

Applying Instructional Design Practices to Evaluate and Improve the Roadway Characteristics Inventory (RCI) Training Curriculum

Final Report



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16. Abstract The Transportation Statistics Office (TranStat) of the Florida Department of Transportation (FDOT) provides training for district data collection technicians in both office- and field-based Roadway Characteristics Inventory (RCI) methods. The current training program, which has been primarily conducted in a traditional classroom environment, has been in effect for two and one-half years and trains an estimated 60 district (FDOT/consultants) employees each year. The courses include basic to advanced data collection methods. The training has not been evaluated for effectiveness based on instructional design standards and theory. And, it requires considerable cost in travel, materials, planning and scheduling. Due to budget constraints the agency needs to provide a more cost effective delivery method using modern technologies. This research project focuses on the development of an instructional design strategy to improve the effectiveness of the RCI training while reducing its cost. The research will provide FDOT with a plan for developing a more effective curriculum using a competency-based approach that focuses on job performance outcomes and a new method for delivery. Included in the plan will be a curriculum training and analysis, competency model, design document, and course module prototypes.			
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Executive Summary

In 2009 the Florida Department of Transportation (FDOT), Transportation Statistics Office (TranStat) contracted with the Florida State University (FSU), Center for Information Management and Educational Services (CIMES) to conduct research to determine the best strategy for providing effective training using instructional design standards and theory for Roadway Characteristics Inventory (RCI) technicians while at the same time reducing costs.

To address these challenges, a competency-based approach to training was proposed and a study undertaken to identify competencies in the form of knowledge, skills, and abilities that the FDOT would like RCI technicians to possess. The study also identified desired standards of on-the-job performance for TranStat's RCI technicians.

The research questions included:

1. What responsibilities and tasks do data collection technicians need to perform on the job?
2. What is the combination of knowledge, skills, and abilities that data collection technicians should possess?
3. What are the behavioral examples that demonstrate the existence of such competencies?
4. What are the desired performance levels for these tasks?

The implementation goal was to develop a competency model for training RCI technicians. The research used a multipart methodology to gather mainly qualitative data on the nature of the RCI technician job. The research followed several major pathways: a literature review, a document analysis, a job task analysis, focus groups to validate the job tasks and competency model, observations of RCI technicians, and in-depth interviews with job experts to identify knowledge, skills, and attitudes needed to perform the job tasks.

The research findings provided the foundation for creating a design document outlining the proposed solution, goals, objectives, learning strategy, instructional content, assessment, feedback, learning portal framework, and learning management system.

Functional prototypes of the training curriculum were developed based on the competency model and design document specifications and included the following:

1. TRIP Orientation
2. RCI Fundamentals 101
 - 2.1. Lesson 1: **Overview**
 - 2.2. Lesson 2: **Introduction**
 - 2.3. Lesson 3: **Roadtrip 1**
 - 2.3.1. Pre-inventory activities
 - 2.3.1.1. Preparing the folder
 - 2.3.1.2. Inspecting the vehicle
 - 2.3.2. Inventory activities
 - 2.3.2.1. Verifying roadway length
 - 2.3.2.2. Inventorying intersections
 - 2.3.2.3. Inventorying structures
 - 2.3.3. Post-inventory activities
 - 2.3.3.1. Navigating the interface
 - 2.3.3.2. Entering data into the RCI database

A learning portal called *Training for Inventory Personnel (TRIP)* is also being created to provide related resources, frequently asked questions, a glossary, note-taking tools, a calendar, and course modules. The portal will include a

learning management system (LMS) to track learner progress and assessment. A discussion board for trainees and TranStat instructors to interact with one another is also included within the portal framework.

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Introduction

Background

The Transportation Statistics Office (TranStat) of the Florida Department of Transportation (FDOT) provides training for district data collection technicians in both office- and field-based Roadway Characteristics Inventory (RCI) methods. The current training program has been in effect for two and one-half years and provides training for an estimated 60 district (FDOT/consultants) employees each year. Training is conducted on basic to advanced data collection methods.

Alternatives to the traditional classroom

The FDOT conducts TranStat training primarily in a traditional classroom environment that requires considerable cost in travel, materials, planning, and scheduling. Due to budget constraints, FDOT is seeking to reduce these types of expenses and exploring more cost-effective training methods. This could entail the use of technology, Web-based training, and a more streamlined curriculum focused on performance outcomes. The desired outcome is an updated training program that enhances effectiveness and accessibility.

Diversity in training: participants' profiles

Since the implementation of the traditional training program, the profile of district employees undergoing TranStat training has changed considerably. Training participants currently tend to be less experienced in data collection methods and relatively new to the field of transportation. Training needs are also more varied, as some participants are familiar only with office work while others have experience only with fieldwork. In addition, an increased number of training participants have a language other than English as their first language. Meeting the needs of a group of training participants with different skill levels, experiences, interests, and language abilities can present a challenge.

Prerequisite skills and prior knowledge

Training a more diverse pool of participants draws attention to the need for better assessment of prerequisite skills and prior knowledge. Such assessment would provide guidance for additional training before exposing participants to the regular RCI curriculum. Such additional training might include courses in mathematics, reading, or writing.

Gaps in districts' training needs

The capabilities and skills sets at the district level have changed over the last couple of years. The application of new technology and procedures may have rendered the current training less effective than it was two years ago. FDOT wishes to identify possible knowledge and skills differences among districts and to determine district-level job needs in order to design training that maximizes performance.

Objectives

The objective of this study was to identify competencies in the form of knowledge, skills, abilities, and attitudes that the FDOT would like RCI technicians to possess. The study also determined the desired level of RCI technician performance on such competencies at the district level.

The research questions included:

1. What responsibilities and tasks do data collection technicians need to perform on the job?
2. What is the combination of knowledge, skills, and abilities that data collection technicians should possess?
3. What are the behavioral examples that demonstrate the existence of such competencies?
4. What are the desired performance levels for these tasks?

Literature Review

As the nation grapples with one of its biggest financial crises in decades, many states are struggling to manage shrinking budgets. As a result, state agencies are under tremendous pressure to continue improving efficiency and productivity while striving to attain excellent customer service for residents. In the face of early retirements, wage cuts, and furloughs, it becomes even more critical for state agencies to strengthen their workforce through better hiring and retention of competent employees as well as through workforce management and development. These actions will lead to higher morale and a stronger commitment to quality for employees who are expected to achieve more with less (Pew Center, 2009).

Consequently, the Pew Center's annual report, *Grading the States* (Pew Center, 2009), highlights workforce planning as one of the human resource strategies that is crucial for economic rebound. It maintains that workforce planning becomes even more vital when states are grappling with scarce resources. Identifying the combination of knowledge, skills, abilities, and competencies for current and future job positions needed by the agencies will ensure that the agency continues to succeed in its mission in the face of downsizing, redeployment, or a hiring freeze.

Many private companies and governmental organizations have, over the past decade, addressed the challenges of performance improvement, employee development, and training through the implementation of competency modeling initiatives (Ennis, 2008; Hayton & Kelley, 2006; Rodriguez, Patel, Bright, Gregory, & Gowing, 2002). This entails aligning work performance with what is actually required on the job (Draganidis & Mentzas, 2006; Langdon & Marrelli, 2002).

The United States Office of Personnel Management (OPM), for example, used traditional job analysis techniques (Harvey, 1991) to generate robust competency models. The models, which cover a wide variety of job occupations, were entered into user-friendly automated systems for use by human resource personnel, managers, and workers in the public sector. A major objective of this initiative was to promote a common understanding of jobs among employees, management, and human resources (HR) personnel by defining competencies in a consistent manner (Rodriguez et al., 2002).

Similarly, the Employment and Training Administration (ETA) within the U.S. Department of Labor started the Competency Model Clearinghouse by working with business, industry, and education/training professionals to develop competency models for specific industries. The clearinghouse then shares the information on competencies with both publicly funded and private organizations (Ennis, 2008).

What is a competency?

David McClelland first brought attention to the competency movement with the publication of his paper, "Testing for Competence Rather than Intelligence" (1973). His research maintains that job performance and success in life cannot be predicted by merely relying on traditional academic aptitude, tests of content knowledge, academic grades, or credentials. Equally important are a person's competencies and personal characteristics. Many other researchers have since supported the notion of using competencies and characteristics to distinguish outstanding performers from marginal employees (Boyatzis, 1982; Hoge, Tondora, & Marrelli, 2005; Lucia & Lepsinger, 1999; Spencer & Spencer, 1993).

Over the years, researchers and HR practitioners have offered multiple definitions of a competency. In a 1995 conference on competencies in Johannesburg, South Africa, suggestions from several hundred HR specialists led to the following synthesized definition: A competency is "a cluster of related knowledge, skills and attitudes (KSA) that affects a major part of one's job (a role or responsibility), that correlates with performance on the job, that can be measured against well-accepted standards, and that can be improved via training and development" (Parry, 1996, p. 50). (Note: "KSA" now refers in the literature to either knowledge, skills, and *abilities* or to knowledge, skills, and *attitudes*.)

In other words, developing a safety conscious competency among RCI technicians, for example, requires each component of the KSAs to be addressed: *knowledge* (the road safety procedures outlined in the handbooks), *skills*

(how to plan a route, identify potential hazards on the roadways, recognize distracted drivers, check for faulty vehicles and equipment, etc.) and *attitudes* (it is better to collect less data than to put others and yourself at risk).

Some training specialists maintain that there should be a distinction between soft and hard competencies (Parry, 1996). Soft competencies refer to elements like traits, personality, and values that cannot be easily changed or developed through training. These are in contrast to hard competencies that are job specific such as technology competence (using the DMI and entering data into the RCI databases). HR specialists may also prefer to focus on hard skills for performance assessments, training programs, and compensation programs instead of dimensions that are difficult to measure like personality, traits, or values.

Marrelli, Tondora, & Hoge (2005), on the other hand, define competency as a “measurable human capability that is required for effective performance. A competency may be comprised of knowledge, a single skill or ability, a personal characteristic, or a cluster of two or more of these attributes” (p. 534).

This definition further elaborates that knowledge is an “awareness, information, or understanding about facts, rules, principles, guidelines, concepts, theories, or processes needed to successfully perform a task” (Marrelli, 2001, p. 534). Certain types of knowledge are easy to assess when they are concrete or specific (such as the distance interval between each data collection point) and more difficult to measure when they are abstract and complex (for example, how road characteristics data affects roadway planning).

A skill, on the other hand, “is a capacity to perform mental or physical tasks with a specified outcome” (Marrelli, 2001, p. 534). Knowing how to do something (reading about the procedures in the handbook) is not the same as actually being able to *do* it (observe, record, and accurately enter roadway changes data into RCI). Skills can also range from specific tasks such as applying the right code to each roadway characteristic to more complex tasks such as planning a route (Lucia & Lepsinger, 1999).

Marrelli also makes a distinction between skills and abilities, which are often confused with one another. “Ability is a demonstrated cognitive or physical ability to successfully perform a task with a wide range of possible outcomes” (Marrelli, 1998, p. 10). In other words, it is a combination of several capabilities that enables a person to perform the job. Abilities often take time and effort to develop and have a strong element of natural capacity (Marrelli, 1998; Marrelli et al., 2005). The ability to organize data into a logical format, for example, is easily mastered by some people but is more difficult for others.

Some HR and training specialists may be reluctant to include “soft competencies” such as personal characteristics within training objectives, performance assessments, and compensation programs; however, many researchers believe that personal characteristics do have an impact on performance. Marrelli (1998, 2001) has reasoned that personal characteristics should be defined as “enabling behaviors” that come from learning experiences, natural tendencies, or both (Marrelli et al., 2005). These include elements that influence effective performance such as the way one collaborates with others, work habits, and styles of communication.

What is a competency model?

Individual competencies are organized and combined into a competency model. This organizational framework enables people within a particular job, occupation, organization, or industry to have a common language to discuss and apply similar expectations of competencies to workplace performance (Hoge et al., 2005; Marrelli et al., 2005; Rodriguez et al., 2002; Shippmann, Ash, Battista, Carr, Eyde, Hesketh, Kehoe, Pearlman, Prien, & Sanchez, 2000).

A complete competency model should list the competencies, have a brief definition of each competency, provide descriptors that elaborate or clarify the given definitions, and have behavioral examples for each of the competencies listed that illustrate when that specific competency is being demonstrated on the job (Hoge et al., 2005; Lucia & Lepsinger, 1999; Marrelli, 1998; Marrelli et al., 2005).

In addition, some competency models also provide different levels of proficiency for the various behavioral examples (Blank, 1982; Ennis, 2008; Lucia & Lepsinger, 1999; Marrelli et al., 2005; Rodriguez et al., 2002; Spencer & Spencer, 1993). Such proficiency standards are important when performance-based competencies are used in compensation, promotions, training, and other personnel decisions. Benner (1984) describes the different levels as novice, advanced beginner, competent, proficient, and expert. Mansfield (1996) suggests calling the levels not demonstrated, developing, capable, and outstanding; while Marrelli (et al., 2005) offers the classification of behavioral examples as low proficiency, moderate proficiency, and high proficiency.

With regard to identifying the different types of competencies, some experts maintain that there are similar core competencies, which stretch across different occupations, that all workers should have (Lucia & Lepsinger, 1999; Rothwell, 2005). Examples of such core competencies include reading, writing, mathematics, teamwork, planning, and organizing.

On the other hand, there are competencies required for a person to be effective in a specific unit (sales or accounting), type of job (consultant or supervisor), or position (RCI technician or Revenue Specialist). The more sophisticated and well-defined models also consider contexts such as the employees' internal and external environments, the types of clients the employees deal with, and other job-specific variables that require the employees to have a unique set of competencies (Lucia & Lepsinger, 1999).

It is also noteworthy that some competencies such as customer service or problem solving may be common across organizations. However, the competencies are manifested by different types of behaviors depending on the organization, job type, or position (Lucia & Lepsinger, 1999). For example, problem solving required of RCI technicians who are unsure of how to classify an unusual roadway characteristic may involve an information search from multiple sources. This is different from the type of problem solving required of front desk personnel when a group of stranded tourists need rooms at an overbooked hotel.

An example of a framework with different levels of competencies was developed by the Employment and Training Administration's (ETA) Competency Model Clearinghouse (2009). The ETA model depicts competency groups at different levels beginning with personal effectiveness (see Figure 1 below). As one goes higher up the hierarchy, however, the competencies become more focused toward a specific industry, job, or position (Ennis, 2008).

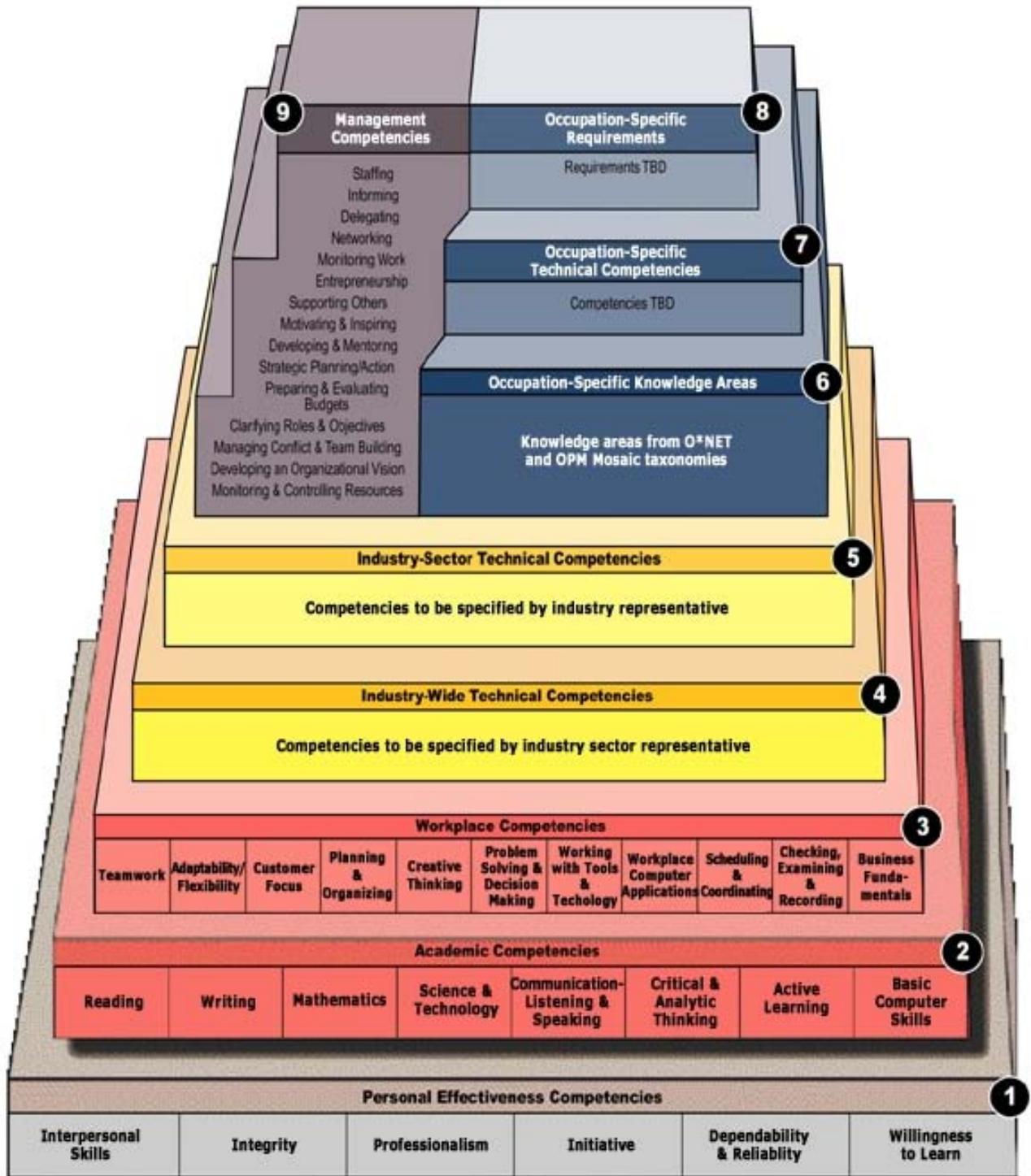


Figure 1 General Competency Model Framework developed by the ETA Competency Model Clearinghouse
 Reproduced with permission from the United States Department of Labor, Employment, and Training
 Administration’s Competency Model Clearinghouse “Building Blocks” for Competency Models (2009).

Applications of competency modeling

Competency modeling emphasizes a whole-person evaluation approach (Delamare Le Deist & Winterton, 2005) that can be used to examine the competencies of an individual and provide a path for developing the required competencies that are lacking. “By focusing on the full range of competencies or whole-person assessment, the emphasis is on potential, or what the person can bring to the organization, rather than on a set of narrowly defined tasks based on job requirements” (Rodriguez et al., 2002, p. 310). Through a skills gap analysis, a development plan could be developed to help the employee close that gap (Draganidis & Mentzas, 2006).

Organizations can also use competencies to distinguish the performance of outstanding employees from marginal ones; this can also aid organizations in identifying the specific competencies that these high performers possess. The organization can then help other employees develop those same competencies to improve their performance, too (Gilbert, 1996).

Additionally, identifying the competencies necessary for employees to be effective in their jobs can help an organization focus on observable and measurable behaviors that have the most impact on successful job performance (Lucia & Lepsinger, 1999).

Below are five ways in which a competency model can enhance human resource functions:

1. Employee Selection

There’s an old saying in performance management that goes, “You can train a turkey to climb a tree, but it’s easier to hire a squirrel.” A competency model furnishes a big picture of what it takes to do a job. This enables hiring managers to look for candidates with the required knowledge, skills, and characteristics that correlate strongly to excellent job performance (Hoge et al., 2005; Lucia & Lepsinger, 1999; Rothwell, 2002; Spencer & Spencer, 1993). The candidates lacking the crucial set of competencies (or lacking the potential to develop them) can be weeded out and the organization can then focus on those who are best-suited to the job. Hiring candidates who are more likely to meet the job expectations can save the organization money and time as well as any energy they may spend training the selected candidates (Lucia & Lepsinger, 1999).

Well-constructed competency models also highlight characteristics that are more easily developed through training as well as those that will take more time and resources to develop (Lucia & Lepsinger, 1999). A hiring manager may need to decide if a candidate’s competency gap can be overcome through training and development, or if it’s a deeper underlying problem. For example, a personable candidate with no knowledge and skills related to the RCI technician job may be sent for training and, over a period of two or three years, make a capable employee. Another candidate with some relevant experience but who does not work well with others (attitude issues), may not be as good a fit within the organization since changing a person’s attitude generally takes longer.

2. Training and Development

Competency models can help ensure that training targets competencies that are most relevant to the job and thus have the most impact. With increasingly limited training budgets at many state agencies, such an approach enables organizations to prioritize scarce resources by focusing on programs that have the most impact on performance instead of those that target behaviors not important to the job (Lucia & Lepsinger, 1999). For example, RCI technicians would be better off learning the basics of using the RCI database versus going through an advanced math program. Although some numerical skills are important on the job, they may not be as important as being able to use the RCI database.

Competency models also help employees assess their current capabilities and identify behaviors to help them improve their performance (Hoge et al., 2005). Employees can make more informed decisions about training and professional development when they have a better idea of which competencies they should be developing (Lucia & Lepsinger, 1999; Rothwell & Wellins, 2004).

3. Performance Management

Managing employee performance requires constant communication between managers and employees to set goals and expectations, track and evaluate progress, provide performance feedback, and coach or mentor (Hoge et al., 2005).

Well-developed competency models with behavioral examples provide a common understanding of behaviors on the job that lead to effective performance. This enables managers to provide constructive feedback to employees with regard to developing the desired behaviors (Lucia & Lepsinger, 1999; Spencer & Spencer, 1993). Such models also provide benchmarks for estimating the employees' level of proficiency in the target competencies.

5. Career Development

Competency models can be created for various occupations within an organization. These competency models can then be connected to one another to build career pathways within the organization (Ennis, 2008). Such an approach can be useful in succession planning whereby candidates with high potential for success in certain positions are identified and provided with the necessary training or development to eventually take on the new responsibilities (Hoge et al., 2005; Lucia & Lepsinger, 1999; Spencer & Spencer, 1993). Employees who would like to make lateral moves within the organization can also use the competency models to determine areas of the organization that are a good fit for their interests and existing competencies (Draganidis & Mentzas, 2006; Shippmann, et al., 2000).

6. Compensation

Competency-based compensation systems provide a common framework of performance for the organization and its employees. It provides for more transparency in compensation and promotion since the employees' competencies become the basis of their assigned base pay grade, pay increases, and bonuses (Hoge et al., 2005; Spencer & Spencer, 1993).

An organization can also identify competencies that it values (such as leadership and teamwork) and design awards program to recognize employees who show exemplary levels of such competencies (Marrelli, 2001).

Finally, a competency model is not fully realized if it is used only in specific human resource functions or practices. To fully optimize its value, it should be integrated into all aspects of human resource practices (Lucia & Lepsinger, 1999).

Developing a competency model

A variety of methods for developing competency models have emerged over the years. The more effective ones, however, appear to follow McClelland's (1973) recommendations, which are to identify top performers and focus on what they actually do on the job (Lucia & Lepsinger, 1999). This will identify observable and measurable behaviors required to successfully perform the job that can then be emulated by other workers.

There are two general approaches to developing the competency model (Lucia & Lepsinger, 1999)—to build one from scratch or to use a generic model. Building a model from scratch entails collecting data internally using research tools such as interviews, observations, focus groups, and document analysis. The data is then analyzed to determine themes of competencies that impact performance. This approach is time-consuming but can provide results specific to a job within an organization.

The following steps for developing a competency model from scratch are adapted from the recommendations made by Draganidis & Mentzas (2006) in their review of various competency modeling systems:

1. Create a competency modeling team
This team will oversee the whole project and should ideally consist of human resource staff, key executives, and employees with deep knowledge and expertise on the job.
2. Identify performance standards
A proficiency scale is developed to determine superior, average, and poor performance for the job.
3. Develop a tentative competencies list
The competency modeling team develops a list of competencies based on reviews of models developed by other organizations. These competencies should consider the organization's own context and business strategies.

4. Define the competencies and behavioral indicators
Information from incumbent job holders and their managers are collected via focus groups, interviews, observations, document analyses, and surveys to identify actual competencies required for the job and generate behavioral examples.
5. Develop an initial competency model
An updated competency model is created based on quantitative analysis of the survey results and qualitative analysis of themes from the focus groups, interviews, observations, and document analysis.
6. Cross-check the initial competency model
The model is checked for accuracy through additional focus groups, interviews, or surveys with job holders and managers not involved in the initial competency model development.
7. Refine model
The model is revised by the competency modeling team based on similar analysis done to develop the initial competency model.
8. Validate the model
The competencies are turned into a questionnaire to be used for rating current individual effectiveness. Current job holders that have been categorized as superior, average, and marginal performers using the performance scale defined earlier are then rated using the questionnaire by their managers and peers. The ratings from the questionnaires are then correlated with the performance ratings. Competencies with high correlation values are strongly linked to performance.

Another way of validating the model is to ask current job holders to rate the listed competencies in terms of their importance to superior job performance. The results will provide a profile of “best estimate” characteristics of superior performers.
9. Finalize the model
The final step in this process is to remove competencies that have low or no correlation to the performance measures, thus producing a validated model linked to effective performance.

The second approach to identifying competencies involves the use of validated competency models. Instead of using extensive research methods to identify the model, an off-the-shelf generic competency model is used as the starting point. This approach could save time and money but the generic model may lack details on the technical knowledge, skills, and abilities needed to successfully perform a job. Therefore “this method is best suited for leadership and management roles that cut across several functions and for positions that require limited skills and knowledge” (Lucia & Lepsinger, 1999, p. 53).

Regardless of the approach used by the organization, the process of developing a competency model requires input and feedback from many sources such as human resource specialists, management, subject matter experts, and current job holders and their managers. Having a committee made up of people with different expertise is also a good way to get buy-in for the eventual competency model (Parry, 1996).

In addition, employee input can prevent disconnect between what top management regards as critical competencies and what the workers view as important competencies needed to perform the job. Some research studies have highlighted that employees emphasize dimensions such as trust; management tends to focus on expertise and effective relationships; and top management emphasizes achievement of results (Graham & Tarbell, 2006).

Therefore, if the competency model is to be incorporated into a variety of human resource practices (such as training, selection, and performance assessment), employee participation in the development of the model can provide awareness as well as acceptance (Lucia & Lepsinger, 1999). A common expectation of successful performance can be shared by having the entire organization involved in helping to define the meaning of the various competencies (Ennis, 2008).

Another consideration for developing the competency model is for participants to come from multiple groups (such as different geographical locations). The participants should also be considered high performers and highly representative of the current job holders. In addition, they should also have strong analytical and verbal skills so that they can systematically break down tasks, analyze the implications, and communicate their views (Marrelli et al., 2005).

The future of competency modeling

Technology is gradually changing the way competency models are developed and used within organizations. Surveys or interviews can now be conducted online or via telephone (Kaye & Johnson, 1999; Levine & Sanchez, 2007). Practitioners and researchers are also using the telephone and video conferencing to gather information or feedback through focus groups (Hurworth, 2004; Litosseliti, 2003; Smith, Sullivan, & Baxter, 2009). Therefore, public agencies facing budgetary concerns might find the use of such research methods attractive in terms of savings in time and costs. Although some challenges remain in using these technologies to replace traditional face-to-face methods, these problems should decrease as technology gets better (Levine & Sanchez, 2007).

Private and public organizations are also turning to online databases for job information such as the Occupational Information Network (O*NET) developed by the U.S. Department of Labor/Employment and Training Administration (ETA). This enables them to identify standardized job descriptions, job requirements, and common tasks.

Organizations seeking to identify job competencies from a generic model can also utilize the services offered by the ETA Competency Model Clearinghouse. Organizations can access industry models such as “Transportation, Distribution, and Logistics,” “Advanced Manufacturing” and “Information Technology” among others.

The clearinghouse Web site also provides an online tool for users to utilize the same competency framework (Figure 1 above) to create a generic competency model. As discussed earlier, additional data can then be collected internally by an organization to customize the generic model with job requirements, knowledge areas, and technical competencies specific to a particular occupation.

Finally, more organizations will be focusing on the integration of competency modeling systems with Web services (Draganidis & Mentzas, 2006). An example of such an application is a Web-based training portal that enables employees’ competencies profiles to be automatically updated upon successful completion of a training course. Employees can log in to view their profiles and sign up for additional training to further develop their competencies.

Methodology

The competency model research uses a multipart methodology to gather mainly qualitative data on the nature of the RCI technician job. This data is then analyzed and interpreted to identify the competencies desired for effective on-the-job performance. Our research followed several major pathways: a literature review, a document analysis, a job task analysis (JTA), focus groups to validate the job tasks and competency model, observations of RCI technicians, and in-depth interviews with job experts to identify knowledge, skills, and attitudes needed to perform the job tasks. This leads to triangulation of data that increases the reliability and validity of our findings.

Literature review

The comprehensive literature review was instrumental in three ways: clarifying major issues related to competency modeling; helping identify the most appropriate methods for developing the competency model; and providing supportive secondary evidence.

Document analysis

We examined a variety of documents and media assets provided to us by TranStat. These included Field and Office Training Manuals, the RCI Application Manual, the TranStat Web site, a Web-based training module, PowerPoint slides and recorded video from the training courses, and basic job descriptions from different districts.

Job task analysis

The review of documents and training materials enabled us to perform a basic job task analysis and identify a preliminary list of duties and tasks performed by RCI technicians. The list, later elaborated upon by two focus groups consisting of RCI technicians and instructors, became the final documentation on RCI technician job descriptions, prerequisites, qualifications, duties, and tasks descriptions.

Observations

Field and office observations

We observed RCI technicians performing their data inventory tasks in the field using the provided documentation and tools as well as in their respective offices doing pre-inventory activities and entering data into the RCI application. For the observations, we used a purposeful sampling method to identify outstanding RCI technicians who could share their best practices and provide valuable insights into various aspects of the job. The RCI technicians were also selected from two different districts so that we could document differences in common practices at the district level.

Altogether, we observed six RCI technicians and their supervisors. We conducted two field and two office observations on four different days with each session lasting approximately four hours. While the observations were taking place, the researcher also asked follow-up questions to generate think-aloud data so that the cognitive processes involved in performing the tasks could also be documented. The observations were video recorded and later transcribed in detail with accompanying still shots from the video.

Training observations

We also observed three RCI training sessions, *Transtat Roadway Characteristics Inventory Basics*, *Transtat RCI, Intermediate Field Data Collection*, and *Transtat RCI Advanced Concepts I*. From these sessions, we were able to identify the various types of knowledge and skills that RCI technicians should possess. The training observations also included brief interviews with participants to get their feedback on the most useful topics covered during training.

Interviews

A critical component of the research study involved domain analysis through interviews with three subject matter experts. These experts were selected using purposeful sampling with a main criteria being level of responsibility – an RCI technician, a supervisor, and a Central Office manager. To ensure that there was no data bias, we used a different set of experts for the in-depth interviews. We conducted phone interviews with the RCI technician and supervisor (who was also a contractor). A face-to-face interview was then conducted with the manager from Central Office.

The list of duties and tasks that had been validated by one of the focus groups was used to guide the discussion. From this starting point, the interviewees were given the following instructions:

1. Describe each procedural step and any technical knowledge required to perform the given task from start to finish.
2. Describe special tools, equipment, materials, and other resources needed to perform the task.
3. Describe related pieces of knowledge needed to perform the task
4. Describe critical safety knowledge and skills needed to perform this task in a safe manner.
5. Describe the attitudes that are critical to performing this task in a competent manner on the job.
6. Describe how a good, average, and poor RCI technician would perform this task.

The highly-focused questions generated diverse viewpoints on the types of knowledge, procedures, skills, use of equipment, safety guidelines, desired attitudes, and descriptions of what poor, average, and outstanding performance look like for each of the tasks performed. Upon completion of the interviews, documentation on what had been discussed was emailed to the respective participants who made edits to the documents as part of the data validation process.

Competency modeling

Data from the SME interviews, observations, and document analysis were then analyzed and themes or broad categories of job competencies were derived from them. These categories were “Personal Effectiveness,” “Academic Competencies,” and “Work Competencies.” These were then expanded into sub-categories to identify more specific competency terms. For example, under “Work Competencies,” more specific competencies such as “RCI Knowledge,” “Measuring, Recording, & Verification Skills,” and “Information Search Skills” were identified (see Appendix A for the full competency model).

Each competency within this preliminary model was then provided with a definition, general descriptions of observable behaviors that should be demonstrated to indicate the existence of such competencies, and specific behavioral examples of on-the-job performance outcomes for RCI technicians (see Appendix B for complete descriptions and behavioral examples of each competency).

The final competency model was eventually derived based on feedback and validation by a panel of experts in a focus group (see Appendices A and B). Additionally, the various tasks performed by the RCI technicians were then associated with the various competencies required to effectively perform the task (see Appendix C).

Focus groups

We conducted three focus groups. The purpose of the first two groups was to validate the preliminary list of duties and tasks based on our document analysis and to prioritize the most important tasks. The third focus group was tasked with validating the preliminary competency model derived from the various research activities.

Validate list of duties and tasks (groups 1 and 2)

A major challenge in putting together the focus groups was the geographical locations of the job experts in various parts of Florida. We wanted to garner as much feedback as possible from different districts so as to ensure that differences in data inventory practices were represented and taken into account as we developed the competency model. The first group consisted of two supervisors and two expert RCI technicians. Since they were in different locations and travel was not an option, we set up a video conference call whereby they could participate in the

discussion and view a common document being worked on that listed the duties and tasks. Mindful that the job experts may not have as much experience with writing task statements, a brief tutorial on the topic was emailed to them prior to the meeting. At the start of the focus group, a PowerPoint presentation was also used to briefly explain how to write good task statements.

The second group consisted of Central Office instructors who are extremely familiar with the RCI training content and are experts in identifying learning objectives, conceptual information, procedural steps, and principles associated with each task. This focus group was conducted face-to-face at the Central Office. Similarly, they were also shown the PowerPoint presentation on how to write good task statements.

Both groups reviewed the preliminary list of duties and tasks; created new groupings of duties and tasks; rearranged the sequence of the tasks; and added, deleted and edited the tasks statements to form a final list.

Upon completion of the focus groups, the participants then received an email survey (see Appendix F for the complete instrument used) asking them to individually rate the final list of duties and tasks according to importance, frequency, and difficulty.

In rating the tasks in terms of importance, the participants used the following scale: 1 “Not important,” 2 “Somewhat important,” 3 “Moderately important,” 4 “Fairly important,” and 5 “Very important.”

In rating the frequency with which the tasks are performed on the job, the participants used the scale: 1 is for “Several times a year or less,” 2 for “Several times a month,” 3 for “Several times a week,” 4 for “Several times a day,” and 5 for “Several times an hour.”

Finally, participants rate the tasks in terms of level of difficulty using the scale: 1 for “Not difficult,” 2 for “Somewhat difficult,” 3 for “Moderately difficult,” 4 for “Difficult,” and 5 for “Very difficult.”

Tasks with average ratings of 3.3 or less were removed from the final list of duties and tasks. The validated list was then used for subsequent research activities.

Validating the competency model (group 3)

The final stage of this research project entailed the validation of the competency model. This step was critical in fostering a common understanding of RCI technician competencies and behavioral examples of performance on the job. The five participants were carefully selected to represent RCI technicians with various levels of experience and responsibilities from different districts to account for variability in practices while Central Office managers were selected for their organizational and operational perspectives. The focus group required participants to log in to an online meeting to collaborate on a common document and to actively participate in the discussion via teleconference (see Appendix G for the instructions provided prior to the focus group session).

During the focus group, the participants took turns providing feedback for the competencies and behavioral examples identified while the document was edited online for everyone to see.

After the focus group session, the validated competency model document was then emailed to each participant who then used an online survey to rank the competencies on a scale of 1 (Not important) to 5 (Very important). See Appendix H for the complete instrument used.

Findings

This study was conducted to identify important competencies that the FDOT would like RCI technicians to possess in order to be effective on the job. The competencies would then be used to design new Web-based training materials for RCI technicians. In doing so, the study aimed to answer the following questions:

1. What duties and tasks do RCI technicians need to perform on the job?
2. What is the combination of knowledge, skills, abilities, and attitudes that data collection technicians should possess?
3. What are the desired performance levels for these tasks?
4. What are the behavioral examples that demonstrate the existence of such competencies?

We will now discuss the results of the various research activities in the context of each of these questions.

What duties and tasks do RCI technicians need to perform on the job?

A preliminary list of duties and tasks was identified based on our analysis of various documents and multimedia assets. The list was divided into Field and Office duties that were then further elaborated upon in terms of tasks performed. This document became the starting point of discussion for the two focus groups—one with the job experts and the other with TranStat’s trainers (see Appendix I).

Participants in each focus group collaborated on the preliminary Job Task Analysis (JTA) to reorganize the list of duties and their corresponding tasks based on their expert knowledge. Interestingly, the two groups differed in terms of how the duties and tasks were organized. The job experts identified only two duties for Field Work and nine for Office Work (Appendix J). This is in contrast to the trainers who identified four Field Work duties and four Office Work duties (Appendix K). Since there were two versions of the validated list of duties and tasks, a decision was made to use the list created by the trainers which appeared to be more complete and balanced.

After collaborating on the list of duties and tasks, the focus group participants were asked to individually rate each task according to its importance, frequency, and difficulty. For the purpose of developing the competency model, however, only the importance ratings were used to pare down the number of tasks to a more manageable list. Tasks with average importance ratings of 3.3 or less (Table 1 below) were removed from the final list of duties and tasks. This was to ensure that the final list was more manageable when used as the framework for the in-depth interviews with other job experts.

Table 1: Mean ratings for list of tasks

Office Work		Mean Importance Ratings	Mean Frequency Ratings	Mean Difficulty Ratings
Duty 1: Perform pre-inventory activities	a) Identify roadway ID requiring inventory.	5.0	2.7	3.0
	b) Collect and review existing and historical data for field verification purposes and identify problems prior to inventory.	4.3	2.3	3.0
	c) Review GIS basemap alignment to identify road changes. If there is a discrepancy, generate an RCI/GIS basemap package.	3.0	1.7	3.3
	d) Verify existing administrative data (for elements not visible in the field). If there is a discrepancy, determine if an RCI/GIS basemap package is necessary.	4.0	2.0	3.0
	e) Compile inventory folder that includes inventory matrices, field inventory worksheets, SLDs, County Section Number Key Sheets, GIS basemaps, RCI printouts for various road features, and route maps.	3.3	2.3	2.7
Duty 2: Perform data entry	a) Obtain data from construction plans that cannot be collected from the field (e.g., horizontal bearings and curve data). Convert the construction stations to match milepoints.	3.3	1.7	4.3

Office Work		Mean Importance Ratings	Mean Frequency Ratings	Mean Difficulty Ratings
preparation activities <i>Pre-inventory</i>	b) Review the inventory folder to ensure all recorded data is readable, complete, and unambiguous (copies of the marked-up SLD, features inventory field sheet, miscellaneous inventory field sheet, construction plans, Feature/Characteristic Sort and the Financial Management Projects by Roadway ID reports).	3.7	2.7	2.3
	c) Reconcile the field collected milepoints against the currently recorded milepoints to see whether they are in tolerance before updating the RCI.	4.0	2.3	2.3
	d) Ensure that features referenced by intersection milepoints match SLD mark-up milepoints.	4.7	2.3	2.3
	e) Coordinate with other offices to update appropriate data.	4.0	2.7	2.3
Duty 3: Perform data entry <i>Post-inventory</i>	a) Enter, update, and verify data into the Roadway Characteristics Inventory (RCI) database according to the handbooks.	5.0	3.0	3.3
	b) Validate data by using the RCI database automated process	4.0	3.0	2.3
	c) Run Main 1, Main 2, Main 3, and all RCI edits, and reconcile data.	4.7	3.0	3.3
Duty 4: Perform post-inventory activities	a) Produce Straight-line Diagrams and update Districts' servers; then notify TranStat.	5.0	2.7	3.7
	b) Review County Section Number Key Sheets and update as needed.	5.0	2.0	3.0
	c) Update RITA with SLD and inventory dates.	5.0	3.0	3.3
	d) Perform QA/QC checks.	5.0	3.7	4.0
	e) File and retain inventory folder for 5 years.	4.0	2.0	2.0
	f) Update RCI database as needed.	5.0	3.0	3.3

Field Work		Mean Importance Ratings	Mean Frequency Ratings	Mean Difficulty Ratings
Duty 1: Perform pre-inventory field preparation	a) Ensure vehicle is equipped with all field inventory equipment and that it is in working order.	4.7	3.3	2.7
	b) Perform vehicle safety inspection using a checklist.	4.3	3.3	2.3
	c) Check tire pressure and calibrate the DMI.	5.0	3.3	3.0
	d) Bring all the related materials such as forms, handbooks, and maps.	4.3	3.3	1.7
Duty 2: Inventory data collection preparation <i>Pre-inventory</i>	a) Wait for any transportation maintenance or construction activities to be complete before inventorying the Roadway ID.	4.3	2.7	2.0
	b) View videologs to become familiar with the assigned roadway.	3.0	2.7	2.7
	c) Review GIS basemaps to ensure that the alignment of beginning milepoint (BMP) and end milepoint (EMP) is digitized correctly.	3.0	2.7	3.3
	d) Bring inventory folder with inventory matrices, field inventory worksheets, SLDs, County Section Number Key Sheets, GIS basemaps, RCI printouts for various road features, and route maps.	3.0	2.7	1.7
Duty 3: Data collection Inventory	a) Apply safety guidelines.	5.0	5.0	3.7
	b) Drive through and verify the roadway length. If there is a discrepancy in the length, initiate the basemap package process.	4.7	3.0	2.7

Field Work		Mean Importance Ratings	Mean Frequency Ratings	Mean Difficulty Ratings
	c) Mark any obscure items with temporary paint such as structures, facility crossings, culverts, angled intersections, and other items.	3.3	2.3	2.7
	d) Collect and record point features: street names, bridge numbers, milemarkers, call boxes, county lines, railroad crossing numbers, and milepoints for all intersections and counter stations.	4.7	2.7	2.7
	e) Collect and record milepoints for roadway features such as number of lanes, median type, and shoulder type.	4.7	2.7	3.0
	f) Measure roadway dimensions: total surface width, inside and outside shoulder widths, median widths, and box culvert dimensions.	4.7	2.7	3.0
	g) Collect milepoints for miscellaneous features (structures, underpasses, pavement condition, and friction course).	4.7	3.0	2.7
Duty 4: Post data collection Inventory	a) Make sure that all required data have been collected or verified before leaving the inventory site.	5.0	3.0	2.7
	b) Prepare inventory folder for data input and ensure legibility and accuracy.	4.7	3.0	2.3

What combination of knowledge, skills, abilities, and attitudes should RCI technicians possess?

The next step in the competency modeling process entailed a domain analysis of the RCI technician job. The final list of duties and tasks were provided to an experienced RCI technician and a supervisor from two separate districts (Table 2 below).

Table 2: Final list of duties and tasks for Office and Field Work

Office Work	
Duty 1: Perform pre-inventory activities	a) Identify roadway ID requiring inventory.
	b) Collect and review existing and historical data for field verification purposes and to identify problems prior to inventory.
	c) Verify existing administrative data (for elements not visible in the field). If there is a discrepancy, determine if an RCI/GIS basemap package is necessary.
Duty 2: Perform data entry preparation activities Pre-Inventory	a) Review the inventory folder to ensure all recorded data is readable, complete, and unambiguous (copies of the marked-up SLD, features inventory field sheet, miscellaneous inventory field sheet, construction plans, Feature/Characteristic Sort, and the Financial Management Projects by Roadway ID reports).
	b) Reconcile the field collected milepoints against the currently recorded milepoints to see whether they are in tolerance before updating the RCI.
	c) Ensure that features referenced by intersection milepoints match SLD mark-up milepoints.
	d) Coordinate with other offices to update appropriate data.
Duty 3: Perform data entry Post-Inventory	a) Enter, update and verify data into the Roadway Characteristics Inventory (RCI) database according to the handbooks.
	b) Validate data by using the RCI database automated process.
	c) Run Main 1, Main 2, Main 3, and all RCI Edits; and reconcile data.
Duty 4: Perform post-inventory activities	a) Produce Straight-line Diagrams and update Districts' servers; then notify TranStat.

Office Work	
	b) Review County Section Number Key Sheets and update as needed.
	c) Update RITA with SLD and inventory dates.
	d) Perform QA/QC checks.
	e) File and retain inventory folder for 5 years.
	f) Update RCI database as needed.
FIELD WORK	
Duty 1: Perform <i>pre-inventory</i> field preparation	a) Ensure vehicle is equipped with all field inventory equipment that is in working order.
	b) Perform vehicle safety inspection using a checklist.
	c) Check tire pressure and calibrate the DMI.
	d) Bring all the related materials such as forms, handbooks, and maps.
Duty 2: Inventory data collection preparation <i>Pre-Inventory</i>	a) Wait for any transportation maintenance or construction activities to be complete before inventorying the Roadway ID.
Duty 3: Data Collection <i>Inventory</i>	a) Apply safety guidelines.
	b) Drive through and verify the roadway length.
	c) Collect and record point features: street names, bridge numbers, milemarkers, call boxes, county lines, railroad crossing numbers, and milepoints for all intersections and counter stations.
	d) Collect and record milepoints for roadway features such as number of lanes, median type, and shoulder type.
	e) Measure roadway dimensions: total surface width, inside and outside shoulder widths, median widths, and box culvert dimensions.
	f) Collect milepoints for miscellaneous features (structures, underpasses, pavement condition, and friction course).
Duty 4: Post data collection <i>Inventory</i>	a) Make sure that all required data have been collected or verified before leaving the inventory site.
	b) Prepare inventory folder for data input and ensure legibility and accuracy.

Level of work and supervisory experience

Job expert 1 has only a few years of experience as an RCI technician. Job expert 2, on the other hand, has had at least 10 years of experience on the job and is a district supervisor. It became apparent that these two experts emphasized different types of information in their domain analysis. Job expert 1 often provided descriptions of procedures, tools, and some related knowledge at an operational level to perform the tasks. When describing safety guidelines as well as desirable attitudes, this expert described the effect of these considerations at a more personal level.

Job expert 2, who is no longer doing these routine tasks but supervises instead, provided more elaborated concepts when describing procedures, tools used, and related knowledge. Additionally, this expert's descriptions of safety guidelines and attitudes often take into consideration the effect on team members as well as other road users (see Table 3 below for an example).

Work processes

There were also differences in domain analysis due to work processes. These differences became apparent in the types of information provided during the interviews. Job expert 2, responsible for creating the Straight-line Diagrams, provided detailed work flows and processes different from those of job expert 1, who utilized the SLDs as part of the job. For a comparison see Table 4a and Table 4b.

Table 3: Differences in emphasis between RCI technician and district supervisor during domain analysis

RCI Technician (Job Expert 1)						
DUTY	TASK	PROCEDURAL STEPS AND TECHNICAL KNOWLEDGE	TOOLS	RELATED KNOWLEDGE	SAFETY	ATTITUDES
Duty 3: Data Collection	c) Collect and record point features: street names, bridge numbers, milemarkers, call boxes, county lines, railroad crossing numbers, and milepoints for all intersections and counter stations.	<ol style="list-style-type: none"> 1. Begin at the zero milepoint for the section 2. Start your DMI 3. As you drive down the section, get the milepoint for each feature and their characteristics 4. Write down every milepoint noted for each feature on your inventory sheets 5. Drive all the way to the end of the section collecting information for each feature 	<ul style="list-style-type: none"> • DMI • SLD • Inventory sheets 	<ul style="list-style-type: none"> • Know beginning and end point • Know how to pick out the features and characteristics as you drive down the roadway • Know how to use the handbook if unsure of the features • Know how to use the inventory forms • Know where to collect the milepoint for the feature (e.g., in the center of an intersection, center of the railway) 	<ul style="list-style-type: none"> • As you are coming up to collect a milepoint, give yourself sufficient distance for stopping • Ensure that there is no one right behind you as you're slowing down • Have strobe lights on 	Mindful of personal safety and safety of other road users
District Supervisor (Job Expert 2)						
DUTY	TASK	PROCEDURAL STEPS AND TECHNICAL KNOWLEDGE	TOOLS	RELATED KNOWLEDGE	SAFETY	ATTITUDES
Duty 3: Data Collection	c) Collect and record point features: street names, bridge numbers, milemarkers, call boxes, county lines, railroad crossing numbers, and milepoints for all intersections and counter stations.	<ol style="list-style-type: none"> 1. Person who scribes will look and call up the names when they come up 2. Driver then hits DMI at the correct spot for that feature 3. If there are changes, mark it down in the field notes (names may have been misspelled, new sign up, new bridges may have been constructed and so the numbers have changed) 4. If unsure of name of the intersection, take a picture and discuss it with someone more knowledgeable 	<ul style="list-style-type: none"> • Inventory forms • DMI • Reports of the roadway • SLDs • Camera 	<ul style="list-style-type: none"> • Know what the features are and their characteristics • Know the tolerance rules • Know how to read SLDs • Know how to fill up the forms 	<ul style="list-style-type: none"> • The driver has the lights on with sign that says "Slow Moving Vehicle." • Driver pays attention to traffic in the mirrors and all around them. • The scribe is calling out names so that the driver is prepared when the intersection comes up. 	<ul style="list-style-type: none"> • Highly mindful of personal safety and safety of other road users • Being organized and prepared • Paying attention to what's coming on the SLDs as well as on the road • Being willing to multi-task <ul style="list-style-type: none"> • Working together as a team

Table 4a: Task analysis for handling Straight-line Diagrams or SLDs for contractor (supervisory level)

District Supervisor (Contractor)

DUTY	TASK	PROCEDURAL STEPS AND TECHNICAL KNOWLEDGE List each procedural step and technical knowledge required to perform task from start to finish	TOOLS List special tools, equipment, materials, etc. needed to perform the task	RELATED KNOWLEDGE List related pieces of knowledge needed to perform the task	ATTITUDES List attitudes critical to performing this task in a competent manner on the job	PERFORMANCE STANDARDS Describe Good, Average, and Poor performance
Duty 4: Perform post-inventory activities	a) Produce Straight-line Diagrams and update Districts' servers; then notify TranStat.	<ol style="list-style-type: none"> 1. Use the Straight-line Diagrammer 2. Clean up the SLD and look at regenerated SLD and make sure information is still correct. 3. SLD goes through QC (3 individuals). One looks at intersections, another looks at features, and another looks at the headers and footers of the SLD. 4. Once final SLD is ready, submit to District Office. 5. District Office uploads to the server at district level. 	<p>Mainframe</p> <p>Final markups from the field</p> <p>Microstation (similar to AutoCad)</p> <p>RCI</p>	<p>Diagrammer</p> <p>How to use Microstation</p> <p>How to use RCI</p> <p>How to use Mainframe</p>	<p>Have to be flexible, not get frustrated with updates required. Easy to work with because a lot of times people can get defensive about their work.</p>	<p>Good RCI Technicians They understand the RCI data very well. They also know the computer programs very well and can work independently. They regenerate the diagrams, are detailed oriented, and do lots of cleanup of the diagrams. They consistently turn in good work and make no mistakes.</p> <p>Average RCI Technicians They do not have a good understanding of the RCI data. They know the programs only moderately well and occasionally ask for help. The SLDs look similar to the old ones instead of cleaned up. There is no consistency in the quality of work and they make a few mistakes.</p> <p>Poor RCI Technicians They have a poor understanding of RCI data. They do not know how to use the programs well and are constantly asking for help. They look at the necessary changes and make those changes only instead of regenerating a new diagram. They are not detail-oriented and make a lot of mistakes.</p>

Table 4b: Task analysis for handling Straight-line Diagrams or SLDs for FDOT employee (non-supervisory level)

RCI Technician (FDOT employee)

DUTY	TASK	PROCEDURAL STEPS AND TECHNICAL KNOWLEDGE List each procedural step and technical knowledge required to perform task from start to finish	TOOLS List special tools, equipment, materials, etc. needed to perform the task	RELATED KNOWLEDGE List related pieces of knowledge needed to perform the task	ATTITUDES List attitudes critical to performing this task in a competent manner on the job	PERFORMANCE STANDARDS Describe Good, Average, and Poor performance
Duty 4: Post data collection	a) Make sure that all required data have been collected or verified before leaving the inventory site.	1. Look at SLD and inventory sheets and make sure that all information is complete and accurate 2. Look at inventory sheets and SLD to make sure the writing is legible to make it easy for you and others using these forms	Inventory sheets SLD	Know all the features and characteristics to ensure that you collected all of them	<ul style="list-style-type: none"> • Paying attention to detail and caring about the quality of data you collected • Being a team player who is concerned with how others use your collected data 	<p>Good RCI Technicians All data accurately collected and recorded. Record extra notes to help others make sense of their data. Notes are neat, legible, and organized.</p> <p>Average RCI Technicians All data collected accurately. Record extra notes to help others make sense of their data. But the notes may be difficult to read or not well-organized.</p> <p>Poor RCI Technicians Might not have all of the correct information. May not have the extra notes that the Good and Average RCI technicians have on their sheets to help others understand the information they have.</p>

Appendices D and E (see Appendices) depict the complete domain analysis of job experts 1 and 2 respectively.

What are the desired performance levels for these tasks?

Both job experts 1 and 2 were unfamiliar with the exercise of describing job outputs that distinguish between good, average, and poor performance. After working through several tasks, however, they were able to provide rich descriptions of performance levels. There were nevertheless differences in the details provided. The first job expert, with less work experience and no supervisory experience, described performance in a rather narrow scope. In contrast, the second job expert, a supervisor, described performance in the context of workflow and its impact on other parts of the organization and employees (see Table 5 below).

Table 5: Differences in performance descriptions between two job experts

Office Work			
DUTY	TASK	JOB EXPERT 1	JOB EXPERT 2
Duty 3: Perform data entry preparation activities	1. Review the inventory folder to ensure all recorded data is readable, complete, and unambiguous (copies of the marked-up SLD, features inventory field sheet, miscellaneous inventory field sheet, construction plans, Feature/Characteristic Sort and the Financial Management Projects by Roadway ID reports).	<p>Good RCI Technicians Might add extra notes to the SLD and inventory sheets. If they see something in the field that might concern another group (e.g., maintenance, traffic ops), they might note those and call in those observations. Each feature is numbered and you want to order them so that you won't miss it.</p> <p>Average RCI Technicians Might notice some of it. They might collect info but not know how the other departments use it.</p> <p>Poor RCI Technicians Will not collect these extra notes. Rookie might just enter the easiest information first, based on what they know.</p>	<p>Good RCI Technicians Takes the initiative to get the job done and get as much information as possible before they decide they cannot go forward with the issue. Their write-ups are easy to understand by the office person because they are clear, make sense, followed established rules, and are not missing important information.</p> <p>Average RCI Technicians Calls the office when in doubt to ask questions on how to handle situations. Write-ups are for the most part easy to understand by the office person because they are clear, make sense, and followed established rules. Some information may be missing but they are not the important details. The office person or supervisor may need to do more investigation.</p> <p>Poor RCI Technicians They do not really understand how to do things or follow the procedures. They do not call to ask questions when in doubt. Their write-ups are messy, disorganized, do not make sense in terms of descriptions, and information are occasionally missing or placed in the wrong places. The office person or supervisor has to spend more time trying to pull the information out and often has to investigate the matter further.</p>

What are the behavioral examples that demonstrate the existence of such competencies?

From the rich descriptions of performance by both experts, we derived various behavioral examples demonstrating the existence of specific competencies. Appendices D and E, respectively, contain these two experts' complete descriptions of performance. We then used the derived examples to enrich the preliminary competency model discussed below.

The preliminary competency model

We carefully examined the domain analysis documents (Appendices D and E) as well as the detailed transcriptions of the various observations and came up with three main themes of competency – personal effectiveness, academic, and work competencies. Personal effectiveness entails competencies that constitute abilities and attitudes. These are also known as “soft competencies.” Academic competencies encompass basic skills such as reading, writing, and mathematics. Finally, the “hard competencies” are the ones that are work-related. These three main themes are then further subdivided into more specific competency themes (see Figure 2 below).

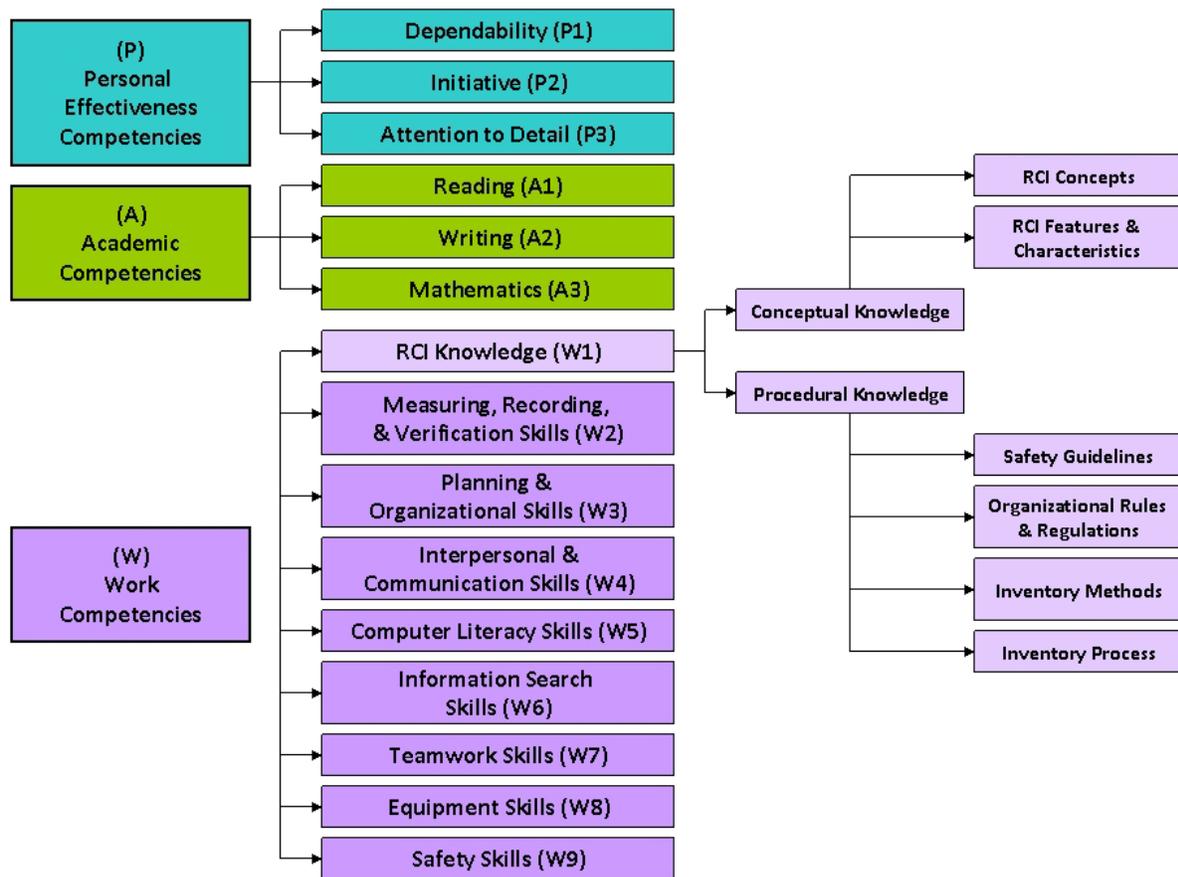


Figure 2 Preliminary competency model for RCI technicians

In addition, we developed a competency model that not only has a brief definition of each competency, but also contains descriptions that further illustrate the meaning of the competency. Each competency also includes behavioral examples that illustrate when that competency is being demonstrated on the job.

Table 6: An example of how a specific competency (RCI Knowledge) is described

<p>Competency: RCI KNOWLEDGE (W1)</p> <p>Definition: Demonstrates the ability to apply knowledge of roadway characteristics inventory concepts, processes, and procedures</p> <p>Description</p> <ul style="list-style-type: none"> ▪ Knows why the RCI information is collected in a certain way and how the data will be used in other departments ▪ Knows how the data from the features and characteristics are handled by the databases ▪ Knows the various inventory methods ▪ Knows the pre-inventory, inventory, and post-inventory process ▪ Knows which characteristics to pick up for different road types ▪ Knows how to measure the various features and characteristics ▪ Knows the various features as well as characteristics and how they are related to one another ▪ Knows the tolerances for each feature and characteristic ▪ Knows when and how to submit a basemap correction package ▪ Knows potential causes of problems with data ▪ Knows safety guidelines for RCI technicians and other road users ▪ Knows organization rules and procedures ▪ Knows the difference between the different types of edits ▪ Knows how to use the handbooks and other resources <p>Behavioral Examples</p> <ul style="list-style-type: none"> ▪ Identifies data problems by viewing existing and historical data ▪ Demonstrates understanding that a roadway can have different features on both the left and right side even though it's a composite road ▪ Decides whether a measurement is in tolerance for a specific feature or characteristic ▪ Knows what the data errors mean on validation reports ▪ Identifies the different types of data collected for on-system and off-system ▪ Demonstrates understanding of how some features are connected to other features when entering data in RCI application or running edits ▪ Demonstrates understanding of RCI edits as well as how to resolve inconsistencies ▪ Uses knowledge of common mistakes to identify and resolve issues during QA/QC
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Validating the preliminary competency model

A focus group was then used to validate the preliminary competency model. Although the participants were not collaborating face-to-face, the teleconference session provided ample opportunities for each participant to provide his or her input to the feedback process. The diversity in background and experience helped generate interesting perspectives. Generally, the participants were able to agree to most of the definitions, descriptions, and the behavioral examples for each competency. Being able to see the document edited as they collaborated led to a lively discussion and the task was accomplished in less than 4 hours (refer to Appendix B and *Addendum 1: Competency Model–Roadway Characteristics Inventory Technicians* for complete definitions, descriptions and behavioral examples of each competency in the model).

Upon completion of the validation process, each participant then completed an online survey (Appendix I) to provide individual ratings of each competency in terms of its importance to performance effectiveness for an RCI technician. Participants rated each validated competency on a scale of 1 (Not Important) to 5 (Very Important).

Table 7: Mean ratings of competencies in terms of importance

1. PERSONAL EFFECTIVENESS	Mean Rating
DEPENDABILITY (P1): Displays responsible behaviors at work	5
INITIATIVE (P2): Demonstrates a willingness to find a solution to challenges	4.6
ATTENTION TO DETAIL (P3): Demonstrates attention to detail	5
PHYSICAL ABILITY (P4): Able to physically perform work responsibilities and tasks	4
2. ACADEMIC COMPETENCIES	
READING (A1): Demonstrates understanding of written sentences, paragraphs, figures, and technical graphics in work-related documents	4.4
WRITING (A2): Demonstrates ability to use standard English for compiling information and preparing written documents	4
MATHEMATICS (A3): Demonstrates ability to do basic mathematical calculations	3.8
3. WORK COMPETENCIES	
RCI KNOWLEDGE (W1): Demonstrates the ability to apply knowledge of roadway characteristics inventory concepts, processes, and procedures	4.8
MEASURING, RECORDING, AND VERIFICATION SKILLS (W2): Entering, recording, storing, or maintaining information in written or electronic format	5
PLANNING & ORGANIZATIONAL SKILLS (W3): Planning and prioritizing work to manage time effectively and accomplish assigned tasks	4.6
INTERPERSONAL AND COMMUNICATION SKILLS (W4): Listening, speaking, and signaling so that others can understand	4.4
COMPUTER LITERACY SKILLS (W5): Using a computer and related applications to input, store, and retrieve information	4.2
INFORMATION SEARCH SKILLS (W6): Identifying information needs and finding the right resources or persons to obtain the required information	4.2
TEAMWORK SKILLS (W7): Working cooperatively with others to complete work assignments	4.8
EQUIPMENT SKILLS (W8): Demonstrates ability to use tools, forms, vehicles, and equipment provided	4.4
SAFETY SKILLS (W9): Mindful of personal safety issues and the safety of others	4.8

Conclusions

This research project identified and applied instructional design practices to evaluate and improve the RCI training curriculum. A key component in fulfilling the project objectives was the identification of competencies desired in RCI technicians so that the development of the training curriculum, course modules, and delivery methods could be done in a more focused and cost effective manner. To identify the competency model unique to the context and needs of RCI technicians in Florida, we embarked on a rigorous research study using data from multiple research methods. The resulting competency model (Appendices A and B) is comprehensive, detailed, and rich with various behavioral examples that contextualized the various competencies.

Findings

What are the implications of our research findings? The competency model enabled us to identify and define specific knowledge, skills, and abilities needed to perform the RCI technician job. By also providing descriptions and behavioral examples, the document could provide a starting point for the FDOT to discuss job performance at the individual, district, and organizational level. This document could also have potential benefits in terms of selecting future RCI technicians. It is easier to identify and select the right type of employees when you have a good idea of the competencies they should have; then, the competencies they lack can be developed through training and development. It is also useful in terms of managing performance. Supervisors could use the behavioral examples to highlight performance outcomes that demonstrate competence in various areas.

Mapping the various duties and tasks to the identified competencies (Appendix C) also enabled us to understand how complex these tasks really are in terms of the combination of knowledge, skills, and abilities involved. This has a major influence on the type of instructional practices explored and applied to training and development projects. When employees need to master a vast amount of knowledge and skills to do their job, they need a mental model to organize these components. Most training programs, including the ones currently used by TranStat, are organized around topics. Although, this method could be useful in transmitting and teaching a vast amount of information, it could also lead to cognitive overload as trainees struggle to identify how all the discrete pieces of information, concepts, procedures, and heuristics come together in the context of the actual tasks they do on the job. A different instructional strategy should be explored in terms of presenting similar knowledge and skills in a manner that help trainees build a mental model of how to apply these knowledge and skills to tasks that they need to do on the job.

Outcomes and recommendations

The outcomes of this research study provided a compelling case for the task-centered method of instruction that is applied within the competency-based framework. By identifying the knowledge, skills, and abilities needed to perform various tasks, we were able to design course modules and activities based on actual tasks performed on the job. These components of knowledge, skills, and abilities or KSAs are then taught within the context of the authentic tasks. The tasks progress from simple to more complex so that new components of KSAs can be taught with each subsequent new task. This method of layering knowledge by building upon knowledge attained earlier could help reduce cognitive load and make learning more meaningful for the trainees. Refer to *Addendum 2: Competency-based Training for RCI Technicians Using the Task-Centered Approach* for more details on the task-centered strategy and how it is being applied to training materials currently under development.

Although some competencies can be more readily taught through Web-based multimedia course modules, others that involve soft skills like teamwork and communication pose a bigger challenge. However, the definition, descriptions, and behavioral examples identified in the competency model provide a starting point for harnessing current developments in information and communication technologies (ICT). By defining and describing what competent behavior should look like, better rubrics can be designed to evaluate skills like communication and team work. These skills could then be developed and evaluated using technology like discussion boards, chats, or live synchronous training, even when trainees are geographically dispersed.

As for providing Web-based training, it is no longer enough to develop sleek multimedia materials and then keep your fingers crossed that learners will use them. An engaging learning environment is required to not only deliver the materials, but also provide trainees with tools to manage their own learning and track their progress. While the basic materials use a variety of media – voice narration, video, animation, and even simulations – these are augmented by additional resources that trainees can use when they are already equipped with the basic knowledge. These resources include handbooks, glossaries, and other Web-based resources. Once again, in designing such an environment, the competency framework generated through this research study provides a useful guide to the types of resources and the extent to which they are being provided.

A true measure of the effectiveness of any training method or learning environment requires some form of assessment. The competency framework could be used to guide any form of assessment, be it within the training materials or on-the-job performance assessment, to determine effective application of the knowledge and skills learned.

As a result of this research project, we developed several prototype course modules using the competency model as a guiding framework. We also developed a matrix showing how the training content currently taught through face-to-face sessions can be translated into a set of Web-based courses utilizing the task-centered approach (see Appendix L). The modules developed include the following:

1. TRIP Orientation
2. RCI Fundamentals 101
 - 2.1. Lesson 1: **Overview**
 - 2.2. Lesson 2: **Introduction**
 - 2.3. Lesson 3: **Roadtrip 1**

These multimedia course modules are offered through a learning portal called *Training for Roadway Inventory Personnel*, or *TRIP* (see Appendix M for an outline of the proposed courses and modules). CIMES provided the conceptual model for TRIP and the FDOT Office of Information Services is developing the portal. The portal is a learning environment that tracks trainees' progress through the course modules and provides additional resources such as glossaries and handbooks. More important, it keeps track of the assessment activities performed during the training sessions so that trainees and instructors can identify areas of strengths and weaknesses. This will help trainees focus future learning efforts on specific topics or skills.

A discussion board is also provided to supplement the course modules. The types of activities undertaken via the discussion boards seek to foster communication and teamwork skills among trainees and to evaluate their performance based on carefully defined rubrics that instructors could utilize. A long term benefit of such a discussion board is the accumulation of knowledge based on issues, concerns, and sharing of information among trainees from various districts. The collective knowledge is a useful tool and an additional resource for future trainees and other RCI technicians to tap into as part of a process known as informal learning.

These research outcomes in addition to the instructional prototype highlight opportunities for future research. One idea would be to assess the effectiveness of the task-centered instructional approach as compared to other forms of training methods. Future research could also explore the effectiveness of various elements in Web-based training environments such as the provision of automatic feedback, effective moderation of discussion boards, and factors in online interactions that promote team work and communication among trainees.

Summary

This project demonstrated how an organization could embark on the development of a competency model tailored specifically to the needs of a particular profession, in this case the RCI technician job. This report in turn described how various research methods generated different types of data that were then harnessed to create a robust, comprehensive, and validated competency model. We have also discussed various ways the research outcomes could be used to inform decisions on instructional design practices, the development of learning materials and environment, as well as other decisions related to hiring and performance management.

We hope others will find this process and findings similarly useful in helping them identify competencies in their own job areas and then apply the insights to practical usage such as training and performance management

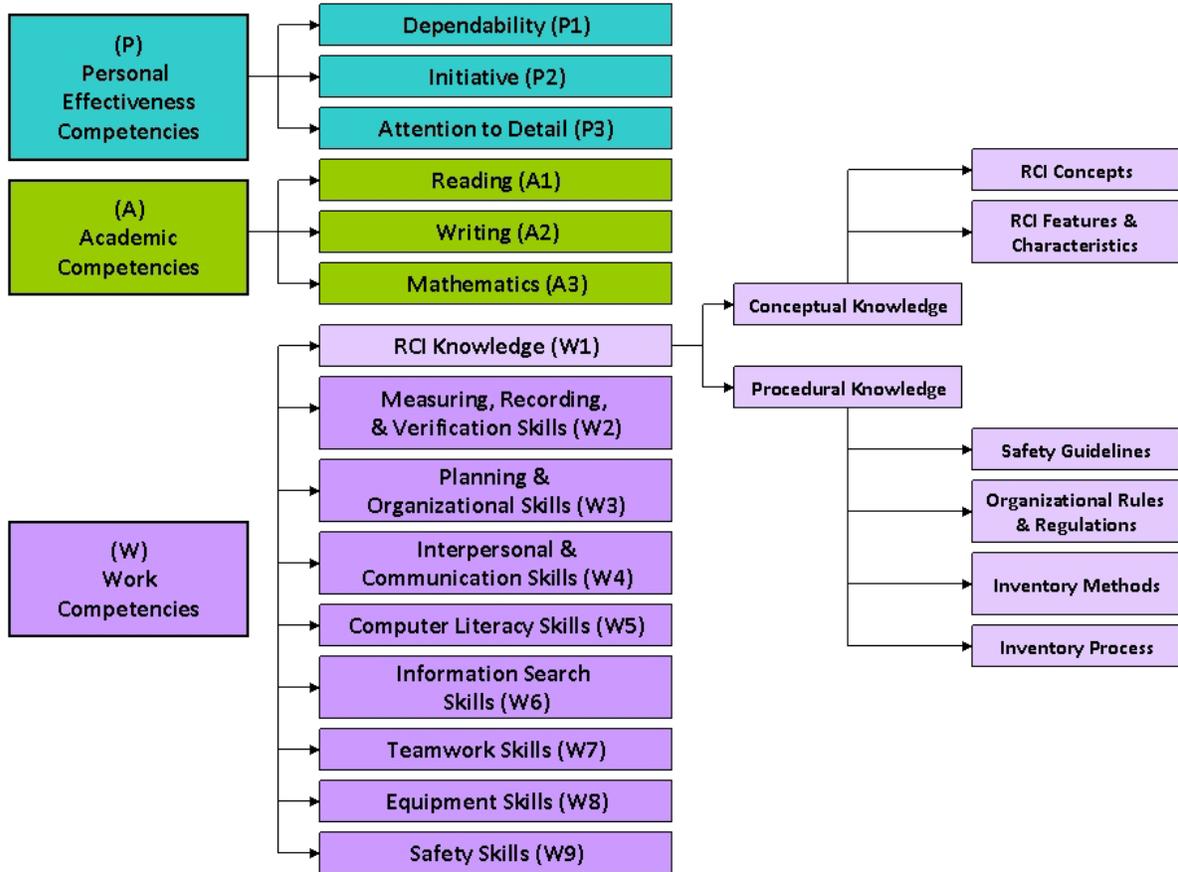
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Appendices

Appendix A: Graphical representation of the RCI technician competency model



Appendix B: Description of competencies in the competency model

Category: PERSONAL EFFECTIVENESS COMPETENCIES (P)

Competency: **DEPENDABILITY (P1)**

Definition: Displays responsible behaviors at work

Description

- Is reliable, honest, responsible, and dependable in fulfilling work responsibilities
- Cares about the quality of the data
- Diligently follows through on commitments and consistently meets deadlines
- Demonstrates regular and punctual attendance
- Follows written and verbal directions
- Complies with organizational rules, policies, and procedures
- Exhibits flexibility in accommodating schedule changes
- Accepts responsibility for personal actions and for those of the team or district
- Attempts to learn from mistakes
- Able to multi-task
-

Behavioral Examples

- Willing to adjust work schedule to accommodate inventory needs of new construction projects
- Communicate any personal schedule changes so that other team members can plan for them
- Willing to learn new software to get the job done
- Demonstrates patience when dealing with errors during data updates
- Demonstrate ability to follow directions and procedures

Competency: **INITIATIVE (P2)**

Definition: Demonstrates a willingness to find a solution to challenges

Description

- Pursues work with energy and drive with a strong orientation toward accomplishment
- Persists and expends extra effort to accomplish tasks even when conditions are difficult or deadlines are tight
- Persists at a task or problem despite interruptions, obstacles, or setbacks
- Exerts effort toward task mastery
- Establishes and maintains personally challenging but realistic work goals
- Goes beyond the routine demands of the job
- Strives to exceed standards and expectations
- Performs effectively even with minimal direction, support, or approval and without direct supervision
- Exhibits confidence in capabilities and an expectation to succeed

Behavioral Examples

- Asks questions when in doubt about processes, procedures, or roadway characteristics
- Investigates data abnormalities when reviewing historical data during pre-inventory activities
- Returns to the field to re-inventory a feature or characteristic if data does not seem to be correct
- Attempts to get as much information as needed and achieves resolution to data collection problems before handing over the issue to the supervisor or co-worker
- Attempts to identify problems and resolve the issues during QA/QC checks instead of leaving them for someone else to resolve

- Uses tools like iView, Videolog, and GoogleEarth to become familiar with assigned roads before going for data collection

Competency: Attention to DETAIL (P3)

Definition: Demonstrates attention to detail

Description

- Diligently checks work to ensure that all essential details have been considered
- Notices errors or inconsistencies that others have missed, and takes prompt, thorough action to correct errors
- Follows procedures established for organizational workflow

Behavioral Examples

- Takes the time to review existing and historical data prior to inventory and identifies mistakes or problems with the road data
- Ensures that existing administrative data (for elements not visible on the field) are correct and up-to-date. If there are discrepancies, determines if an RCI/GIS basemap package is necessary
- Submits write-ups and inventory sheets that are easy to understand by data entry personnel because they have no missing information and all procedures have been followed
- Double checks during data entry that all features and characteristics are updated when making data changes to inter-related features
- Takes the time to look at and analyze data when performing QA/QC checks
- Ensures that district information is correct and informs central office to make updates if necessary
- Recognizes when the DMI needs to be calibrated more than once a week and diligently performs the calibrations

Competency: Physical Ability (P4)

Definition: Able to physically perform work responsibilities and tasks

Description

- Ability to get in and out of vehicles
- Ability to operate motor vehicles
- Ability to sit for prolonged periods of time in a vehicle
- Ability to walk short distances in possibly uneven terrain
- Ability to react quickly to possible road hazards
- Ability to operate standard measuring instruments such as the DMI
- Ability to physically operate a computer to update and maintain data

Category: ACADEMIC COMPETENCIES (A)

Competency: READING (A1)

Definition: Demonstrates understanding of written sentences, paragraphs, figures, and technical graphics in work-related documents

Description

- Locates, understands, and interprets written information in manuals, handbooks, reports, memos, letters, forms, graphs, charts, tables, calendars, schedules, signs, notices, applications, and directions
- Reads and understands maps, construction plans, Straight-line Diagrams (SLDs), Key Sheets, and instructions, as well as field and office handbooks

- Recognizes and interprets the value of numbers and what they mean to data collection
- Integrates and synthesizes information from multiple written and online materials
- Applies what is learned from written material to follow instructions and complete specific tasks
- Applies what is learned from written material to work situations

Behavioral Examples

- Effectively uses the field handbook to look up roadway characteristics and their codes
- Uses available manuals to effectively operate tools and equipment such as the DMI and tire pressure gauge
- Reads SLDs correctly to become familiar with the features and characteristics on a route

Reads Key Sheets and identifies common problem areas

- Extracts information from technical graphics such as SLDs and construction plans for required features and characteristics

Competency: WRITING (A2)

Definition: Demonstrates ability to use standard English for compiling information and preparing written documents

Description

- Uses correct spelling, punctuation, and capitalization
- Creates documents such as forms, reports, graphics, and email
- Communicates thoughts, ideas, information, messages, and other written information (which may contain technical terms and concepts) in a logical, organized, and coherent manner

Behavioral Examples

- Fills in inventory sheets with no spelling errors
- Submits a basemap correction request
- Submits an SLD package with clear and accurate instructions
- Writes coherent and well-thought out emails for work-related communication

Competency: Mathematics (A3)

Definition: Demonstrates ability to do basic mathematical calculations

Description

- Performs addition, subtraction, multiplication, and division of numbers
- Demonstrates understanding of basic concepts of geometry such as angle calculation and curves
- Converts measurement of feet into miles and vice versa
- Performs other calculations and conversions related to distance measurement, curve data, and station exceptions

Behavioral Examples

- Accurately measures and records lengths and distances associated with features and roadway characteristics
- Determines whether a measurement is in tolerance for any roadway feature or characteristic
- Possesses ability to apply new methods for getting accurate measurements of features and characteristics

Category: WORKPLACE COMPETENCIES (W)

Competency: RCI Knowledge (W1)

Definition: Demonstrates the ability to apply knowledge of roadway characteristics inventory concepts, processes, and procedures

Description

- Knows why the RCI information is collected in a certain way and how the data will be used in other departments
- Knows how the data from the features and characteristics are handled by the databases
- Knows the various inventory methods
- Knows the pre-inventory, inventory, and post-inventory process
- Knows which characteristics to pick up for different road types
- Knows how to measure the various features and characteristics
- Knows the various features as well as characteristics and how they are related to one another
- Knows the tolerances for each feature and characteristic
- Knows the inventory process and procedures for HPMS
- Knows when and how to submit a basemap correction package
- Knows potential causes of problems with data
- Knows safety guidelines for RCI technicians and other road users
- Knows organization rules and procedures
- Knows the difference between the different types of edits
- Knows how to use the handbooks and other resources

Behavioral Examples

- Identifies data problems by viewing existing and historical data
- Demonstrates understanding that a roadway can have different features on both the left and right side even though it's a composite road
- Decides whether a measurement is in tolerance for a specific feature or characteristic
- Knows what the data errors mean on validation reports
- Identifies the different types of data collected for on-system and off-system
- Demonstrates understanding of how some features are connected to other features when entering data in RCI application or running edits
- Demonstrates understanding of RCI and HPMS edits as well as how to resolve inconsistencies
- Uses knowledge of common mistakes to identify and resolve issues during QA/QC

Competency: Measuring, Recording, and Verification Skills (W2)

Definition: Entering, recording, storing, or maintaining information in written or electronic format

Description

- Selects, uses, and completes appropriate forms
- Attends to and follows through on important paperwork
- Accurately measures and records roadway features and characteristics using assigned equipment
- Completes data collection in a timely and accurate manner
- Obtains appropriate information, signatures, and approvals promptly
- Verifies that all information is present and accurate before forwarding materials
- Detects and corrects errors, even under time constraints
- Notices errors or inconsistencies

- Keeps logs, records, and files that are up-to-date and readily accessible (e.g., vehicle logs and repair records)

Behavioral Examples

- Ensures that there are no abnormalities with the road such as alignment changes due to new construction and section status (for example, active w/combo) when reviewing existing and historical data as part of pre-inventory activities
- Uses the matrices in the field handbook to double check features that should be collected based on Functional Classification
- Carefully reviews the inventory folder before data entry to ensure all recorded data are readable and complete, and all necessary materials (such as final write-up forms, marked-up SLDs, and inventory field sheets) are included
- Identifies accurately the start and stop of road changes
- Uses the tolerance rules to determine if there is a real discrepancy in measurement
- Updates RITA with SLD and inventory dates in an accurate and timely manner

Competency: Planning & Organizational Skills (W3)

Definition: Planning and prioritizing work to manage time effectively and accomplish assigned tasks

Description

- Approaches work in a methodical manner
- Plans and schedules tasks so that work is completed on time
- Keeps track of details to ensure work is performed accurately and completely
- Prioritizes various competing tasks and performs them quickly and efficiently according to their urgency
- Finds new ways of organizing work area or planning work to accomplish tasks more efficiently

Behavioral Examples

- Effectively uses the established filing process for inventory folders and other documents
- Is systematic and puts things away in the manner in which they were originally organized
- Uses the district standard checklist to ensure that everything needed for data collection is in the vehicle along with the latest updates
- Checks the map to know exactly where to go before getting on the road to collect data
- Collaborates with other RCI technicians and departments

Competency: Interpersonal and Communication Skills (W4)

Definition: Listening, speaking, and signaling so others can understand

Description

- Maintains open lines of communication with others
- Establishes a high degree of trust and credibility with others
- Listens to and considers others' viewpoints
- Demonstrates respect for the opinions, perspectives, and individual differences of others
- Receives, attends to, interprets, understands, and responds to verbal messages
- Picks out important information in verbal messages
- Understands and acts upon instructions to complete assignments
- Speaks clearly and confidently in a logical manner
- Uses standard technical terminology and working definitions in their proper context

Behavioral Examples

- Coordinates with other districts and departments to update appropriate data
- Explains data-related problems that need to be corrected by other offices

- Ensures that all facts are correct before communicating with other offices
- Uses screenshots to explain computer-related problems with data, basemaps, or SLDs
- Effectively describes problems encountered during QA/QC to supervisor or more experienced RCI technicians to resolve the issues
- Attempts to look at partner's point of view in resolving disagreements

Competency: Computer Literacy Skills (W5)

Definition: Using a computer and related applications to input, store, and retrieve information

Description

- Uses basic computer hardware (e.g., PCs, printers) and software (e.g., word processing, spreadsheet, and database software) to perform tasks
- Uses the organization's email system and its basic functions (e.g., replying to/forwarding messages, using electronic address books, and attaching files)
- Composes professional emails to communicate business-related information to co-workers, supervisors, and colleagues
- Uses the Internet and Web-based tools to manage basic workplace tasks
- Uses relevant computer applications to run reports
- Demonstrates an understanding of basic database management concepts
- Uses database application to enter, manipulate, edit and format text and numerical data
- Demonstrate understanding of FDOT's IT usage policies and resource constraints

Behavioral Examples

- Uses applications that are mainframe-based and Web-based
- Runs reports in RITA to identify roadway IDs requiring inventory
- Uses the RCI application as well as procedures outlined in the Handbook to view, update, and delete inventory data
- Enters data in an accurate and organized manner so that the data can easily be used by others
- Takes the time to validate data in RCI and identify preliminary problems with data before running the edit functions
- Knows the computer applications very well and is able to work with minimal supervision
- Applies basic and advanced RCI concepts to data entry
- Uses iView to look at a basemap and ensure that the roadway is digitized in the right direction
- Uses applications like iView and Videolog to become familiar with the road about to be inventoried
- Follows FDOT's IT usage policies and guidelines

Competency: Information Search Skills (W6)

Definition: Identifying information needs and finding the right resources or persons to obtain the required information

Description

- Effectively uses both internal resources (e.g., internal computer networks, company filing systems) and external resources (e.g., Internet search engines) to locate and gather information relevant to the problem
- Examines information obtained for relevance and completeness
- Recognizes important gaps in existing information and takes steps to eliminate those gaps

Behavioral Examples

- Carefully checks the handbooks and other resources for information or procedures pertaining to collecting, recording, and verifying RCI data

- Finds out the contact information for other departments (such as railway or maintenance) to identify ID for specific features
- Contacts central office, senior RCI technicians, or those from other districts to clarify procedures or get more information on unfamiliar features or characteristics
- Finds documentation on what the edit errors mean
- Takes photos of unfamiliar features or characteristics to show to and discuss with someone else

Competency: Teamwork Skills (W7)

Definition: Working cooperatively with others to complete work assignments

Description

- Demonstrates the ability to work responsibly on a team
- Recognizes the importance of teamwork and its impact on the organization
- Assists others who have less experience or have heavy workloads
- Identifies and draws upon team members' strengths and weaknesses to achieve results
- Learns from other team members
- Effectively communicates with all members of the group or team to achieve team goals and objectives
- Effectively communicates with members from other districts or departments

Behavioral Examples

- Ensures that final write-ups, inventory sheets, marked-up SLDs, and other required materials provide complete information with clear notes on decisions made in the field so that there is no ambiguity when someone else is doing the data entry
- Follows procedures to facilitate workflow so that other co-workers are able to fulfill their own responsibilities and tasks
- Willing to help newer RCI technicians learn to do the job
- Contributes to training sessions at the district level by sharing personal experiences and techniques
- Scribe calls out the road names upon coming up to an intersection so that the driver can hit the correct DMI spot
- Adds extra notes to inventory sheets and SLDs if something is amiss in the field and informs the relevant department (such as maintenance or traffic operations) to let them know of the issue

Competency: Equipment Skills (W8)

Definition: Demonstrates ability to use tools, forms, vehicles, and equipment provided

Description

- Utilizes tools and equipment for their intended use
- Maintains given tools and equipment in good working order
- Maintains logs and other paperwork required for the use of vehicles

Behavioral Examples

- Uses tire pressure gauge to ensure that tire pressure is just right and does not affect the accuracy of the DMI
- Turns on the strobe lights to ensure other road users can easily see the data collection vehicle
- Accurately calibrates the DMI using the measured milepoint
- Is highly familiar with the DMI to ensure a smooth data collection process
- Adjusts tire pressure to ensure accuracy of DMI
- Is aware of how the weather affects tire pressure

- Selects the appropriate tools to use such as a measuring tape for uneven surfaces or for measuring a culvert

Competency: Safety Skills (W9)

Definition: Mindful of personal safety issues and the safety of others

Description

- Abides by all traffic rules and regulations
- Follows all safety guidelines and procedures related to the RCI activities
- Attentive to all that happens on the road while driving or conducting road inventory
- Demonstrates concern for personal and co-worker's safety at all times

Behavioral Examples

- Goes through the maintenance and safety checklist before driving the RCI vehicle
- Checks that all lights (i.e., strobelights, headlights, brakelights, etc.) are working correctly and are visible for others on the road
- Wears the safety vest when outside the vehicle; keeps an extra vest in the vehicle in case someone else needs one
- Drives the vehicle at a steady pace and sticks to the same lane, if possible
- Whenever possible, pulls over carefully to park in a safe area before measuring road dimensions
- Looks out for potential safety hazards when team partner is getting in and out of vehicles and during measurement
- Demonstrates patience and understanding even when other road users are angry or abusive
- Avoids certain roads during the rush hours; waits until traffic gets lighter before doing the inventory
- Avoids doing data collection during bad weather; waits for less dangerous road conditions and better visibility

Appendix C: Mapping of job tasks to competencies

FIELD										
	Duties	Tasks							Competencies	
A	Performs pre-inventory field preparation	A-1. Ensure vehicle is equipped with all field inventory equipment and that all is in working order.	A-2. Perform vehicle safety inspection using a checklist.	A-3. Check tire pressure and calibrates the DML.	A-4. Bring all related materials such as forms, handbooks, and maps.					<ul style="list-style-type: none"> ▪ Attention to Detail ▪ Planning and Organizational Skills ▪ Equipment Skills ▪ Safety Skills
B	Prepares inventory data collection	B-1. Wait for any transportation maintenance or construction activities to be complete before inventorying the Roadway ID.	B-2. View videologs to become familiar with the assigned roadway.	B-3. Review GIS basemaps to ensure that the alignment of beginning milepoint (BMP) and end milepoint (EMP) is digitized correctly.	B-4. Bring inventory folder with inventory matrices, field inventory worksheets, SLDs, Key Sheets, GIS basemaps, RCI printouts for various road features, and route maps.					<ul style="list-style-type: none"> ▪ Attention to Detail ▪ Initiative ▪ Reading ▪ Planning and Organizational Skills ▪ RCI Knowledge ▪ Teamwork Skills
C	Data Collection	C-1. Apply safety guidelines.	C-2. Drive through and verify the roadway length. If there is a discrepancy in the length, initiate the basemap package process.	C-3. Mark any obscure items with temporary paint such as structures, facility crossings, culverts, angled intersections, and other items.	C-4. Collect and record point features: street names, bridge numbers, milemarkers, call boxes, county lines, railroad crossing numbers, and milepoints for all intersections and counter stations	C-5. Collect and record milepoints for roadway features such as number of lanes, median type, and shoulder type.	C-6. Measure roadway dimensions: total surface width, inside and outside shoulder widths, median widths, and box culvert dimensions.	C-7. Collect milepoints for miscellaneous features (structures, underpasses, pavement condition, and friction course).		<ul style="list-style-type: none"> ▪ Attention to Detail ▪ Reading ▪ Writing ▪ Mathematics ▪ RCI Knowledge ▪ Measuring, Recording, and Verification Skills ▪ Planning and Organizational Skills ▪ Teamwork Skills ▪ Equipment Skills ▪ Safety Skills
D	Post data collection	D-1. Make sure that all required data have been collected or verified before leaving the inventory site.	D-2. Prepare inventory folder for data input and ensure legibility and accuracy.							<ul style="list-style-type: none"> ▪ Dependability ▪ Attention to Detail ▪ Reading ▪ Writing ▪ RCI Knowledge ▪ Measuring, Recording, and Verification Skills ▪ Planning and Organizational Skills ▪ Teamwork Skills

OFFICE									
	Duties	Tasks						Competencies	
A	Perform pre-inventory activities	A-1. Identify roadway ID requiring inventory.	A-2. Collect and review existing and historical data for field verification purposes and to identify problems prior to inventory.	A-3. Review GIS basemap alignment to identify road changes. If there is a discrepancy, generate an RCI/GIS basemap package.	A-4. Verify existing administrative data (for elements not visible in the field). If there is a discrepancy, determine if an RCI/GIS basemap package is necessary	A-5. Compile inventory folder that includes inventory matrices, field inventory worksheets, SLDs, Key Sheets, GIS basemaps, and RCI printouts for various road features, and route maps.			<ul style="list-style-type: none"> ▪ Dependability ▪ Initiative ▪ Attention to Detail ▪ Reading ▪ RCI Knowledge ▪ Planning and Organizational Skills ▪ Information Search Skills
B	Perform data entry preparation activities	B-1. Obtain data from construction plans that cannot be collected from the field. (e.g., horizontal bearings and curve data). Convert the construction stations to match milepoints.	B-2. Review the inventory folder to ensure all recorded data is readable, complete, and unambiguous (copies of the marked-up SLD, features inventory field sheet, miscellaneous inventory field sheet, construction plans, Feature/Characteristic Sort and the Financial Management Projects by Roadway ID reports).	B-3. Reconcile the field collected milepoints against the currently recorded milepoints to see whether they are in tolerance before updating the RCI.	B-4. Ensure that features referenced by intersection milepoints match SLD mark-up milepoints.	B-5. Coordinate with other offices to update appropriate data.			<ul style="list-style-type: none"> ▪ Dependability ▪ Initiative ▪ Attention to Detail ▪ Reading ▪ Mathematics ▪ RCI Knowledge ▪ Measuring, Recording, and Verification Skills ▪ Planning and Organizational Skills ▪ Interpersonal and Communication Skills ▪ Computer Literacy Skills ▪ Teamwork Skills
C	Perform data entry	C-1. Enter, update, and verify data into the Roadway Characteristics Inventory (RCI) database according to the handbooks.	C-2. Validate data by using the RCI database automated process.	C-3. Run Main 1, Main 2, Main 3, and all RCI Edits; and reconcile data.					<ul style="list-style-type: none"> ▪ Dependability ▪ Attention to Detail ▪ Reading ▪ Mathematics ▪ RCI Knowledge ▪ Measuring, Recording, and Verification Skills ▪ Planning and Organizational Skills ▪ Computer Literacy Skills ▪ Information Search Skills

Appendix D: Validated domain analysis, Subject Matter Expert 1 (RCI technician)

OFFICE										
D	Perform post-inventory activities	D-1. Produce Straight-line Diagrams and update Districts' servers; then notify TranStat.	D-2. Review Key Sheets and update as needed.	D-3. Update RITA with SLD and inventory dates.	D-4. Perform QA/QC checks.	D-5. File and retain inventory folder for 5 years.				<ul style="list-style-type: none"> ▪ Dependability ▪ Initiative ▪ Attention to Detail ▪ Reading ▪ Writing ▪ Mathematics ▪ RCI Knowledge ▪ Measuring, Recording, and Verification Skills ▪ Planning and Organizational Skills ▪ Computer Literacy Skills ▪ Information Search Skills ▪ Teamwork Skills

Appendix D: Validated domain analysis, Subject Matter Expert 1 (RCI technician)

VALIDATED
DOMAIN ANALYSIS: RCI Technicians (Florida Department of Transportation)
Subject Matter Expert 1 (RCI Technician)

OFFICE WORK							
DUTY	TASK	PROCEDURAL STEPS & TECHNICAL KNOWLEDGE List each procedural step and technical knowledge required to perform task from start to finish	TOOLS List special tools, equipment, materials, etc. needed to perform the task	RELATED KNOWLEDGE List related pieces of knowledge needed to perform the task	SAFETY List critical safety knowledge and skill needed to perform this task in a safe manner	ATTITUDES List attitudes critical to performing this task in a competent manner on the job	PERFORMANCE STANDARDS Describe Good, Average, and Poor performance
Duty 1: Perform pre-inventory activities	a) Identify roadway ID requiring inventory.	<ol style="list-style-type: none"> 1. Go to RITA 2. Run the report, "Schedules Report" 3. Pull up the information you need. 4. Print out (if it's a lot of section) otherwise write the section numbers down. 	Computer and intranet access RITA database, login and password	Know where to find RITA, how to get to it, which site. How to navigate around RITA, how to pull the district reports. Different menus for 5 yr and construction acceptances.			
	b) Collect and review existing and historical data for field verification purposes and to identify problems prior to inventory.	<ol style="list-style-type: none"> 1. Go to RCI 2. Print out all of the old information in RCI database 3. Print out old SLDs 4. Go to iView and GIS Coordinator and pull up the basemap for that section. 5. Check the basemap to make sure roadway is digitized in the right 	<p>RCI database (login name and password)</p> <p>Internet access for SLDs (on the FDOT server. Each district has its own server and you'll need access to that districts server)</p>	<p>Know where RCI is and how to access it</p> <p>How to access district server</p> <p>Where the basemap correction form is located</p>		Driven attitude to want to make sure all the information is correct. You want every thing correct.	<p>Good RCI Technicians They identify all the mistakes, figure out a road that's got a problem on it. It might not look like a problem but catch perhaps an overlap. Will catch the complicated issues.</p> <p>Average RCI Technicians Might catch or might not. Probably no difference with Good RCI Technicians.</p>

OFFICE WORK

DUTY	TASK	PROCEDURAL STEPS & TECHNICAL KNOWLEDGE List each procedural step and technical knowledge required to perform task from start to finish	TOOLS List special tools, equipment, materials, etc. needed to perform the task	RELATED KNOWLEDGE List related pieces of knowledge needed to perform the task	SAFETY List critical safety knowledge and skill needed to perform this task in a safe manner	ATTITUDES List attitudes critical to performing this task in a competent manner on the job	PERFORMANCE STANDARDS Describe Good, Average, and Poor performance
		direction and on the correct road. 6. If there is a problem (such as the roadway is digitized on the wrong road or incorrect direction) then inventory it in the right direction or right road. 7. Once you have the correction information, fill up basemap correction form and send to Central Office for basemap corrections	iView on the district server Basemap correction form Email access to send to GIS Coordinator.				Poor RCI Technicians Everything looks ok and not really realizes something was wrong.
	c) Verify existing administrative data (for elements not visible in the field). If there is a discrepancy, determine if an RCI/GIS basemap package is necessary.						

OFFICE WORK

DUTY	TASK	PROCEDURAL STEPS & TECHNICAL KNOWLEDGE List each procedural step and technical knowledge required to perform task from start to finish	TOOLS List special tools, equipment, materials, etc. needed to perform the task	RELATED KNOWLEDGE List related pieces of knowledge needed to perform the task	SAFETY List critical safety knowledge and skill needed to perform this task in a safe manner	ATTITUDES List attitudes critical to performing this task in a competent manner on the job	PERFORMANCE STANDARDS Describe Good, Average, and Poor performance
<p>Duty 2: Perform data entry preparation activities</p>	<p>a) Review the inventory folder to ensure all recorded data is readable, complete, and unambiguous (copies of the marked-up SLD, features inventory field sheet, miscellaneous inventory field sheet, construction plans, Feature/Characteristic Sort and the Financial Management Projects by Roadway ID reports).</p>	<p>1. After you've gone out to inventory, use the old SLD and make corrections on that SLD. Not all the features are on the SLD. 2. The old SLDs with your new markups Features of the printouts from RCI and those markups If it's a new inventory and no SLD, then we use the forms (features inventory field sheet).</p>	<p>SLDs Printouts of features from RCI Features inventory sheets</p>	<p>Know to navigate and use RCI for printout of features How to printout How to read the SLDs How to use features inventory sheet</p>		<p>Being attentive to details and meticulous. Need to be organized. Know what you got and why you got it (what you meant to write).</p>	<p>Good RCI Technicians Might add extra notes to his SLD and inventory sheets. If they see something in the field that might concern another group (eg. Maintenance, traffic ops) they might note those and call in those observations. Each feature is numbered and you want to order them so that you won't miss it. Average RCI Technicians Might notice some of it. They might now to collect info but not know how the other departments use it. Poor RCI Technicians Will not collect these extra notes. Rookie might just enter the easiest information first based on what they know.</p>
	<p>b) Reconcile the field collected milepoints against the currently recorded milepoints to see whether they are in</p>	<p>1. Compare the printouts and what data you have 2. If within tolerance you merely update the</p>	<p>RCI printouts SLDs Field notes</p>	<p>What is in tolerance for that section you're doing. How to calculate tolerance</p>			<p>Good RCI Technicians If the tolerance is close, he might change it because he knows that he might not the same exact measurement with</p>

OFFICE WORK

DUTY	TASK	PROCEDURAL STEPS & TECHNICAL KNOWLEDGE List each procedural step and technical knowledge required to perform task from start to finish	TOOLS List special tools, equipment, materials, etc. needed to perform the task	RELATED KNOWLEDGE List related pieces of knowledge needed to perform the task	SAFETY List critical safety knowledge and skill needed to perform this task in a safe manner	ATTITUDES List attitudes critical to performing this task in a competent manner on the job	PERFORMANCE STANDARDS Describe Good, Average, and Poor performance
	tolerance before updating the RCI.	date on which road was inventoried. 3. If not within tolerance then you will change the milepoints in RCI.	RCI system	Tolerance is 52 feet (.010 clicks) for on system, 250 feet (.050) for off-system			the DMI. His driving might change it whether he's on the inside or outside lane. Average RCI Technicians Similar to rookie, would not know to change it because of variances. Poor RCI Technicians Won't change it because he's within tolerance.
	c) Ensure that features referenced by intersection milepoints match SLD mark-up milepoints.	You need to match up your milepoints and ensure you're within tolerance. Similar to task (a)	Same as (a)	Same as (a)	Same as (a)	Same as (a)	Same as (a)
	d) Coordinate with other offices to update appropriate data.	Everybody uses the same SLD and we need to make sure Maintenance have same milepoints. Any changes in road sections (such as length) should also inform them.	Printouts of SLD Prints RCI Field notes Contact for other departments Phone or email	Know features of interest for other departments who using the same SLDs eg. Cross drains are on SLDs and as maintenance features, if the mileage is different for maintenance and RCI then the mileage is not matching up. Knowing who to call		A courteous thing to just help other people to make their jobs easier Concern with interdepartmental cooperation	Good RCI Technicians Collect info, who to contact and pass on that information. Average RCI Technicians Might collect some info but not all and then hold it because they don't know who to call. Poor RCI Technicians Would not even collect the information because they don't know or understand how it

OFFICE WORK

DUTY	TASK	PROCEDURAL STEPS & TECHNICAL KNOWLEDGE List each procedural step and technical knowledge required to perform task from start to finish	TOOLS List special tools, equipment, materials, etc. needed to perform the task	RELATED KNOWLEDGE List related pieces of knowledge needed to perform the task	SAFETY List critical safety knowledge and skill needed to perform this task in a safe manner	ATTITUDES List attitudes critical to performing this task in a competent manner on the job	PERFORMANCE STANDARDS Describe Good, Average, and Poor performance
		<ol style="list-style-type: none"> 1. Look at SLD or field notes for information of interest relevant to other departments 2. Look up their contact information on the district server. 3. Send email or call them such as section, what action has been done. Informal communication. 		(usually the department head)			works.
Duty 3: Perform data entry	a) Enter, update and verify data into the Roadway Characteristics Inventory (RCI) database according to the Handbooks.	<ol style="list-style-type: none"> 1. Go through all information you have and decide what needs to be updated 2. Log into RCI database 3. Click on Roadway ID number and type number 4. Click on Feature Characteristics and select relevant feature 5. Determine what needs to be changed 6. Enter information 	Usual forms RCI database	<p>Know what the tolerances are</p> <p>Know what the feature numbers are and what kind of information is available in each feature. A lot of features coordinate with other features (eg. Divided road). Say you lengthen the median, then the Edit report will show errors, then you need to change the type road feature and the through lane feature.</p>		Proactive attitude and note the changes before the edits come or before some comes to check it. If you don't care, you might not change that feature so that you don't have to change other features.	<p>Good RCI Technicians Knows how the features coincide and would make the changes even before running the edits.</p> <p>Average RCI Technicians Might know to change some of them but not all of them that coincide with each other.</p> <p>Poor RCI Technicians Might not know that they have to change all the other features. They are going run edits and not sure why they are getting flagged.</p>

OFFICE WORK

DUTY	TASK	PROCEDURAL STEPS & TECHNICAL KNOWLEDGE List each procedural step and technical knowledge required to perform task from start to finish	TOOLS List special tools, equipment, materials, etc. needed to perform the task	RELATED KNOWLEDGE List related pieces of knowledge needed to perform the task	SAFETY List critical safety knowledge and skill needed to perform this task in a safe manner	ATTITUDES List attitudes critical to performing this task in a competent manner on the job	PERFORMANCE STANDARDS Describe Good, Average, and Poor performance
		changes and saved.					
	b) Validate data by using the RCI database automated process.	1. Click on Validate button e.g. If you change features you have to change the others, validates all information is changed and correct	RCI program	Know how the validate feature works and how it is used.			
	c) Run Main 1, Main 2, Main 3, and all RCI Edits; and reconcile data.	1. Open up the mainframe program 2. Log in with username and password 3. Click on Main 1 Edit 4. Enter district number 5. Click Run (usually we run all the edits at the same time) 6. Repeat process for Main 2 and Main 3. 7. Look at the finished reports and view the edits. 8. Look for roadways that we have worked on for the entire district 9. Ensure the section	Mainframe access to run edits	Know the difference between Main 1, 2, and 3. Main 1: preliminary RCI/HPMS edit Main 2: overlaps and duplicate edits Main 3: data outside of the limits edits. Need to know what the edits stand for and why it's showing How to fix them in the RCI		If you're lazy, you get a coworker to fix it for you without completely understanding. If you do it yourself and try to figure out yourself then you'll learn and know how to do this the next time.	Good RCI Technicians Know what all the edits are. It might be something they overlooked, but they usually figure it out right away what they need to change and why. Knows every edit and what they mean. Average RCI Technicians Might know the simple edits but not the in-depth edits (eg. If you lengthen a roadway, once central office has done that in RCI, may not realize) **REFER TO RECORDING). Poor RCI Technicians Might run edits, don't understand why you have edits.

OFFICE WORK							
DUTY	TASK	PROCEDURAL STEPS & TECHNICAL KNOWLEDGE List each procedural step and technical knowledge required to perform task from start to finish	TOOLS List special tools, equipment, materials, etc. needed to perform the task	RELATED KNOWLEDGE List related pieces of knowledge needed to perform the task	SAFETY List critical safety knowledge and skill needed to perform this task in a safe manner	ATTITUDES List attitudes critical to performing this task in a competent manner on the job	PERFORMANCE STANDARDS Describe Good, Average, and Poor performance
		number you're working on have no edits. 10. If there edits, you can print those edits out. 11. Go back to RCI database and figure out what the edit is talking about and make the necessary corrections in RCI database. 12. Run edits again		Contact Central Office HPMS coordinator to explain things you don't understand.			Not going to understand the edits being pulled.
Duty 4: Perform post-inventory activities	a) Produce Straight-line Diagrams and update Districts' servers; then notify TranStat.	1. Produce the SLD. 2. Send a pdf of SLDs. 3. Take that PDF and load it onto district server. (DOT Intranet, click on Offices, click on Planning Intranet, click on SLDs. Select District number, go to the appropriate folder. Overwrite the old pdf with the new SLD). 4. Send Central Office a notification (email) that you have updated the	SLD software/Adobe Illustrator PDF files of SLDs Intranet access Email	How to create, edit and save SLDs Know how to navigate the software and make the SLDs look good How to load SLDs onto FDOT's server Know contact to notify of the new upload		Attention to detail when you produce SLD. How good do you want it to look? A good SLD should have things lined up as they should be, the lines are straight, are the fonts the same size. Accuracy depends on the	Good RCI Technicians Knows how to produce an SLD correctly and make it look good. Average RCI Technicians Could probably produce an SLD is a supervisor was sitting there helping them. The SLDs might not look so good. There might not be as much details that should be there. Poor RCI Technicians Have no idea on how to do SLD. Some

OFFICE WORK

DUTY	TASK	PROCEDURAL STEPS & TECHNICAL KNOWLEDGE List each procedural step and technical knowledge required to perform task from start to finish	TOOLS List special tools, equipment, materials, etc. needed to perform the task	RELATED KNOWLEDGE List related pieces of knowledge needed to perform the task	SAFETY List critical safety knowledge and skill needed to perform this task in a safe manner	ATTITUDES List attitudes critical to performing this task in a competent manner on the job	PERFORMANCE STANDARDS Describe Good, Average, and Poor performance
		SLD (what section number has been uploaded to the server).				accuracy of RCI data.	
	b) Review County Section Number Key Sheets and update as needed.	Key sheets are like a map of all the roadways that are inventoried. Make sure the Key Sheets reflect correct information. basemap's database. 1. Logon to district server 2. Once you get to the SLD folder, there's another folder with Key Sheets for every county in the district (e.g., Washington county Key Sheet). This will have all the state roads on it (on-system keymaps). Off-system keymaps are in their own folders.) 3. Ensure accuracy. Make sure all the off-system roadways are	Intranet SLDs Key Sheets/ Keymaps iView which is in the RCI system	Know where the materials are actually located Know how to read that Key Sheet Know why the Key Sheets could be incorrect What actions to take if the Key Sheet is incorrect		Attention to detail Take pride in being meticulous since you're not the only that use the Key sheets. If it's not updated correctly then others can't find what they need.	Good RCI Technicians Know how to compare keymap and iView, to identify reasons for it to be incorrect. Take appropriate steps. Average RCI Technicians Should be able to at least compare the keymap and the iView to ensure it is correct. Take appropriate steps to have the keymaps corrected. Poor RCI Technicians Might not understand how to read the keymaps. Might not know how to compare the keymap to iView to ensure that it is correct.

OFFICE WORK

DUTY	TASK	PROCEDURAL STEPS & TECHNICAL KNOWLEDGE List each procedural step and technical knowledge required to perform task from start to finish	TOOLS List special tools, equipment, materials, etc. needed to perform the task	RELATED KNOWLEDGE List related pieces of knowledge needed to perform the task	SAFETY List critical safety knowledge and skill needed to perform this task in a safe manner	ATTITUDES List attitudes critical to performing this task in a competent manner on the job	PERFORMANCE STANDARDS Describe Good, Average, and Poor performance
		<p>labeled correctly on that Key Sheet. Compare the section coming up for inventory (from RCI) and look at the keymap. If that section is not on the keymap then that keymap is incorrect.</p> <p>4. Go to iView and type in your section number. If it highlights it, you know it's been digitized just not on the Key Sheet, which now needs to be updated (usually only happens when we correct new sections).</p> <p>5. Inform the appropriate personnel to update the keymaps through email with the changes that need to be made. Let the person know whether the road is digitized in the right direction, or whether</p>					

OFFICE WORK

DUTY	TASK	PROCEDURAL STEPS & TECHNICAL KNOWLEDGE List each procedural step and technical knowledge required to perform task from start to finish	TOOLS List special tools, equipment, materials, etc. needed to perform the task	RELATED KNOWLEDGE List related pieces of knowledge needed to perform the task	SAFETY List critical safety knowledge and skill needed to perform this task in a safe manner	ATTITUDES List attitudes critical to performing this task in a competent manner on the job	PERFORMANCE STANDARDS Describe Good, Average, and Poor performance
		roadway has been shortened or lengthened (any changes in feature 140 – section status exception- then the keymaps need to be updated).					
	c) Update RITA with SLD and inventory dates.	RITA is a tracking application (Roadway Inventory Tracking Application). Tracks all the dates when all these inventory steps have been performed (when SLD loaded to server, SLD produced, info entered into RCI. This is how central office keeps track of things being done in a timely manner). 1. Log onto RITA with username and password 2. From drop-down menu, select type of	Intranet to access RITA (from the central office SharePoint site)	Know how to access and use the RITA menus Know what menu to go to for what you're doing Know what dates that you completed the tasks (keep up with the dates for each task)		Detail oriented and organized to keep up with the dates so that you can enter info more accurately.	Good RCI Technicians Should know how to access and update all the dates in RITA Average RCI Technicians Since there's so much information, they person might be overwhelm and get a little confused about what they should or should not update. Poor RCI Technicians Probably need somebody there to help them navigate and sort out the dates that should be updated.

OFFICE WORK							
DUTY	TASK	PROCEDURAL STEPS & TECHNICAL KNOWLEDGE List each procedural step and technical knowledge required to perform task from start to finish	TOOLS List special tools, equipment, materials, etc. needed to perform the task	RELATED KNOWLEDGE List related pieces of knowledge needed to perform the task	SAFETY List critical safety knowledge and skill needed to perform this task in a safe manner	ATTITUDES List attitudes critical to performing this task in a competent manner on the job	PERFORMANCE STANDARDS Describe Good, Average, and Poor performance
		updates e.g., “5-year RCI”, “Construction”, or “30-year HPMS) 3. Select type of roadways “All Roadways,” or “On-System,” “Off-System” 4. Hit “Go to sections” or “Roadway ID Number” 5. Enter the information e.g., ID number 6. Enter date that you inventory the section 7. Enter date SLD was updated 8. Put in date that the SLD was uploaded to the server 9. Hit Submit and information will be stored.					
	d) Perform QA/QC checks.	Same as running the Edits. 1. Someone who did not do the inventory to review the data	RCI SLDs Inventory sheets	Know where the common mistakes are Good knowledge of RCI and how all of these are			Good RCI Technicians Able to identify simple as well as more detailed mistakes. Pick out any imperfections in the SLD.

OFFICE WORK

DUTY	TASK	PROCEDURAL STEPS & TECHNICAL KNOWLEDGE List each procedural step and technical knowledge required to perform task from start to finish	TOOLS List special tools, equipment, materials, etc. needed to perform the task	RELATED KNOWLEDGE List related pieces of knowledge needed to perform the task	SAFETY List critical safety knowledge and skill needed to perform this task in a safe manner	ATTITUDES List attitudes critical to performing this task in a competent manner on the job	PERFORMANCE STANDARDS Describe Good, Average, and Poor performance
		2. Compare the information from the SLD to the one in RCI 3. Load the SLD (even when there are no changes) to the server after every inventory.	Edit reports	produced and how they tie together Knowledge of how these data are being used			Average RCI Technicians Might catch some of the simple mistakes, but miss the detailed errors (eg. when looking at SLD you has 2 measurements (total width of through lane and total width of the entire roadway). If those numbers are incorrect the Average RCI Technicians person might not notice it (due to system glitches). Poor RCI Technicians Briefly scanned the SLDs, it might look correct to them when actually there were mistakes.
	e) File and retain inventory folder for 5 years.	Central office wants you to retain all the historical data, SLDs produced, etc. for 5 years.	District intranet RCI database	Know why you have to retain the files for 5 (unless you change the information such as in District 3 they are required to have the roadways inventoried every 5 years but they inventory every 3 years). Know the types of data you		Being very cautious and careful of not deleting information.	

OFFICE WORK							
DUTY	TASK	PROCEDURAL STEPS & TECHNICAL KNOWLEDGE List each procedural step and technical knowledge required to perform task from start to finish	TOOLS List special tools, equipment, materials, etc. needed to perform the task	RELATED KNOWLEDGE List related pieces of knowledge needed to perform the task	SAFETY List critical safety knowledge and skill needed to perform this task in a safe manner	ATTITUDES List attitudes critical to performing this task in a competent manner on the job	PERFORMANCE STANDARDS Describe Good, Average, and Poor performance
				have to retain Know that there is a Historical feature where the system saves the information, so even if you deleted something, you can enter a previous date and it will bring back the archived data.			
	f) Update RCI database as needed.	Central Office notifies of all roadway construction that has been completed. So now they have to re-inventory the roadway to update the information or the construction area. 1. Central office sends email about construction projects are completed 2. Do another inventory 3. In RITA there's a	Email Project ID number What type of construction Dates construction completed Dates of inventories and SLD	How how to update RITA based on construction projects information			

OFFICE WORK

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		“Construction” option. 4. Fill out the construction portion update 5. Put in dates in which the construction was finally accepted 6. Put in construction project number from the email sent by central office 7. Enter type of construction project 8. Enter inventory dates and updated RCI and dates produced SLD, date in which it was distributed.					

FIELD WORK							
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Duty 1: Perform pre-inventory field preparation	a) Ensure vehicle is equipped with all field inventory equipment that is in working order.	1. Turn on the strobe lights 2. Check your tire pressure to ensure that all tires are at the same pressure using a tire pressure gauge 3. Make sure you have a measuring wheel, flexible measuring tape, approved FDOT orange vest, can of spray, digital camera	measuring wheel, flexible measuring tape, approved FDOT orange vest, can of spray, digital camera, pressure gauge	Know how to check tire pressure Know where the switches to turn on the strobe lights Know how to reset your measuring wheel to zero	Know the checklist of safety procedures	Pay attention to details to ensure that you do have the equipment because if you leave something behind you might not be able to do your job properly Mindful that any faulty equipment will impact the quality of data collected	
	b) Perform vehicle safety inspection using a checklist.						
	c) Check tire pressure and calibrate the DMI.	1. Check tire pressure of all tires to ensure they are all the same 2. Go to the district measured mile 3. Align your vehicle to the beginning point of the measured mile	DMI DMI manual Measured mile	Know that if the tire pressure is not the same for all tires, you will not be able to calibrate the DMI to exactly a mile (inaccurate) Know where the district	Look where you're going Make sure you have strobe lights on while running the measured mile	Pay attention even to minor details to ensure that you have accurate calibration for the DMI	Good RCI Technicians Recognize when the DMI need to be calibrated more than once a week and diligently perform the calibration. Average RCI Technicians Calibrate once a week without recognizing other factors that

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		5. Look into DMI manual since there are different brands of the DMI 6. Run the measured mile according to the procedures in the DMI manual 7. When you reach the end of the measured mile, align your vehicle the same way you started 8. Finish the calibration according to the DMI manual. 9. After the calibration procedure is completed, re-run the measured mile to ensure accuracy.		measured mile is Know how to align your vehicle to the start and end points of the measured mile Know how to calibrate the DMI using the manual Know how the weather affects tire pressure and how it then affects the DMI calibration		If you have a don't care attitude you may not align your vehicle the same exact spot every time	affect the accuracy of the calibration. Poor RCI Technicians Might not be particular about the alignment of the vehicle in the same spot which in turn affects the accuracy of the DMI
	d) Bring all the related materials such as forms, handbook and maps.	1. Refer to district standard checklist for materials 2. Ensure that all materials and some extra inventory forms	Handbooks, inventory forms, latest SLDs, latest printouts for that section, latest keymap for that	Know where all of these materials can be found or downloaded Know the office procedures for getting		Being organized and knowing where all the materials are Making sure the	Good RCI Technicians Materials are organized in folder with dividers, and most recent SLDs and keymaps Average RCI Technicians

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		are in the vehicle	county	these materials		materials are the correct ones (the latest or newest)	Has the materials somewhere in the vehicle but they are not well-organized and they might not know where the materials are when he needs it Poor RCI Technicians Do not have all the materials needed to perform the job, or they may not have the latest information
Duty 2: Inventory data collection preparation	a) Wait for any transportation maintenance or construction activities to be complete before inventorying the Roadway ID.	1. Put a note in RITA that the road is under construction 2. Wait for central office to send construction acceptance note 3. Inventory the road	RITA Construction acceptance note	Know how to handle a roadway that's under construction		Proactive attitude where the construction is complete enough and you can inventory it anyway	
Duty 3: Data Collection	a) Apply safety guidelines.	1. Turn strobe lights on 2. Stay as far to the side of the road as possible 3. Wear safety vest when outside the vehicle 4. Don't completely stop in the through lane because you might get	Safety vests Strobe lights	Know what all the recommended safety procedures are	Follow all safety recommendations	Highly mindful of personal safety as well as the safety of other road users	Good RCI Technicians Mindful of personal safety and safety of others, always have vest on when outside the vehicle, pull over in a safe place to get on and off the roadway. Average RCI Technicians Follows all safety procedures but may not know the safe places to

FIELD WORK

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		rear ended 5. Check to ensure there are no traffic in either direction before you take the measurement					pull over Poor RCI Technicians Do not sufficiently follow procedures and may put self and others at risk
	b) Drive through and verify the roadway length.	1. Start at the zero milepost of the section according to the SLD 2. Drive the entire length of section without collecting any features 3. End of the ending mileage of the section according to the SLD 4. If there is a discrepancy, note the mileage on the SLD	DMI SLD	Not all sections start at an intersection, so should know other features that could be the starting and end point of the roadway Know the terminology to ensure accurate starting and end points for the section (e.g., physical gore at the end of a bridge)	1. Strobe lights should be on 2. Stay in the same lane the entire way 3. Drive at a consistent pace	Pay attention to details and maintain safety consciousness	Good RCI Technicians Accurate in identifying the starting and ending points. Mindful of road safety procedures. Average RCI Technicians Accurate in identifying the starting and ending points but may not follow all safety procedures. Poor RCI Technicians Did not identify accurately the starting and ending points and do not follow safety procedures.
	c) Collect and record point features: Street names, bridge numbers, milemarkers, call boxes, county lines, railroad crossing numbers, and mileposts for all	1. Begin at the zero milepoint for the section 2. Start your DMI 3. As you drive down the section, get the milepoint for each feature and their	DMI SLD Inventory sheets	Know beginning and end point Know how to pick out the features and characteristics as you drive down the roadway	As you are coming up to collect a milepoint, give yourself sufficient distance for stopping Ensure that there is	Mindful of personal safety and safety of other road users	Good RCI Technicians Collect information at accurate mileposts. Correctly identify all the features on the roadway. Write down all the needed information, correct the mileposts for all the features and write down all the characteristics

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	intersections and counter stations.	characteristics 4. For every milepoint noted for each feature write it down in your inventory sheets 5. Drive all the way to the end of the section collecting information for each feature		Know how to use the handbook if unsure of the features Know how to use the inventory forms Know where to collect the milepoint for the feature (eg. in the center of an intersection, center of the railway)	no one right behind you as you're slowing down Have strobe lights on		of the feature (eg. on a railroad, get the milepoint and get the railroad number and check digits). Average RCI Technicians Collect all the milepoints for the features but might miss some of the characteristics for the feature. Poor RCI Technicians Might miss some of the features by not knowing what exactly that feature is or that they need to pick it up. And would not know how to make the notes of the characteristics of that feature.
	d) Collect and record milepoints for roadway features such as number of lanes, median type, and shoulder type.	1. Start at zero milepoint 2. Start a milepoint for each feature 3. Run the length of that feature until it changes 4. When it changes, end that milepoint 5. Start a new milepoint for the change 6. Continue process	DMI SLD Inventory sheets Field handbook	Know how to collect and record the feature milepoints Know what the features are in terms of what a through lane is, what a median is Know the different types of medians and different types of	As you are coming up to collect a milepoint, give yourself sufficient distance for stopping As you are coming up to collect a milepoint, give yourself sufficient distance for	Mindful of personal safety and safety of other road users	Good RCI Technicians Able to accurately identify where the changes start and stop. Know the different types of median and shoulders and how to measure them. Collect accurate information on each feature and characteristics. Average RCI Technicians Able to accurately identify where the changes start and stop. Know the different types of median and

FIELD WORK							
DUTY	TASK	PROCEDURAL STEPS & TECHNICAL KNOWLEDGE List each procedural step and technical knowledge required to perform task from start to finish	TOOLS List special tools, equipment, materials, etc. needed to perform the task	RELATED KNOWLEDGE List related pieces of knowledge needed to perform the task	SAFETY List critical safety knowledge and skill needed to perform this task in a safe manner	ATTITUDES List attitudes critical to performing this task in a competent manner on the job	PERFORMANCE STANDARDS Describe Good, Average, and Poor performance
		until all the features have been covered till the end of the section		shoulders Know where to accurately start and stop the changes along the roadway	stopping Ensure that there is no one right behind you as you're slowing down Have strobe lights on		shoulders and how to measure them. Data collection is not as accurate or detailed. Poor RCI Technicians May not accurately identify where the changes start and end. May not be familiar with all the features and the recorded changes may not be very accurate or detailed.
	e) Measure roadway dimensions: Total surface width, inside and outside shoulder widths, median widths, and box culvert dimensions.	1. Determine what type of feature and characteristics 2. Take out the measuring wheel and reset to zero 3. Place the wheel on the outside of the white line to walk the wheel to the outside of the other wide line across the roadway (through lane with) 4. Note the measurement on the wheel 5. Return to vehicle and	SLD Measuring wheel Inventory forms Can of spray paint Safety vest Flexible measuring tape	Know how to use the measuring wheel Know where to start and stop measurement for each type of feature and characteristic Know how to use the flexible measuring tape where it is not feasible to use the measuring wheel Know how to measure the box culverts	Know where a safe place is to pull over and park for a few minutes Have safety vests on when outside the vehicle Be aware of any traffic travelling along the roadway Be careful when leaning over to see where the box culverts openings	Be mindful of personal safety as well as other road users	Good RCI Technicians Know all of the features and different characteristics and how to measure them accurately. Able to determine when the features have changes and thus new measurements for different widths need to be taken. Accurately record all the information. Follow safety procedures all the time. Average RCI Technicians Know most of the features and their characteristics of the features. Should know how to accurately take measurement of most of the characteristics.

FIELD WORK							
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		write down the measurement of the width on the SLD 6. If roadway characteristics changes, you need to take another measurement using the same process. 7. If measuring box culverts, determine the actual opening and where it ends 8. Get out of the vehicle and look over the side to see where the openings are and spray a line indicating the width of the opening 9. Spray another line on the side where the culvert opening ends 10. Use your DMI in the vehicle to get those end and start milepoints			are		Follow safety procedures most of the time. Poor RCI Technicians Do not know many of the features and characteristics. Unsure on how to take measurements when features characteristics change. Do not follow safety procedures on a constant basis (e.g., not putting on vest, getting out of vehicle without parking in a safe place).
	f) Collect milepoints for miscellaneous features (structures,						

FIELD WORK

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	underpasses, pavement condition, and friction course).						
Duty 4: Post data collection	<p>a) Make sure that all required data have been collected or verified before leaving the inventory site.</p> <p>b) Prepare inventory folder for data input and ensure legibility</p>	<p>1. Look at SLD and inventory sheets and make sure that all information is complete and accurate</p> <p>2. Look at inventory sheets and SLD to make sure the writing is legible to make it easy for you and others using these forms</p> <p>1. Rewrite some of your notes to make them more legible</p>	<p>Inventory sheets</p> <p>SLD</p> <p>SLD</p> <p>Inventory forms</p>	<p>Know all the features and characteristics to ensure that you collected all of them</p> <p>Know how the data entry person is going to use your data and</p>		<p>Paying attention to detail and caring about the quality of data you collected</p> <p>Being a team player who is concerned with how others use your collected data</p> <p>Being a team player who has the information</p>	<p>Good RCI Technicians All data accurately collected and recorded. Record extra notes to help others make sense of their data. Notes are neat, legible, and organized.</p> <p>Average RCI Technicians All data collected accurately. Record extra notes to help others make sense of their data. But the notes may be difficult to read or not well-organized.</p> <p>Poor RCI Technicians Might not have all of the correct information. May not have the extra notes that the Good RCI Technicians and Average RCI Technicians performers have on their sheets to help others understand the information they have.</p> <p>Good RCI Technicians Very well organized, all information is legible for others</p>

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	and accuracy.	2. Put info into folders to organize it to enter data for a later date	Folders	organize it accordingly		well-organized and easy for others to use	to read without having to explain it. Average RCI Technicians Information is relatively organized and for the usually easy for others to read. Poor RCI Technicians Information is not legible or easy to read and not well-organized and placed in folders.

Appendix E: Validated domain analysis, Subject Matter Expert 2 (RCI technician)

VALIDATED
DOMAIN ANALYSIS: RCI Technicians (Florida Department of Transportation)
Subject Matter Expert 2 (Supervisor/Consultant)

OFFICE WORK							
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Duty 1: Perform pre-inventory activities	a) Identify roadway ID requiring inventory.	1. Go to RITA and run the reports that lets us know what's coming up (usually done several months in advance). 2. If there is construction acceptance from central office and district (identify the construction was done and verify data).	Computer Intranet access User ID and Password RITA iView RCI Database	Know how to run reports in RITA Know which report is applicable Know how to use RCI Know how to use iView		Pay attention and detail oriented so that there won't be mix ups in folders	Good RCI Technicians Tend to notice abnormalities and investigate further before going out to the field Average RCI Technicians Tend to notice abnormalities and may point out to their supervisor to investigate. Poor RCI Technicians Do not notice abnormalities.
	b) Collect and review existing and historical data for field verification purposes and to identify problems prior to	1. Make sure there's nothing wrong with the roads (e.g. new construction and thus alignment has changed, sometimes	Computer Intranet access User ID and Password	Know how to run reports in RITA Know which report is		Pay attention and detail oriented Somebody who gets their job	Good RCI Technicians Tend to notice abnormalities and investigate further before going out to the field Average RCI Technicians

OFFICE WORK

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	inventory.	requiring a basemap package) we have time to prepare for it. 2. Look at district's internal spreadsheet, (contains a log of the inventoried roadway IDs), and compare to RITA spreadsheets (office manager).	RITA iView Microsoft Access	applicable Know how to use RCI Know how to use iView Know how to use Access Understand how billing works		done	Tend to notice abnormalities and may point out to their supervisor to investigate. Poor RCI Technicians Do not notice abnormalities.
	c) Verify existing administrative data (for elements not visible in the field). If there is a discrepancy, determine if an RCI/GIS basemap package is necessary.	1. Central office sends out a basemap report monthly 2. If there is any road that need to be excluded, they'll have it pointed out to them, or if they need to look at a road with discrepancies. 3. Look at matrices in the Field Handbook (lists what features are to be collected based on	Computer Shared drive to store the basemap information	Know basic knowledge of RCI and basemaps so they can understand if these lengths are out of tolerance		Somebody who is detailed oriented and cares about the data and point things out when they realize something's not right Someone who can work well with others	Good RCI Technicians Tend to notice abnormalities and investigate further before going out to the field Average RCI Technicians Tend to notice abnormalities and may point out to their supervisor to investigate. Poor RCI Technicians Do not notice abnormalities.

OFFICE WORK							
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		Functional Classification). 4. Ensure that those features are in the database.					
Duty 2: Perform data entry preparation activities	a) Review the inventory folder to ensure all recorded data is readable, complete, and unambiguous (copies of the marked-up SLD, features inventory field sheet, miscellaneous inventory field sheet, construction plans, Feature/Characteristic Sort and the Financial Management Projects by Roadway ID reports).	1. Prepare the field mark-up form and final write-up (which is also sent to FDOT) 2. Turn in the folder to senior field technician 3. Field technician will check what's in the database	Field forms Final write-up forms Camera to take pictures of certain characteristics	Know how to use the forms Know how to use the handbooks		People should try to solve the problem in the field even a more senior person will review later, so that we don't have to make additional trips out to the field. Mindful that others will rely on their information and make it easy for others to work with the info.	Good RCI Technicians Takes the initiative to get the job done and get as much information as possible before they decide they cannot go forward with the issue. Their write-ups are easy to understand by the office person because they are clear, make sense, followed established rules, and are not missing important information. Average RCI Technicians Calls the office when in doubt to ask questions on how to handle it. Write-ups are for the most part easy to understand by the office person because they are clear,

OFFICE WORK

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							<p>make sense, and followed established rules. Some information may be missing but they are not the important details. The office person or supervisor may need to do more investigation.</p> <p>Poor RCI Technicians They do not really understand how to do things or follow the procedures. They do not call to ask questions when in doubt.</p> <p>Their write-ups are messy, disorganized, do not make sense in terms of descriptions, and information are occasionally missing or placed in the wrong places. The office person or supervisor has to spend more time trying to pull the information out and often has to investigate the matter further.</p>
	b) Reconcile the field collected milepoints against the currently	1. Field technician writes down everything in the	Final notes RCI database	Know both the district's and Central Office's		Pay attention to tolerances	

OFFICE WORK							
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	recorded milepoints to see whether they are in tolerance before updating the RCI.	field for off system 2. Data entry person will check the final notes against the RCI printouts 3. Apply the tolerances rules 4. If it's not within tolerance make changes in RCI.		tolerance rules. Know how to update RCI data			
	c) Ensure that features referenced by intersection milepoints match SLD mark-up milepoints.	1. Go through every intersection to see if it matches SLD 2. Make necessary changes. 3. Mark it on the final form that changes have been made and why.	SLDs The final write-ups	Know the tolerance rules because there are different tolerances for different features (look up in handbook)		Paying attention to details and Meticulous in recording the changes so that others understand the changes being made	Good RCI Technicians Make correct decisions for handling the information needed. The information provided is clear, concise, and organized which makes it go smoothly for the data entry person. If there are changes to be made, they make the best decision that they can and do the write-ups before passing it along to the next person. Average RCI Technicians Usually make correct decisions for handling the information needed. The information provided is generally clear,

OFFICE WORK

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							<p>concise, and organized which makes it go smoothly for the data entry person. They may not always make the necessary changes and rely instead on the next person to make those changes.</p> <p>Poor RCI Technicians Do not pay attention to the details or do not understand how the features relate to one another. Therefore, they sometimes make incorrect decisions about the information needed. The information they provide is messy and disorganized which makes it difficult for the data entry operator to use. They do not make necessary changes and rely instead on the next person to make those changes.</p>
	d) Coordinate with other offices to update appropriate data.	1. Send email to District Office. 2. District Office will contact Central	Email Phone calls			Being able to explain the problem that needs to be	

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		Office or other organizations	Documentation of communication Screenshots of database of what needs to be done or updated			corrected. Have the knowledge and make sure you're correct before informing other offices	

OFFICE WORK

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Duty 3: Perform data entry	a) Enter, update and verify data into the Roadway Characteristics Inventory (RCI) database according to the Handbooks.	1. Get folder that is ready 2. Look at notes and make sure they make sense. 3. If something is not there, review the field notes. 4. Start with feature 111 and then 113 (numerical). 5. Look at the matrices according to the handbook as in what needs to go in and ensure all of that is in the database.	RCI database Final write-ups Field notes iView (aerial pictures) Handbooks	Know how the different features are related to one another How to use RITA Know what the terminologies are and how they work (e.g. shoulder types, composites, left and right and inputting those features)		Somebody who pays attention to details and caring about the quality of the data Able to follow directions.	Good RCI Technicians They know how to use the software and follow the recommended procedures in the handbook. They also recognize that data entry methods will change down the road and different people will be doing data entry. So they make the data organized and easy to use. They also rarely make mistakes in their data entry. They make good judgment calls when there is a problem. Average RCI Technicians They know how to enter the data and follow the recommended procedures in the handbook. Their coding methods, however, is not very good and may present problems in the future when other people have to update the data. Their data entry may have a few mistakes. When there is a problem, they alert their supervisor to ask for

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							clarification. Poor RCI Technicians They are unsure on how to use the software to enter data. They do not follow the procedures recommended in the handbook. Their data entry has lots of mistakes and sloppy coding. If there is a problem, they may alert the supervisor or just let it slide.
	b) Validate data by using the RCI database automated process.	1. Click the Validate data for every feature. The system catches some of the preliminary ones within the RCI database. 2. Fix the identified errors	RCI	Know what the error is trying to tell you			Good RCI Technicians Look carefully at the validation reports, know what the errors mean, and immediately fix the errors. Average RCI Technicians Look carefully at the validation reports. Fix all the errors they are familiar with and seek help for the ones they are unsure of. Poor RCI Technicians Just throw everything into the database and not pay much attention to the validation reports. Do not fix errors.
	c) Run Main 1, Main	This is on a	Mainframe	Know what the		Being willing to	Good RCI Technicians

OFFICE WORK

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	2, Main 3, and all RCI Edits; and reconcile data.	mainframe that is separate from RCI and it tends to catch a lot more discrepancies 1. Go to mainframe 2. Run every single edit 3. Print out the reports 4. Make corrections 5. Run edits again until there are no errors	RCI Handbook	errors mean Know how to fix the errors		go to somebody with more knowledge to help with identify errors if they can't figure it out	Knows where to find the documentation on what the edits mean. They will usually figure out why they are getting the errors and fix those errors. Average RCI Technicians May try to find the information on what the edits mean before going to someone else to help them fix the errors. Poor RCI Technicians They cannot figure out what the edits mean and they do not make an effort to find the relevant information. They may turn in the data without fixing the edits.
Duty 4: Perform post-inventory activities	a) Produce Straight-line Diagrams and update Districts' servers; then notify TranStat.	1. Use the Straight Line Diagrammer 2. Clean up the SLD and look at regenerated SLD and make sure information is still correct. 3. SLD goes through QC (3 individuals).	SLDs SLD Diagrammer Mainframe Final markups from the field Microstation	Know how to read SLDs How to use SLD Diagrammer How to use Microstation How to use RCI		Have to be flexible, not get frustrated with updates required. Easy to work with because a lot of times people can get defensive about	Good RCI Technicians They understand the RCI data very well. They also know the computer programs very well and can work independently. They regenerate the diagrams, are detailed oriented and do lots of clean up of the diagrams. They consistently turn in good work and make no mistakes.

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		One looks at intersection, another looks at features and another look at the headers and footers of the SLD. 4. Once final SLD is ready, submit to District Office. 5. District Office uploads to the server at district level.	(similar to AutoCad) RCI	How to use Mainframe		their work.	<p>Average RCI Technicians They do not have a good understanding of the RCI data. They know the programs only moderately well and occasionally ask for help. The SLDs look similar to the old ones instead of cleaned up. There is no consistency in the quality of work and they make a few mistakes.</p> <p>Poor RCI Technicians They have a poor understanding of RCI data. They do not know how to use the programs well and are constantly asking for help. They look at the necessary changes and make those changes only instead of regenerating a new diagram. They are not detail-oriented and make a lot of mistakes.</p>
	b) Review County Section Number Key Sheets and update as needed.	Keysheets only deal with on system roadways. Central office uses a	Shape files from GIS at central office	Know to use ArcMap Know to read a		Detail oriented, ready to troubleshoot problems areas,	<p>Good RCI Technicians Take the time to make the maps accurate and look really good. They move objects around and</p>

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		program, “Keysheet Manager”. 1. Keysheet will display all the on-system roadways 2. If a roadway is affected and need to be changed. 3. Create a new keysheet based on the new information. Sometimes contact the GIS office at TranStat to get current data. 4. Reviewed by other individuals (the QC folks) to see if it looks odd in particular areas or areas for improvement (more legible). 4b. If there are discrepancies (there might something wrong with the	ArcMap to create the keysheets Older keysheets Adobe Acrobat to create pdf files	keysheet Know to create PDF files Know advanced knowledge of RCI (advanced concepts) Know where some problem areas on keysheet Key Sheets can be resolved		care about quality of the Key Sheets	make sure the maps can easily be read by others. Average RCI Technicians They move objects around and the maps are accurate but they do not look visually appealing. Poor RCI Technicians The maps are not visually appealing. If there is a problem, they just ignore it and draw over it. The maps are kind of accurate but are detrimental when creating future maps.

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		coding in RCI), will investigate it further. Look in the database and review the files if there is a glaring problem in it. May even require collection of new data in the field. 5. The keysheet is sent to District Office. 6. District Office sends the updated Key Sheets to the central office.					
	c) Update RITA with SLD and inventory dates.	1. Once it's been through the field and RCI, it'll go back to the admin people and they'll update RITA change the dates. 2. Follow the checklist	RITA Files of the roadway (pre-inventory activities). Manila folder. Checklist Internal database	Know how to use RITA Know how to read the SLD		Attention to details Easy to work with	[RCI Technicians not involved here, so no performance standards relevant to them]

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	d) Perform QA/QC checks.	<ol style="list-style-type: none"> 1. The field team turn in their final markups to field manager 2. Ensure all information is there 3. Ensure information makes sense 4. If it doesn't make sense, ask field team what they meant 5. May even go out in the field to take a look 6. If everything is ok, it gets turned in for data entry 7. Check edits after data entry 8. After data entry, the QC is to make sure the SLD and RCI matches as per requirement and that 	(Access spreadsheet) Roadway files containing all information including field notes Need the regenerated SLD to check against final SLD RCI database RCI Videolog	Know how to use RCI Able to understand and read the SLD Know the differences between data collection for on-system and off-systems		Being attentive to details Play well with others	<p>Good RCI Technicians They take the time to look at the data and analyze the situation. If there is something wrong with the data, they take the initiative to identify the problem and resolve the issue. They are able to communicate with others and ask questions to resolve the issues.</p> <p>Average RCI Technicians They glance at the roadway information and do not go deep into the details. They are quite likely to miss out on a few things. They may not take the initiative to fix the database to make sure they match but might go to the person who made the SLD or RCI data entry or the manager to point out the problem so that it can be fixed.</p> <p>Poor RCI Technicians They have difficulty</p>

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		they can be read. Checking all the info and making sure the database also got updated, that the data entry person did not miss anything. Will also compare with the final markup.					understanding how RCI works and how everything works together. Therefore, they are unable to analyze the data and pinpoint the reasons for data mismatch. They may realize there is a problem but turn the data in anyway.
	e) File and retain inventory folder for 5 years.	1. Once a roadway is completed, use filing cabinets organized based on county and roadway status. 2. maintain folders in there 3. If something is wrong with a roadway, you can pull out the file.	Folders Filing cabinet	Need to know how the files are organized Know the status of the roadway you're looking for (e.g. active on, active off, active exclusive)		Being systematic and putting things away where you find it	[RCI Technicians not involved here, so no performance standards relevant to them]
	f) Update RCI database as needed.	1. When you get construction notices, discrepancy or other offices will point something out. 2. Investigate the issue by pulling up	Field notes SLD Information from the office or whoever says there's a discrepancy	How to use RCI Understand the RCI basic and advanced concepts depending on		Detail oriented Willing to communicate and to try understand where the other	Good RCI Technicians They are proactive when an issue crops up. They try to look at it from the other person's point of view. They communicate effectively to resolve the issue together. They

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		folders if something happened there 3. If cannot determine from the office, go out to the field and check 4. Depending on what it is, go to RCI and update the information 5. If it involves an on-system roadway, we need a new SLD and go through the whole QC process again. 6. Update RITA when new SLDs are created	Need all the field equipment to go check it out in the field Intranet for district FDOT Infonet ArcMap and all other tools to create new SLDs	what the issues are Understand how relational databases work and how features affect one another Create SLDs How to update RITA		parties are coming from Being willing to educate and share information	are systematic in updating all the relevant sources of information that cause the problem. Average RCI Technicians They do not proactively try to solve the discrepancies because they do not fully understand the data. But they will follow directions in terms of what needs to be fixed. Poor RCI Technicians They do not understand the data and are not really paying attention to what they are doing. They do not ask questions and put in information just to say they did it. They also do not follow directions from the handbook.

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Duty 1: Perform pre-inventory field preparation	a) Ensure vehicle is equipped with all field inventory equipment that is in working order.	1. Check the lights are working correctly and visible 2. Using the checklist in the handbook, ensure equipment are all in the vehicle	Measuring wheel Safety vests Handbooks RCI Office handbook Can of paint	Know how to turn the strobe lights on in the vehicle being used	Keep extra vests in the vehicle in case someone forgets. Wear safety vest every time outside of vehicle.	Highly mindful of personal safety and safety of others	Good RCI Technicians They check the vehicle thoroughly to make sure that everything needed is in there. They also look out for the safety of their partner who is checking the vehicle. Average RCI Technicians They may be in the vehicle most of the time and may do some inspection. But they typically leave the task to the other technician without looking out for their partner's safety. Poor RCI Technicians They sit in the vehicle without paying attention to what is going on around them and completely rely on their partner to complete the task without looking out for the person's safety.
	b) Perform vehicle safety inspection using a checklist.						
	c) Check tire pressure and	1. Use the tire pressure gauge.	Tire pressure gauge	Know what the ideal pressure	Turn strobes light on when		

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	calibrate the DMI.	2. Stick the instrument into the valve stem. 3. Ensure the tire pressure is the recommended reading for that vehicle.		for that vehicle should be How weather affects tire pressure e.g. heat will inflate tire and affects distance measurement	at the side of the road and wear vests		
	d) Bring all the related materials such as forms, handbook and maps.	1. Use the checklist in the handbook to ensure folder is complete 2. Bring extra forms 3. Bring county maps 4. Bring a laptop to look up some roadways (iView) and use RCI if there's a road that affects one of the roads we're working on.	Handbooks Forms Maps Laptop Camera	Know that you can use the laptop to check on the status of roads that you're working on Know how to use iView Know how to use RCI		Attention to detail Being organized Being prepared at all times Being proactive	Good RCI Technicians They are always prepared and organized. They have checked the map and know exactly where they are going. They have all that they need in the vehicle. Average RCI Technicians They may not be well-organized and may be missing one or two things that they need in the vehicle but nothing crucial. They may be unsure of where they are going since they have not looked at the map. Poor RCI Technicians They are disorganized and may be missing some critical things

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							they need in the vehicle. They are not paying attention and presume the other individual will take care of the preparation. They may also be distracted with other non-related matters.
Duty 2: Inventory data collection preparation	a) Wait for any transportation maintenance or construction activities to be complete before inventorying the Roadway ID.	Every Monday central office issue a construction completion report that tells you which road has final acceptance date. If our roadways are on there, look at the financial project database, where the construction number is. Give us a better idea of what they did e.g. resurfacing or widening. Prepare a folder then go out in the field and inventory that road. Administrative personnel will get the report and she preps	Completion acceptance reports Intranet to access the financial database (DOT InfoNet) Materials that go into folder for inventory purposes	Know how to recognize that newly constructed roads are ready to be inventoried Be familiar with types of construction that might require new data to be collected. Know how to use the InfoNet to find the relevant information.		Someone who pays attention to time constraints, when we get notice from central office the inventory needs to be inventoried in 60 days. Being proactive and take the initiative to do the inventory for newly constructed roads even before central office sends notification.	[RCI Technicians not involved here, so no performance standards relevant to them]

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		<p>the folder.</p> <p>Sometimes District Office get notification that construction is completed and we do the same thing to prepare for it. Sometimes we see newly ready construction that's been conducted, we will contact District Office and discuss then perform inventory on that newly completed road.</p>					

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Duty 3: Data Collection	a) Apply safety guidelines.	1. Use a checklist in the handbook	Safety checklist	Know what the safety guidelines are		Highly mindful of their personal safety, their partner’s safety, and the safety of other road users. Ready to use common sense when it comes to safety issues.	<p>Good RCI Technicians They are very vigilant about personal safety and wear a vest all the time when outside the vehicle. They pay attention at all times and look out for their partner when they are doing measurements. They are also very mindful when they are measuring to look out for vehicles in oncoming traffic.</p> <p>Average RCI Technicians They typically follow most of the safety rules and wear the vest when outside the vehicle. They are mindful of oncoming traffic when they do the measurements. However, they may not pay full attention for the safety of their partner.</p> <p>Poor RCI Technicians They occasionally forget to wear the vest when outside the vehicle. They may break some of the safety rules. They may occasionally forget to check the pattern of oncoming traffic and</p>

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							may be distracted with other non-related matters.
	b) Drive through and verify the roadway length.	1. Go to start of roadway 2. Just drive to check length of roadway and make sure it's what it's supposed to be 3. If there's a difference in length that's outside tolerance, the field manager or QC will go out in the field to double check. 4. Discuss with District Office to decide whether a	DMI RCI printouts Basemaps route length report	Know the handbook rules Know the tolerance rules	Strobe lights should be on Driver is really looking in the mirror and paying attention to traffic building up behind Travel at a lower speed than the limit Stay in the	Being considerate of other road users Being mindful of personal safety and safety of others	Good RCI Technicians They realize if there is a difference in roadway length, understand the tolerance rules and may check that length again at least a couple of times to make sure there really is a difference. They also know and understand the reasons for such differences. Average RCI Technicians They notice if there is a difference in roadway length and understand the tolerance rules. However, they do not know why the differences occur. They

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		basemap package needs to be sent to central office.			outside lane as much as possible		would not make the decision to notify the field manager or District Office if they realize there are differences. Poor RCI Technicians They notice that there is a difference in roadway length, but they may not be familiar with the tolerance rules. They would not check the length a couple of times to confirm that there is a length difference. They may mark the folder but not tell anyone.
	c) Collect and record point features: Street names, bridge numbers, milemarkers, call boxes, county lines, railroad crossing numbers, and milepoints for all intersections and counter stations.	1. Person who scribes will look and call up the names when they come up 2. Driver then hits DMI at the correct spot for that feature 3. If there are changes, mark it down in the field notes (names may have been misspelled, new sign up, new bridges may have been	Inventory forms DMI Reports of the roadway SLDs Camera	Know what the features are and their characteristics Know the tolerance rules Know how to read SLDs Know how to fill up the forms	The driver has the lights on with sign that says "Slow Moving Vehicle" Driver pays attention to traffic in the mirrors and all around them	Highly mindful of personal safety and safety of other road users Being organized and prepared Paying attention to what's coming on the SLDs as well as on the	Good RCI Technicians <u>Teamwork</u> The driver and scribe work together effectively as a team. They divide up the tasks according to each others' strengths. <u>Safety Consciousness</u> The driver pays full attention on the road, drives at a constant speed and stays in the same lane.

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		constructed and so the numbers have changed) 4. If unsure of name of the intersection, take a picture and discuss it with someone more knowledgeable			The scribe are calling out names so that the drivers are prepared when the intersection comes up	road Being willing to multi-task Working together as a team	<p><u>Decision-making</u> They make decisions in the field when they come across a questionable feature or characteristic. They may also come back and discuss it with others to get a second opinion.</p> <p><u>Quality of Notes</u> Their notes are complete and have additional information on why they collected the data that way. This additional information is highly useful for admin staff and other departments.</p> <p>Average RCI Technicians <u>Teamwork</u> They do not work very effectively as a team and one technician may leave the other person to do most of the work.</p> <p><u>Safety Consciousness</u> Drives at a constant speed and stays in the same lane, but may occasionally be inattentive to</p>

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							<p>road conditions.</p> <p><u>Decision Making</u> They may be hesitant about making decisions in the field and instead wait to speak to someone more experience or knowledgeable before going out there to complete the roadway.</p> <p><u>Quality of Notes</u> Their data is complete but they may not put the extra notes as to why they collected the data that way.</p> <p>Poor RCI Technicians</p> <p><u>Teamwork</u> They do not cooperate with one another, disagrees a lot on how to do things, and one person may leave the other person to do most of the work.</p> <p><u>Safety Consciousness</u> The driver is not really watching the speed of the vehicle, not driving at a constant speed, and</p>

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							also weaving through traffic. <u>Decision Making</u> They do not make decisions in the field or they make the wrong decisions without asking questions from someone more experience or knowledgeable. <u>Quality of Notes</u> Their notes are messy, difficult to read, and does not make much sense. Data entry people have to guess what they did and why they did it that way since they have no extra information.
	d) Collect and record milepoints for roadway features such as number of lanes, median type, and shoulder type.	1. Go to beginning milepoint 2. When there is a change, stop to collect the milepoint for the lane change 3. Get out and measure the feature 4. When there's an unusual feature, take a picture to bring back to	SLDs Inventory forms DMI Measuring wheel Safety vest Camera	Know tolerance rules Know how to measure Know to use the measuring wheel Know the features and	Always wear the safety vests outside the vehicle Driver needs to be mindful of traffic Pick a good area to pull	Highly mindful of personal safety and safety of other road users Being organized and prepared Pay attention to what's coming	

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		the office to discuss how to code it		characteristics and how to code them	over safely The scribe should watch the person measuring to ensure their safety	on the SLDs as well as on the road Being able to multi-task Working together as a team	
	e) Measure roadway dimensions: Total surface width, inside and outside shoulder widths, median widths, and box culvert dimensions.	1. Refer to handbook		Know how to measure Know what the current standards are			
	f) Collect milepoints for miscellaneous features (structures, underpasses, pavement condition, and friction course).						
Duty 4: Post data collection	a) Make sure that all required data have been collected or verified before leaving the	1. Make sure have all the information 2. Write up final notes and mark up final SLD 3. Use computer to	Final forms Field forms SLDs	Know to look up maps on the computer Know how to		Proactive in providing information that might be helpful to data entry	Good RCI Technicians They fill out all the forms and the information is well-written. They also provide additional information to let the office staff

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	inventory site.	look up aerial pictures Might also look at videologs to verify features 4. Write at the top whether it's field or final	Computer to look up maps or get an aerial view Videologs	fill up the forms Know how to look at videologs		person Organized	know why they made certain decisions in the field. Average RCI Technicians They fill out all the forms although there might be a few things missing that need to be looked up. They may not provide additional information to help the office staff know why they made certain decisions in the field. Poor RCI Technicians They do not completely fill out all the final forms or the forms contain incorrect information. The information provided is difficult to understand. The data entry person needs to verify a lot of the information and talk to the field team.
	b) Prepare inventory folder for data input and ensure legibility and accuracy.						

Appendix F: Rating instrument for list of duties and tasks

Instructions

This document is a writable PDF that you will use to enter your ratings for the task statements and provide feedback on the focus group experience.

1. Please print ***this single*** page so that you can easily refer to the rating scales while completing the form.
2. Read each task statement carefully.
3. Read the scale for each of the three criteria: Importance, Frequency, and Difficulty of the task.
4. Enter each of your three ratings into the appropriate box next to each statement.

For example:

Task Statement	Importance	Frequency	Difficulty
Select Roadway ID from Inventory Schedule Spreadsheet.	4	4	2

5. After rating the task statements, please give us your feedback on the focus group activity.
6. After completing the questionnaire, save this file as “YourFirstName_YourLastName.pdf” (e.g., Tarry_Rhodes.pdf).
7. Finally, send an email to im06@fsu.edu attaching your saved file.

Rating of task statements

Please rate the significance of each task the focus group has identified. Use the criteria: **Importance**, **Frequency**, and **Difficulty**, following the scale for each criterion.

Rating Scale

Importance (contribution of the task to effective operations within your district)				
Not important	Somewhat important	Moderately important	Fairly important	Very important
1	2	3	4	5
Frequency (how often the task is performed)				
Several times a year or less	Several times a month	Several times a week	Several times a day	Several times an hour
1	2	3	4	5
Difficulty (how hard the task is to do or learn to do effectively)				
Not difficult	Somewhat difficult	Moderately difficult	Difficult	Very difficult
1	2	3	4	5

OFFICE RESPONSIBILITIES

Duty 1: Perform pre-inventory activities.

Task statement	Importance	Frequency	Difficulty
Identify roadway ID requiring inventory.			
Collect and review existing and historical data for field verification purposes and to identify problems prior to inventory.			
Review GIS basemap alignment to identify road changes. If there is a discrepancy, generate an RCI/GIS basemap package.			
Verify existing administrative data (for elements not visible in the field). If there is a discrepancy, determine if an RCI/GIS basemap package is necessary.			
Compile inventory folder that includes inventory matrices, field inventory worksheets, SLDs, County Section Number Key Sheets, GIS basemaps, RCI printouts for various road features, route maps.			

Duty 2: Perform data entry preparation activities.

Task statement	Importance	Frequency	Difficulty
Obtain data from construction plans that cannot be collected from the field. (e.g., horizontal bearings and curve data). Convert the construction stations to match milepoints.			
Review the inventory folder to ensure all recorded data is readable, complete, and unambiguous (copies of the marked-up SLD, features inventory field sheet, miscellaneous inventory field sheet, construction plans, Feature/Characteristic Sort and the Financial Management Projects by Roadway ID reports).			
Prep Reconcile the field collected milepoints against the currently recorded milepoints to see whether they are in tolerance before updating the RCI.			
Ensure that features referenced by intersection milepoints match SLD mark-up milepoints.			
Coordinate with other offices to update appropriate data.			

Duty 3: Perform data entry.

Task statement	Importance	Frequency	Difficulty
Enter, update and verify data into the Roadway Characteristics Inventory (RCI) database according to the Handbooks.			
Validate data by using the RCI database automated process.			
Run Main 1, Main 2, Main 3, and all RCI Edits; and reconcile data.			

Duty 4: Perform post-inventory activities.

Task statement	Importance	Frequency	Difficulty
Produce Straight-line Diagrams and update Districts' servers; then notify TranStat.			
Review County Section Number Key Sheets and update as needed.			
Update RITA with SLD and inventory dates.			
Perform QA/QC checks.			
File and retain inventory folder for 5 years.			
Update RCI database as needed.			

FIELD RESPONSIBILITIES

Duty 1: Pre-inventory field preparation activities.

Task statement	Importance	Frequency	Difficulty
Ensure vehicle is equipped with all field inventory equipment that is in working order.			
Perform vehicle safety inspection using a checklist.			
Check tire pressure and calibrate the DMI.			
Bring all the related materials such as forms, handbook and maps.			

Duty 2: Inventory data collection preparation.

Task statement	Importance	Frequency	Difficulty
Wait for any transportation maintenance or construction activities to be complete before inventorying the Roadway ID.			
View videologs to become familiar with the assigned roadway.			
Review GIS basemaps to ensure that the alignment of beginning milepoint (BMP) and end milepoint (EMP) is digitized correctly.			
Bring inventory folder with inventory matrices, field inventory worksheets, SLDs, County Section Number Key Sheets, GIS basemaps, RCI printouts for various road features, route maps.			

Duty 3: Data collection activities.

Task statement	Importance	Frequency	Difficulty
Apply safety guidelines.			
Drive through and verify the roadway length. If there is a discrepancy in the length, initiate the basemap package process.			
Mark any obscure items with temporary paint such as structures, facility crossings, culverts, angled intersections and other items.			
Collect and record point features: Street names, bridge numbers, milemarkers, call boxes, county lines, railroad crossing numbers, and milepoints for all intersections and counter stations.			
Collect and record milepoints for roadway features such as number of lanes, median type, and shoulder type.			
Measure roadway dimensions: Total surface width, inside and outside shoulder widths, median widths, and box culvert dimensions.			
Collect milepoints for miscellaneous features (structures, underpasses, pavement condition, and friction course).			

Duty 4: Post data collection activities.

Task statement	Importance	Frequency	Difficulty
Make sure that all required data have been collected or verified before leaving the inventory site.			
Prepare inventory folder for data input and ensure legibility and accuracy.			

Your feedback on the focus group activity

We would like your feedback on the focus group session in which you participated. This will enable us to improve the way we collect data and manage future research activities.

Please type your feedback in the box below each question.

1. What did you like most about the focus group?

2. What did you like least about the focus group?

3. What are your suggestions for us to improve our focus group sessions?

Appendix G: Focus group instructions for validating the preliminary competency model

Thank you for participating in the focus group that will get together tomorrow, on **Thursday, April 1st, 2010 between 10 am to 3pm.**

Purpose

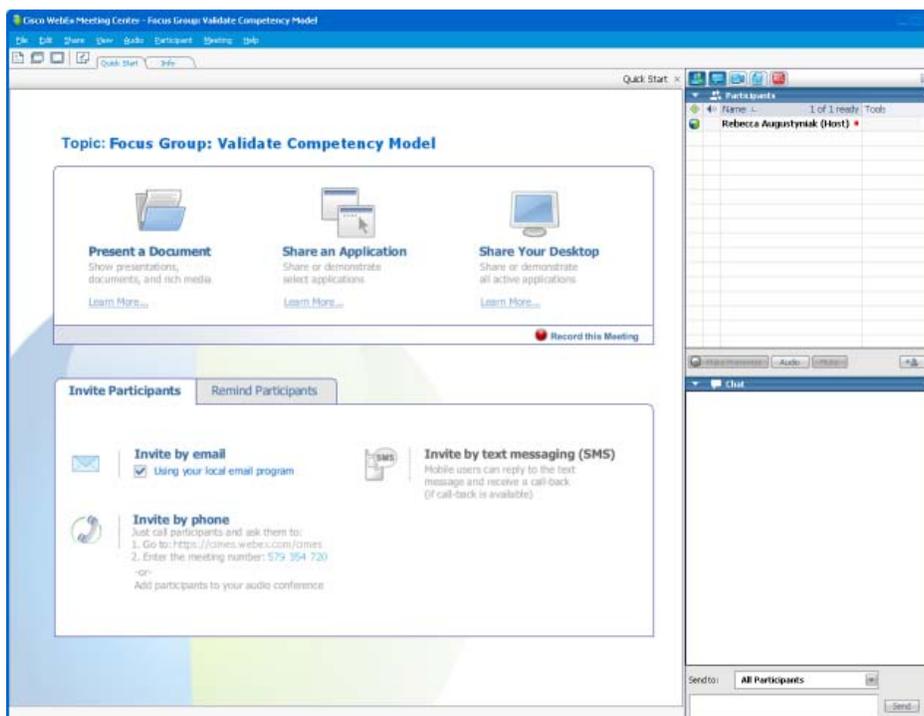
The purpose of this focus group is to validate the preliminary competency model developed by the Center for Information Management & Educational Services (CIMES) on behalf of TranStat. To facilitate our discussion during the focus group, please ensure that you are familiar with the competency model. For your convenience, I have attached the preliminary competency model document to this email.

Equipment needed

The meeting will be conducted online (to share a document) and through teleconference (to communicate with one another). Therefore, you should have access to a computer with internet connection and a telephone.

Instructions to begin focus group

1. Check your email for the meeting invite from the Director of CIMES, Rebecca Augustyniak.
2. Click the link provided in the email to enter the online meeting room.
3. Enter your name, email address, and the password (which is "rcitech").
4. Click the button **Join Now**.
5. Once you enter the meeting room, you will see a screen that looks like this and your name will appear in the Participants box (top right column):



6. Pick up the phone and dial the following number to teleconference: (850) 645-6338.

Meeting Agenda

10:00 – 10:05	Briefing on research participation
10:05 – 10:10	Overview of the competency model validation process
10:10 – 12:00	Validation of the preliminary competency model
12:00 – 13:00	LUNCH BREAK

Appendix G: Focus group instructions for validating the preliminary competency model

13:00 – 14:45	Continue validation discussion
14:45 – 15:00	Summary of major discussion points
15:00	End of focus group

Thank you once again for taking time off from your busy schedule to assist us in this validation process. Your participation is invaluable in helping RCI technicians develop their knowledge and skills through training and professional development.

In the mean time, if you have any questions or concerns, please do not hesitate to contact me at (850) 645-9229 or via email at: imasduki@fsu.edu.

Regards,
Iskandaria (Issy) Masduki
Research Associate & Instructional Design Coordinator
CIMES, Florida State University

Appendix H: Instrument for rating the importance of validated competencies

Instructions:

Thank you for participating in the focus group to validate the RCI technician competency model. The second part of this validation process is for you to rate each competency in terms of its importance to successful job performance.

- Carefully read the definition for each competency. You may also refer to the Word document you received in the email that provides more details for each competency.
- Assign a value of 1 to 5 indicating the importance of each competency to job performance, with 1 being "Not Important" and 5 being "Very Important".

	1 Not Important	2 Somewhat Important	3 Moderately Important	4 Fairly Important	5 Very Important
1. PERSONAL EFFECTIVENESS					
DEPENDABILITY (P1): Displays responsible behaviors at work					
INITIATIVE (P2): Demonstrates a willingness to find a solution to challenges					
PHYSICAL ABILITY (P4): Able to physically perform work responsibilities and tasks					
2. ACADEMIC COMPETENCIES					
READING (A1): Demonstrates understanding of written sentences, paragraphs, figures, and technical graphics in work-related documents					
WRITING (A2): Demonstrates ability to use standard English for compiling information and preparing written documents					
MATHEMATICS (A3): Demonstrates ability to do basic mathematical calculations					
3. WORK COMPETENCIES					
RCI KNOWLEDGE (W1): Demonstrates the ability to apply knowledge of roadway characteristics inventory concepts, processes, and procedures					

	1 Not Important	2 Somewhat Important	3 Moderately Important	4 Fairly Important	5 Very Important
MEASURING, RECORDING, AND VERIFICATION SKILLS (W2): Entering, recording, storing, or maintaining information in written or electronic format					
PLANNING & ORGANIZATIONAL SKILLS (W3): Planning and prioritizing work to manage time effectively and accomplish assigned tasks					
INTERPERSONAL AND COMMUNICATION SKILLS (W4): Listening, speaking, and signaling so that others can understand					
COMPUTER LITERACY SKILLS (W5): Using a computer and related applications to input, store, and retrieve information					
INFORMATION SEARCH SKILLS (W6): Identifying information needs and finding the right resources or persons to obtain the required information					
TEAMWORK SKILLS (W7): Working cooperatively with others to complete work assignments					
EQUIPMENT SKILLS (W8): Demonstrates ability to use tools, forms, vehicles, and equipment provided					
SAFETY SKILLS (W9): Mindful of personal safety issues and the safety of others					

YOUR FEEDBACK ON THE FOCUS GROUP ACTIVITY

We would like your feedback on the focus group session in which you participated. This will enable us to improve the way we collect data and manage future research activities. Please type your feedback in the box below each question.

What did you like most about the focus group?

What did you like least about the focus group?

What are your suggestions for us to improve our focus group sessions?

Appendix I: Preliminary list of job duties and tasks provided to focus groups 1 and 2

INSTRUCTIONS: This document is to be used during the focus group as a starting point for developing the final list of duties and tasks for a Roadway Characteristics Inventory (RCI) Technician in the state of Florida.

Job Description

This position performs routine paraprofessional work maintaining the Roadway Characteristics Inventory (RCI), and is responsible for collecting and processing Transportation Statistics (TranStat) data, including Straight Line Diagrams (SLD), Roadway Characteristics Inventory (RCI), and Highway Performance Monitoring System (HPMS). Also performs other field, office and computer systems tasks as assigned. Driving is an essential part of this position requiring the incumbent to possess and maintain a current Class "E" driver's license.

Educational Qualifications:

Minimum high school diploma.

License(s) and/or Certification(s):

Class "E" driver's license.

	FIELD Duties	FIELD Tasks
1	Perform pre-inventory field preparation activities.	<ul style="list-style-type: none"> a) Ensure equipment is in safe and working order. b) Perform vehicle safety inspection using the list in motor logbook. c) Check tire pressure and calibrate the DMI.
2	Apply field safety guidelines.	<ul style="list-style-type: none"> a) Familiarize oneself with the roadway to be inventoried. b) Pull the vehicle safely off the road near the beginning of the Roadway ID. c) Organize the crew for driving and data collection. d) Check vehicle safety and warning devices for proper placement and operation. e) Turn on the inventory vehicle's safety lights when collecting data. f) Drive slower than the flow of traffic so that no Feature change is omitted. g) Wear a safety vest each time the vehicle is exited. h) Drive at a constant slow speed, and be aware of traffic on the road. i) Drive in the outside lane when there is high traffic volume. j) Wait for any transportation maintenance or construction activities to be complete before inventorying the Roadway ID.
3	Perform RCI field inventory	<ul style="list-style-type: none"> a) Drive through and establish roadway length. b) Mark structures, facility crossings, culverts, angled intersections and other items with orange paint. c) Reconcile measured milepoints to database; update if necessary. d) Collect and record point features: Street names, bridge numbers, milemarkers, call boxes, county lines, railroad crossing numbers, and milepoints for all intersections and counter stations.. e) Collect and record milepoints for roadway features such as number of lanes, median type, and shoulder type. f) Measure roadway dimensions: Total surface width, inside and outside shoulder widths, median widths, and box culvert dimensions. g) Collect milepoints for miscellaneous Features (structures,

Appendix I: Preliminary list of job duties and tasks provided to focus groups 1 and 2

	FIELD Duties	FIELD Tasks
		underpasses, pavement condition, and friction course). h) Make sure that required data have been collected or verified before leaving the inventory site.
4	Record data	Use field forms and mark up SLDs to record data according to specified procedures.

	OFFICE Duties	OFFICE Tasks
1	Perform pre-inventory office preparation activities.	a) Create 5-year Inventory Schedule Spreadsheet from Roadway Inventory Tracking Application (RITA). b) Select Roadway ID from Inventory Schedule Spreadsheet. c) Collect and review existing and historical data for field verification purposes and to identify problems prior to inventory. d) Verify existing administrative data (for elements not visible in the field).
2	Perform data collection office activities.	a) Obtain data that could not be collected in the field from construction plans (e.g. (horizontal bearings and curves) b) Highlight SLD mark-ups and copy for the RCI Database Input Team. c) Examine the field inventory worksheets to ensure all recorded data is readable, complete, and unambiguous. d) Prepare the data package to include copies of the marked-up SLD, Features Inventory Field Sheet, Miscellaneous Inventory Field Sheet, Construction Plans, Feature/Characteristic Sort and the FM Projects by Roadway ID reports. e) Send data package to the RCI Database Input Team. f) Perform a quality control check. g) Reconcile the field collected milepoints against the currently recorded milepoints to see whether they are in tolerance before updating the RCI. h) Ensure that Features referenced by intersection milepoints match SLD mark-up milepoints. i) Complete the Station to Milepoint Spreadsheet tying construction plans to inventoried milepoints. j) Check ending milepoint.
3	Use RCI system	a) Enter, update and verify general interest roadway data along on-system and off-system roadways into the Roadway Characteristics Inventory (RCI) during inventory and post-inventory activities as required by established procedure. b) Enter, correct and review HPMS data into the RCI.
4	Produce and distribute automated Straight Line Diagrams using custom CADD and MicroStation software.	a) Produce SLDs in SLD Diagrammer b) Edit ASCII output in MicroStation c) Update SLD Inventory Block, including 5-year re-inventory date, revision date, and interim revisions by milepoints d) Distribute SLD to designated District Office and TranStat e) Update SLD update and distribution dates in RITA
5	Review, update and distribute County Section Number Key Sheets	

Appendix I: Preliminary list of job duties and tasks provided to focus groups 1 and 2

	OFFICE Duties	OFFICE Tasks
6	Track final acceptance dates for completed construction projects	
7	Review completed construction project plans	
8	Review RCI/GIS Basemap Correction.	
9	Provide technical assistance for quality assessments and quality control (QAIQC) checks.	
10	Compile planning information such as traffic counts, roadway features, and other related information needed by other offices.	
11	Identify and develop programs to improve the maintenance of RCI.	
12	Update maps	Assist with updating general highway maps, district base maps, federal functional classification maps and the state and federal road systems maps for District.
13	Support the Contracts Section for MOA's and Contract Maintenance.	Gather data to support the Contracts Section for MOA's and Contract Maintenance.
14	Prepare and submit pay estimates for payment by the use of Transport (Site Manager) or CIT for FDOT Contracts. Review invoices for accuracy.	
15	Coordinate and evaluate work performance with all District operation centers and the state TranStat (central) office.	
16	Assist in various statistical tasks with state and federal agencies, MPO's, local governments, and the general public.	
17	Assist with and participate in the development of public involvement plans, workshops and public	

Appendix I: Preliminary list of job duties and tasks provided to focus groups 1 and 2

	OFFICE Duties	OFFICE Tasks
	hearings.	
18	Maintain and update current municipal boundaries	
19	Perform related work as required or requested	

Appendix J: List of duties and tasks generated by focus group 1 (job experts)

 RCI TECHNICIAN JOB DUTIES & TASKS Focus Group 1 (RCI Technicians)		
	<i>FIELD Duties</i>	<i>FIELD Tasks</i>
1	Perform pre-inventory field preparation activities	a) Verify that all necessary equipment and documentation are present in the vehicle. b) Ensure that equipment are in safe and working order. c) Perform vehicle safety inspection using the list in motor logbook. d) Check tire pressure and calibrate the DMI. e) Familiarize oneself with the roadway to be inventoried. f) Organize the crew for driving and data collection. g) Check vehicle safety and warning devices for proper placement and operation.
2	Perform RCI field inventory	a) Apply field safety guidelines b) Collect, measure and record roadway features through an established roadway length using field forms in accordance with specified procedures c) Make sure that required data have been collected or verified before leaving the inventory site. d) Check DMI calibration to ensure accuracy

 RCI TECHNICIAN JOB DUTIES & TASKS <i>Focus Group 1 (RCI Technicians)</i>		
	OFFICE Duties	OFFICE Tasks
1	Perform pre-inventory office preparation activities	<ul style="list-style-type: none"> a) Create 3-year HPMS and 5-year RCI Inventory Schedule Spreadsheet from Roadway Inventory Tracking Application (RITA). b) Select Roadway ID from Inventory Schedule Spreadsheet. c) Verify existing administrative data for elements not visible in the field. d) Collect all necessary information such as maps and SLDs to perform field inventory and get to the right locations
2	Perform data collection and input office activities	<ul style="list-style-type: none"> a) Obtain data that could not be collected in the field from construction plans, maps, local agencies, and other resources. b) Examine the field inventory worksheets to ensure all recorded data is readable, complete, and unambiguous. c) Prepare the data package to include copies of the marked-up SLD, Features Inventory Field Sheet, and Miscellaneous Inventory Field Sheet. d) Ensure that all features milepoints not within tolerance are updated in the RCI database.
3	SLD Production and Distribution	<ul style="list-style-type: none"> a) Produce SLDs and ensure that the data is accurate and legible. b) Distribute SLD to designated District Office, TranStat, and outside customers
4	QA & QC	<ul style="list-style-type: none"> a) Ensure database matches the field sheets b) Ensure that the SLD matches the database c) Run edit reports to double check data
5	Updating county key sheets	<ul style="list-style-type: none"> a) Update county key sheets when there is a change in the state highway system b) Distribute updated county key sheets to designated District Office, TranStat, and outside customers.

Appendix J: List of duties and tasks generated by focus group 1 (job experts)

 RCI TECHNICIAN JOB DUTIES & TASKS <i>Focus Group 1 (RCI Technicians)</i>		
	<i>OFFICE Duties</i>	<i>OFFICE Tasks</i>
6	Track final acceptance of construction projects	a) Review weekly construction notice report b) Conduct a field inventory or check construction plans for sections identified in the weekly construction notice report c) Update RCI database as needed
7	RCI/GIS Basemap Correction	a) Review monthly RCI/GIS Basemap Summary report b) Ensure accuracy of length and alignment of sections between the basemap and the RCI database c) Identify reasons for differences in length and alignment d) Coordinate with TranStat to resolve discrepancies
8	Communicate with other offices	Coordinate changes of physical and administrative characteristics with other offices and/or outside agencies
9	Update RITA	Update dates for 3-year HPMS and 5-year RCI/SLD Inventory Schedule, construction notices, and miscellaneous reviews.

Appendix K: List of duties and tasks generated by focus group 2 (trainers)

 RCI TECHNICIAN JOB DUTIES & TASKS <i>Focus Group 2 (Trainer SMEs)</i>		
	FIELD Duties	FIELD Tasks
1	Perform pre-inventory field preparation	a) Ensure vehicle is equipped with all field inventory equipment that are in working order. b) Perform vehicle safety inspection using a checklist. c) Check tire pressure and calibrate the DMI. d) Bring all the related materials such as forms, handbook and maps.
2	Inventory data collection preparation	a) Wait for any transportation maintenance or construction activities to be complete before inventorying the Roadway ID. b) View videologs to become familiar with the assigned roadway. c) Review GIS basemaps to ensure that the alignment of beginning milepoint (BMP) and end milepoint (EMP) is digitized correctly. d) Bring inventory folder with inventory matrices, field inventory worksheets, SLDs, County Section Number Key Sheets, GIS basemaps, RCI printouts for various road features, route maps.
3	Data Collection	a) Apply safety guidelines. b) Drive through and verify the roadway length. If there is a discrepancy in the length, initiate the basemap package process. c) Mark any obscure items with temporary paint such as structures, facility crossings, culverts, angled intersections and other items. d) Collect and record point features: Street names, bridge numbers, milemarkers, call boxes, county lines, railroad crossing numbers, and milepoints for all intersections and counter stations. e) Collect and record milepoints for roadway features such as number of lanes, median type, and shoulder type. f) Measure roadway dimensions: Total surface width, inside and outside shoulder widths, median widths, and box culvert dimensions. g) Collect milepoints for miscellaneous features (structures, underpasses,

 RCI TECHNICIAN JOB DUTIES & TASKS <i>Focus Group 2 (Trainer SMEs)</i>		
	<i>FIELD Duties</i>	<i>FIELD Tasks</i>
		pavement condition, and friction course).
4	Post data collection	a) Make sure that all required data have been collected or verified before leaving the inventory site. b) Prepare inventory folder for data input and ensure legibility and accuracy.

 RCI TECHNICIAN JOB DUTIES & TASKS <i>Focus Group 1 (RCI Technicians)</i>		
	<i>OFFICE Duties</i>	<i>OFFICE Tasks</i>
1	Perform pre-inventory activities	a) Identify roadway ID requiring inventory. b) Collect and review existing and historical data for field verification purposes and to identify problems prior to inventory. c) Review GIS basemap alignment to identify road changes. If there is a discrepancy, generate an RCI/GIS basemap package. d) Verify existing administrative data (for elements not visible in the field). If there is a discrepancy, determine if an RCI/GIS basemap package is necessary. e) Compile inventory folder that includes inventory matrices, field inventory worksheets, SLDs, County Section Number Key Sheets, GIS basemaps, RCI printouts for various road features, route maps.
2	Perform data entry preparation activities	a) Obtain data from construction plans that cannot be collected from the field. (e.g. horizontal bearings and curve data). Convert the construction stations to match milepoints. b) Review the inventory folder to ensure all recorded data is readable, complete, and unambiguous (copies of the marked-up SLD, features inventory field sheet, miscellaneous inventory field sheet, construction plans, Feature/Characteristic Sort and the Financial Management Projects by Roadway ID reports). c) Reconcile the field collected milepoints against the currently recorded milepoints to see whether they are in tolerance before updating the RCI. d) Ensure that features referenced by intersection milepoints match SLD mark-up milepoints. e) Coordinate with other offices to update appropriate data.
3	Perform data entry	a) Enter, update and verify data into the Roadway Characteristics Inventory (RCI) database according to the Handbooks. b) Validate data by using the RCI database automated process. c) Run Main 1, Main 2, Main 3, and all RCI Edits; and reconcile data.

 RCI TECHNICIAN JOB DUTIES & TASKS <i>Focus Group 1 (RCI Technicians)</i>		
	<i>OFFICE Duties</i>	<i>OFFICE Tasks</i>
4	Perform post-inventory activities	a) Produce Straight-line Diagrams and update Districts' servers; then notify TranStat. b) Review County Section Number Key Sheets and update as needed. c) Update RITA with SLD and inventory dates. d) Perform QA/QC checks. e) File and retain inventory folder for 5 years.

Appendix L: RCI training matrix using task-centered approach

Appendix M: Training for Roadway Inventory Personnel (TRIP) curriculum outline

Brief outline

1. TRIP Orientation
2. RCI Fundamentals 101
 - A. Lesson 1: **Overview**
 - B. Lesson 2: **Introduction**
 - C. Lesson 3: **Roadtrip 1**
 - D. Lesson 4: **Roadtrip 2**
 - E. Lesson 5: **Roadtrip 3**
3. RCI Fundamentals 102
 - A. Lesson 6: **Overview**
 - B. Lesson 7: **Introduction**
 - C. Lesson 8: **Roadtrip 4**
 - D. Lesson 9: **Roadtrip 5**
 - E. Lesson 10: **Roadtrip 6**

Expanded outline

1. TRIP Orientation
2. RCI Fundamentals 101
 - A. Lesson 1: **Overview**
 - B. Lesson 2: **Introduction**
 - C. Lesson 3: **Roadtrip 1**
 - i. Pre-inventory activities
 - a. Preparing the folder
 - b. Inspecting the vehicle
 - ii. Inventory activities
 - a. Verifying roadway length
 - b. Inventorying intersections
 - c. Inventorying structures
 - iii. Post-inventory activities
 - a. Navigating the interface
 - b. Entering data into the RCI database
 - D. Lesson 4: **Roadtrip 2**
 - i. Pre-inventory activities
 - a. Calibrating the DMI
 - ii. Inventory activities
 - a. Identifying feature changes in type of roadways, number of through lanes, and width of lanes
 - b. Recording median and outside shoulders in terms of type and width
 - c. Learning codes for Route Signifying Qualifiers
 - iii. Post-inventory activities
 - a. Updating information in the RCI database
 - a. 500-foot rule
 - b. tolerance
 - E. Lesson 5: **Roadtrip 3**
 - i. Pre-inventory activities
 - ii. Inventory activities
 - iii. Post-inventory activities
3. RCI Fundamentals 102
 - A. Lesson 6: **Overview**
 - B. Lesson 7: **Introduction**
 - C. Lesson 8: **Roadtrip 4**
 - i. Pre-inventory activities
 - ii. Inventory activities
 - iii. Post-inventory activities
 - D. Lesson 9: **Roadtrip 5**
 - i. Pre-inventory activities
 - ii. Inventory activities
 - iii. Post-inventory activities
 - E. Lesson 10: **Roadtrip 6**
 - i. Pre-inventory activities
 - ii. Inventory activities
 - iii. Post-inventory activities

Addenda

Addendum 1: Competency Model–Roadway Characteristics Inventory Technicians

Addendum 2: Competency-based training for RCI technicians using the task-centered approach

(Note: This document reflects the design concept proposed before development began. As the project evolved, some elements in the final project changed from the initial design and are not reflected here.)

