in Appendix B.

Table 2
Certified Transit Technician Program
Summary of Operating Indicators
Year:

<i>Operating Indicator</i>	<i>Detail</i>	<i>Actual Results</i>
Beginning enrollment	Number of participants that started the program	
Ending enrollment	Number of participants enrolled at the end of the year	
Attrition	Number of participants who left the program during the year	
Regional significance	Number of agencies with participants in the program	
Attendance - classroom	Number of class hours missed by participants	
Lateness - classroom	Number of times participants were late for class	
Advancement	Number of participants who received promotions at home agency	
On-the-job training hours	Number of hours of OJT completed	
Program progression	Number of classes scheduled	
Movement through program	Number of classes successfully completed	
Program favorability	Number of applicants awaiting admission to program	
Remediation requirements	Number of participants that required remediation	
Additional instruction	Number of requests for additional assistance	
Attendance - home agency	Number of absences at home agency	
Lateness - home agency	Number of times participants reported to work late	
Quantity of work - PMIs	Number of PMIs assigned	
Quantity of work - PMIs	Number of assigned PMIs completed	
Quantity of work - repairs	Number of repairs assigned (all types)	
Quantity of work - repairs	Number of assigned repairs completed	
Work orders - quantity	Number of work orders completed	
Work orders - legible, accurate, complete and timely	Number of work orders rejected as less than acceptable	
Technical ability	Number of Virtual Hands-on-Training (VHOT) hours completed	
Contribution to team and communication skills	Number of opportunities provided to participants to share knowledge and lessons learned with technicians at home agencies	

Following a detailed review of operating indicators, the assessment process includes a comparison of post-participant survey results with the pre-participant survey results in relationship to the actual performance of the participants to identify required program enhancements. The assessment process concludes with a discussion of planned improvements moving forward, followed by a general overview of the program presented as a summary of findings.

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CTT Program Assessment Instrument

Following is the program assessment instrument as developed.



Certified
Transit
Technician

Program
Assessment
Year One

Type date here

Background

[Click here to enter text.](#)

- Describe what the program looked like as it started the year
- Include discussion of critical components
- Describe what was expected moving forward

Program Development

[Click here to enter text.](#)

- Discuss how the program was established
- Identify any structural changes that were made

Program Purpose

[Click here to enter text.](#)

- Review program goals and objectives of the program as designed
- Describe changes in program goals and objectives that occurred during the year

Program Administration

[Click here to enter text.](#)

Present an overview of what happened throughout the year, in terms of the following:

Milestones

- Dates
- Data
- Firsts
- Significant events

Compliance

- Requirements and standards
- Met – how successfully
- Not met – why and describe impact
- Modifications to requirements and standards

Partnerships

- Describe role and responsibility of partners
- Discuss any changes in roles – responsibilities
- Include nature of relationship with partners (supportive)

Mandates

- Describe success in achieving requirements
 - Admission criteria
 - Classroom instruction
 - On-the-job training
 - Program logistics
 - CTT tracking database
- If unsuccessful, include plan to achieve success
- If successful, include plan that builds on that success

Highlights

- Discuss most significant moments for CTT program during first year

New Initiatives

[Click here to enter text.](#)

- Present and discuss new plans or procedures that were introduced

- If introduced to correct a problem, identify the problem and indicate how attempted resolution is working
- If introduced to enhance a successful endeavor, identify the endeavor and indicate how enhancement is working

Highlight

- Bullet list of significant info related to positive aspects of CTT program

Program Metrics

Click here to enter text.

- Fill-out the data collection sheet with the necessary data to calculate the performance measures and objectives achieved during the year
- Transfer the metrics to Tables 1 and 2 for inclusion in the report
- Discuss each performance measure in detail
 - If achieved, what special efforts were made
 - If failed, basis of failure and plan to improve moving forward
 - If overachieved, need to discuss possible adjustment to measure moving forward
- Operating indicators benefit from time – only one year of data will make it difficult to identify any possible trends
- Translate metrics into benefits and significance of benefits

Performance Measures and Objectives

Table 1
Certified Transit Technician Program
Summary of Performance Measures
Year:

	Performance Measure	Detail	Objective	Actual Results	Meets Objective X or ✓
Classroom	Quality of learning	Post-test score versus pre-test score	Post exceeds Pre		
	Level of learning	Post-test score	≥70%		
	Quality of facilities/location	Level of satisfaction	4.5 of 5.0		
Curriculum	Quality of course materials	Level of satisfaction	4.5 of 5.0		
	Course meets expectations	Level of satisfaction	4.5 of 5.0		
	Training materials and handouts	Level of satisfaction	4.5 of 5.0		
Instructor	Quality of presentations	Level of satisfaction	4.5 of 5.0		
	Quality of repairs	Number of repeats, comebacks, and failures	<10% of Total		
On-the-Job	Quality of PMIs	PMI-related recalls within 5 days of PMI	<10% of Total		
	Quantity of OJT hours	OJT hours performed versus required	>90%		
	Work habits	Zero occurrences/disciplinary actions (not miss-out related)	Zero		
	Safety	Zero accidents, injuries, or safety violations	Zero		
	Regulatory	Zero CDL, drug, and alcohol violations	Zero		
	Technical ability	ASE exam	ASE Scores >70%		

Operating Indicators

Table 2
Certified Transit Technician Program
Summary of Operating Indicators
Year:

<i>Operating Indicator</i>	<i>Detail</i>	<i>Actual Results</i>
Beginning enrollment	Number of participants that started the program	
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Attrition	Number of participants who left the program during the year	
Regional significance	Number of agencies with participants in the program	
Attendance - classroom	Number of class hours missed by participants	
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Quantity of work - repairs	Number of repairs assigned (all types)	
Quantity of work - repairs	Number of assigned repairs completed	
Work orders - quantity	Number of work orders completed	
Work orders - legible, accurate, complete and timely	Number of work orders rejected as less than acceptable	
Technical ability	Number of Virtual Hands-on-Training (VHOT) hours completed	
Contribution to team and communication skills	Number of opportunities provided to participants to share knowledge and lessons learned with technicians at home agencies	

Participant Survey Results

Click here to enter text.

- Compare post-survey to pre-survey
- Discuss change – more positive/more negative
- Compare anticipated performance with actual performance

Planned Improvements

Click here to enter text.

- Describe activities that will be introduced into the program to make it better moving forward
- Provide the basis for the use of those specific activities

Operating Indicators

Click here to enter text.

Summary of Findings

Click here to enter text.

- Present brief summary of all findings

Appendix A – CTT Participant Survey, January 2010

Transit Technician Program Pre-participation & Post-participation Survey						
Transit Tech History		Years	Months			
1	Length of time I have worked as a Transit Technician	_____	_____			
2	Length of time I have worked at my current agency.	_____	_____			
3	Length of time I have worked in my current classification.	_____	_____			
Education & Technical Training History		Yes	No			
1	I have a high school diploma. (Yes or No)	O	O			
2	I have attended college. (Yes or No)	O	O			
3	I have a college degree. (Yes or No)	O	O			
4	I have attended a technical training school. (Yes or No)	O	O			
5	I have a technical training school degree. (Yes or No)	O	O			
Agency Size		#				
1	Number of buses my agency maintains.	_____				
Agency Training		Strongly Agree	Agree	Somewhat Agree	Somewhat Disagree	Strongly Disagree
1	I participated in bus maintenance training in the last 12 months.	O	O	O	O	O
2	I participated in bus maintenance training in the last 2 years.	O	O	O	O	O
3	I participated in bus maintenance training in the last 5 years.	O	O	O	O	O
4	My agency encourages participation in training.	O	O	O	O	O
5	Individual training requests at my agency are always approved.	O	O	O	O	O
6	My agency pays for all training expenses, including wages during training.	O	O	O	O	O
7	Training at my agency is typically provided onsite by agency staff.	O	O	O	O	O
8	Training at my agency is typically provided onsite by a contractor.	O	O	O	O	O
9	Training at my agency is typically provided offsite by another transit agency.	O	O	O	O	O
10	Training at my agency is typically provided offsite by a statewide program.	O	O	O	O	O

Transit Technician Program Pre-participation & Post-participation Survey

Page 2

		Yes	No	Not Applicable
Agency Advancement				
1	Advancement is available at my agency.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2	Advancement at my agency is based on length of service.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3	Advancement at my agency is based on technical performance.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4	I must pass a skills test to qualify for advancement at my agency.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5	I must pass a written exam to qualify for advancement at my agency.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

		Strongly Agree	Agree	Somewhat Agree	Somewhat Disagree	Disagree	Strongly Disagree
Mentoring Program							
1	The way my agency selected participants for the Transit Tech Program was fair.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2	I have a Mentor to assist me with the Transit Tech Program.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3	I personally selected my Mentor to assist me with the Transit Tech Program.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4	My agency assigned a Mentor to assist me with the Transit Tech Program.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5	My Mentor will provide (provided) me with valuable assistance with the Transit Tech Program.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

		Strongly Agree	Agree	Somewhat Agree	Somewhat Disagree	Disagree	Strongly Disagree
Transit Tech Program							
1	I possess the necessary knowledge of bus maintenance practices to take full advantage of the transit tech program.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2	I possess the necessary technical skills to take full advantage of the transit tech program.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3	I possess the necessary abilities to take full advantage of the transit tech program.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4	My participation in the Transit Tech Program will expand (expanded) my knowledge of bus maintenance practices.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5	My participation in the Transit Tech Program will increase (increased) my bus maintenance technical skills.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
6	My participation in the Transit Tech Program will improve (improved) my communication skills.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Transit Technician Program Pre-participation & Post-participation Survey

Page 3

		Strongly Agree	Agree	Somewhat Agree	Somewhat Disagree	Disagree	Strongly Disagree
	<i>Transit Tech Program (Continued)</i>						
7	My participation in the Transit Tech Program will make (made) me a better member of my agency's bus maintenance crew.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
8	The Transit Tech course work will be (was) challenging.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
9	The Transit Tech course work will be (was) clear and understandable.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
10	The program instructor will provide (provided) feedback to participants on course work.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
11	Training materials and handouts will be (were) easy to understand.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
12	Technical demonstrations will be (were) detailed and thorough.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
13	The program instructor will provide (provided) feedback to participants on technical demonstrations.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
14	On-the-job instruction will comply (complied) with Transit Tech course requirements.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
15	Technical assistance will be (was) provided when requested.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
16	Supervisors will provide (provided) feedback on technical issues.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
17	Transit Tech Program Management Staff will provide (provided) assistance when	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
18	Successful completion of the Transit Tech program guarantees advancement within my agency.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
19	I intend to pursue a two-year degree upon completion of the Transit Tech Program.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
20	The mix of classroom and on-the-job training was appropriate	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
21	More classroom instruction would have been helpful	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
22	More on-the-job training hours would have been helpful	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

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Appendix B – Data Collection Sheets

Performance Measures Certified Transit Technician Program - Page 1	
CTT Program Performance Measures	
Data Needs	
Official Reporting Period: January 2010 through December 2010	
	2010
Average pre-test score	
Average post-test score	
Level of satisfaction	
Quality of facilities/location	
Quality of course materials	
Course meets expectations	
Training materials/handouts	
Quality of presentations	
Number of repairs assigned	
Number of assigned repairs completed	
Numbers of repeats/comebacks/failures for completed repairs	
Number of preventive maintenance inspections assigned	
Number of assigned preventive maintenance inspections completed	
Number of recalls within 5 days of completed preventive maintenance inspection	
On-the-job training hours performed	
On-the-job training hours required	
Number of occurrences/disciplinary actions (not miss-out related)	
Number of accidents, injuries, and safety violations	
Number of CDL, drug, and alcohol violations	
Average score on ASE exams	
Number of students enrolled in CTT program on January 25, 2010	
Number of students enrolled in CTT program on December 31, 2010	
Number of students who left the program during the year	
Number of agencies with participants in the program	
Number of class hours missed by participants	
Number of times participants were late for class	
Number of participants who received promotions at home agency	
Number of classes scheduled	
Number of classes successfully completed	
Number of applicants awaiting admission to the program	
Number of participants who required remediation	
Number of requests for additional assistance	
Number of absences at home agency	
Number of times participants reported to work late	
Number of work orders completed	
Number of work orders rejected for being less than acceptable	
Number of Virtual Hands-on-Training (VHOT) hours completed	
Number of opportunities provided to participants to share knowledge and lessons learned to technicians at home agencies	

CTT Program Performance Measures & Objectives - 2010**Official Reporting Period:** January through December 2010**Performance Measures**

	Objective	2010
Quality of learning		
Average post-test score versus pre-test score	Post exceeds Pre	
Level of learning		
Average post-test score	≥70%	
Quality of facilities/location		
Level of student satisfaction	4.5 of 5.0	
Quality of course materials		
Level of student satisfaction	4.5 of 5.0	
Course meets expectations		
Level of student satisfaction	4.5 of 5.0	
Training materials and handouts		
Level of student satisfaction	4.5 of 5.0	
Quality of presentations		
Level of student satisfaction	4.5 of 5.0	
Quality of repairs		
Number of repeats, comebacks, and failures divided by the number of completed repairs	<10% of Total	
Quality of preventive maintenance inspections (PMI)		
Number of recalls within 5 days of PMI divided by the number of PMIs completed	<10% of Total	
Quantity of on-the-job training hours		
OJT hours performed divided by OJT required for completion	≥90%	
Work habits		
Occurrences/disciplinary actions (not miss-out related)	Zero	
Safety		
Accidents, injuries and safety violations	Zero	
Regulatory		
CDL, drug, and alcohol violations	Zero	
Technical proficiency		
Number of students who pass the ASE exams divided by the number of ASE exams taken	Scores ≥ 70%	

CTT Program Operating Indicators - 2010

Official Reporting Period: January through December 2010

Reportable Indicators

	<i>Objective</i>	<i>2010</i>
<i>Beginning enrollment</i>		
Number of students enrolled in the CTT Program on January 25, 2010		
<i>Ending enrollment</i>		
Number of students enrolled in the CTT Program on December 31, 2010		
<i>Attrition</i>		
Number of students who left the program during the year		
<i>Regional significance</i>		
Number of agencies with participants in the program		
<i>Classroom attendance</i>		
Number of class hours missed by participants		
<i>Classroom lateness</i>		
Number of times participants were late for class		
<i>Advancement</i>		
Number of participants who received promotions at home agency		
<i>On-the-job training hours</i>		
Number of OJT hours successfully completed		
<i>Program progression</i>		
Number of classes scheduled		
<i>Movement through program</i>		
Number of classes successfully completed		
<i>Favorability</i>		
Number of applicants awaiting admission to the program		
<i>Remediation requirements</i>		
Number of participants that required remediation		
<i>Additional assistance requests</i>		
Number of requests for additional assistance		
<i>Attendance at home agency</i>		
Number of absences at home agency		
<i>Lateness at home agency</i>		
Number of times participants reported to work late		
<i>Quantity of work - preventive maintenance inspections</i>		
Number of preventive maintenance inspections assigned		
<i>Quantity of work - preventive maintenance inspections</i>		
Number of scheduled preventive maintenance inspections completed		
<i>Quantity of work - repairs</i>		
Number of repairs assigned		
<i>Quantity of work - repairs</i>		
Number of assigned repairs completed		
<i>Work orders - quantity</i>		
Number of work orders completed		
<i>Work orders - quality (Legible, Accurate, Complete, and Timely)</i>		
Number of work orders rejected for being less than acceptable		
<i>Technical ability</i>		
Number of Virtual Hands-on-Training (VHOT) hours completed		
<i>Contribution to team</i>		
Number of opportunities provided to participants to share knowledge and lessons learned with technicians at home agencies		

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Appendix C – Agency Reporting

CTT Program Performance Measures - Reporting Requirements

Official Reporting Period: January 2010 through December 2010

<i>Data Needs</i>	<i>Completed by</i>	<i>Forwarded to</i>
Average pre-test score	Instructor	Training Specialist
Average post-test score	Instructor	Training Specialist
Level of satisfaction - Quality of facilities/location	Instructor	Training Specialist
Level of satisfaction - Quality of course materials	Instructor	Training Specialist
Level of satisfaction - Course meets expectations	Instructor	Training Specialist
Level of satisfaction - Training materials/handouts	Instructor	Training Specialist
Level of satisfaction - Instructor/presentations	Instructor	Training Specialist
Number of repairs assigned	Agency	Training Specialist
Number of assigned repairs completed	Agency	Training Specialist
Numbers of repeats/comebacks/failures for completed repairs	Agency	Training Specialist
Number of preventive maintenance inspections assigned	Agency	Training Specialist
Number of preventive maintenance inspections completed	Agency	Training Specialist
Number of recalls within 5 days of completed preventive maintenance inspection	Agency	Training Specialist
On-the-job training hours required	Instructor	Training Specialist
On-the-job training hours performed	Agency	Training Specialist
Number of occurrences/disciplinary actions (not miss-out related)	Agency	Training Specialist
Number of accidents, injuries, and safety violations	Agency	Training Specialist
Number of CDL, drug, and alcohol violations	Agency	Training Specialist
Number of ASE Exams taken	Training Specialist	Training Specialist
Number of ASE Exams successfully passed	Training Specialist	Training Specialist
Number of students enrolled in CTT program on January 25, 2010	Training Specialist	Training Specialist
Number of students enrolled in CTT program on December 31, 2010	Training Specialist	Training Specialist
Number of students who left the program during the year	Training Specialist	Training Specialist
Number of agencies with participants in the program	Training Specialist	Training Specialist
Number of class hours missed by participants	Instructor	Training Specialist
Number of times participants were late for class	Instructor	Training Specialist
Number of participants who received promotions at home agency	Agency	Training Specialist
Number of classes scheduled	Instructor	Training Specialist
Number of classes successfully completed	Instructor	Training Specialist
Number of applicants awaiting admission to the program	Program Manager	Training Specialist
Number of participants who required remediation	Instructor	Training Specialist
Number of requests for additional assistance	Instructor	Training Specialist
Number of absences at home agency	Agency	Training Specialist
Number of times participants reported to work late	Agency	Training Specialist
Number of work orders completed	Agency	Training Specialist
Number of work orders rejected for being less than acceptable	Agency	Training Specialist
Number of Virtual Hands-on Training (VHOT) hours completed	Instructor	Training Specialist
Number of presentations to share knowledge and lessons learned provided by participants at home agencies	Agency	Training Specialist

CTT Program Performance Measures Transit Agency Monthly Reporting Requirements

Agency: _____	Due Date¹: _____			
Month/Year: _____	Submitted to TMAARC Training Specialist: _____			
Data Needs	Technician	Technician	Technician	Technician
Number of repairs assigned	_____	_____	_____	_____
Number of assigned repairs completed				
Numbers of repeats/comebacks/failures for completed repairs				
Number of preventive maintenance inspections assigned				
Number of preventive maintenance inspections completed				
Number of recalls within 5 days of completed preventive maintenance inspection				
Number of occurrences/disciplinary actions (not miss-out related)				
Number of accidents, injuries, and safety violations				
Number of CDL, drug, and alcohol violations				
Number of participants who received promotions				
Number of absences at home agency				
Number of times participants reported to work late				
Number of work orders completed				
Number of work orders rejected for being less than acceptable				
Number of opportunities provided to participant to share knowledge and lessons learned with other technicians				
Submitted by: _____				

¹ One form must be submitted for each month beginning with January 2010. Completed forms should be submitted to the TMAARC Training Specialist by the 15th day of the next month. Monthly forms must be completed for the duration of the CTT program.

