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MEMORANDUM NO: 01-00

**TO: DISTRICT DIRECTORS OF OPERATIONS
DISTRICT CONSTRUCTION ENGINEERS
DISTRICT CONSULTANT CEI ENGINEERS**

FROM: Greg Xanders, State Construction Engineer

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Team Members

SUBJECT: CONSULTANT CEI COSTS TASK TEAM REPORT

The FDOT/FICE Task Team on Consultant CEI costs has completed its report and made recommendations to reduce CEI costs. I want to thank the Florida Institute of Consultant Engineers and members of the team for their hard work in tackling this difficult issue.

The consultant firms representing FICE on the team were: Aim Engineering and Surveying, Consul-Tech Engineering, Metric Engineering, Inc., Parsons Brinkerhoff Construction Services, Inc., PBS&J Construction Services, Inc., Reynolds, Smith and Hills Construction Services, Inc., and Tampa Bay Engineering, Inc.

Should you have any questions on the content of the report please contact Jim Martin at (850) 414-4147 or Suncom 994-4147 or userid cn982jm.

This document will also available online at the State Construction Office web site.

GX/jm
Attachment

Executive Summary

The Department formed a cross functional team in conjunction with the Florida Institute of Consulting Engineers to examine the apparent rising cost of Consultant Construction Engineering and Inspection (CCEI). The team had the following mission statement.

Mission Statement

ATo analyze the present Consultant CEI program and prepare recommendations by October 1999 to improve efficiency as measured by the ratio of CCEI costs to project construction costs@

The team worked together over a nine month time period to develop the following major recommendations.

1. The Department should expand its use of Innovative/Alternative contracting to control contract time. The preferred method is a combination of A+B bidding with Liquidated Savings. Research shows shorter contract time means lower overall CEI costs (i.e. % cei).
2. The Department should enhance its grouping of consultant contracts to include more projects and a longer time frame for services. This will allow the consultant office staffing to gain the same efficiency demonstrated by Department staffing in several positions such as; Senior Project Engineer, Office Engineer, Resident Compliance Officer, and Secretary.
3. The Department should advertise consultant contracts to include projects in corridors or geographical areas with the ability to reduce or supplement the contract with additional projects in those areas. This allows the Department the flexibility to respond to a changing work program and optimize consultant services currently being provided.
4. The Department should look at consolidating and removing some CCEI scope requirements to retain in-house services from the normal consultant contract. The tasks that might be more efficiently handled in-house or by District Wide Contracts are in the areas of EEO/DBE compliance, asphalt plant inspection, and environmental inspection. This would depend upon the workload in each Resident Office.
5. The Department should implement a formal training program to educate its construction project managers on their role in managing consultants for construction engineering and inspection. In addition, business concepts that apply to the private sector for consultants should also be emphasized.

Guidelines have already been written to implement recommendations two and three. This report contains additional recommendations that future task teams should investigate.

FDOT/FICE TASK TEAM
Consultant CEI Costs
Team Report

Background

In February of 1999 at a joint meeting of the Professional Service Unit Administrators and the Construction Engineering and Inspection (CEI) Engineers, the belief was expressed that consultant CEI (CCEI) costs were increasing at an alarming rate. The Florida Institute of Consulting Engineers (FICE) was approached to join in a task force to address this issue. The team was composed of eight Department of Transportation members and eight FICE members and was chaired by the Department's Statewide CEI Coordinator. A cross section of personnel from the Department was included, involving Central and District offices' of Construction and Central Office Contractual Services.

The first meeting was held in March of 1999 at which time the team developed a mission statement. The statement is **“To analyze the present Consultant CEI program and prepare recommendations by Oct. 1999 to improve efficiency as measured by the ratio of CCEI costs to project construction costs”**. The team brainstormed a list of possible reasons for rising CCEI costs. A completion date of October 1999 was set to present the team findings and recommendations to the FDOT Executive Committee. Subsequent to these meetings the Florida Legislature passed a performance measure for the Department of Transportation. The measure stipulated that the Department would be evaluated on keeping CEI costs under or to 15 percent (15%) of the construction cost. CCEI costs would make up a portion of the measure. This measure underlined the necessity for the task team to produce tangible results.

The team explored many areas of the FDOT and Consultant CEI partnership. Many of the issues openly discussed were very controversial with opinions varying among all members at times. Recommendations were made in almost all areas even if a full consensus was not reached. In those cases the major point or points of contention are reported.

The findings and recommendations have been divided into seven different categories. The categories are as follows: Contract Time, Contract Administration, Communications, Optimization of CCEI Contracts, Lump Sum CCEI Contracts, Overhead Costs and Salaries. The findings and recommendations are as follows:

CONTRACT TIME

The team consensus is that increases in contract time are the single largest contributor of rising CCEI costs. Consultant construction inspection and engineering (CCEI) costs are linked directly to contract time. They are fixed to the project time line and any increase in the time line increases the cost proportionately. This is true because 80-85 percent (80-85%) of the cost of CCEI contracts is in salary related costs. Labor is the primary cost driver for CCEI contracts. The following are recommendations for contract time.

\$ Alternative contracting/Incentive bidding - this program appears to be very effective in limiting increases to project schedules and ensuring that the contractor prosecutes the work to completion before or by the prescribed time.

\$ Recommendation: The Department should continue letting projects with incentives or alternate bidding and to increase the number of projects advertised for letting with these initiatives.

\$ A+B Bidding with Liquidated savings - The concept of A + B bidding with Liquidated Savings is the most effective tool available for controlling contract time. This opinion is based on the recent experience of some of the team members. The contractor by bidding time commits the company to higher daily production rates than the Department utilizes in calculating contract time. Also, it forces the contractor to minimize lull periods in the prosecution of the work. The liquidated savings portion entices the contractor to aggressively approach the project. They will commit to longer hours, night work and weekends only if the financial incentives are in place.

\$ Recommendation: The Department should use this concept in an expanded role. To ensure contractors will aggressively pursue the projects, the completion date should be moveable for reasons beyond the contractor's control for calculating the liquidated savings bonus. Reasons for moving the date would be weather, major additions of work, plan revisions, etc.

\$ Enforce existing specifications concerning contract time. - The Department has existing specifications that require the contractor to provide a schedule for the prosecution of the work in the contract, and penalties for the contractor's failure to submit such a schedule or failure to maintain production rates in keeping with the approved production schedule. The Department has not uniformly applied these specifications, allowing many contracts to fall behind production and ultimately exceed the original contract time without assessing liquidated damages. Current attempts to place contractors who fall behind into a delinquent status have also been proven to be unsuccessful.

\$ Recommendation: Tightening the enforcement of these specifications should result in projects being completed on time or develop monetary penalties to assess contractors who fall behind the approved baseline schedule.

\$ Tighten contract time. - Alternative bidding, specifically A + B, has resulted in the construction industry consistently bidding the time portion less than the Department's estimate. This demonstrates it is time for the Department to revisit the production rates it uses in establishing contract time or even the process by which it establishes the time. Allowing the contractors to have too much time encourages their practice of shifting crews between projects often resulting in all projects being delayed. A distinction must be made between contractors that shift crews between projects and maintain the project schedules and those that shift between projects because they do not have the resources to work on all of them. It is not an indictment against the effective scheduling of resources, only against a contract allowing too much time. Tightening the time allowed on contracts should result in reduced occurrences of a contractor completing the large dollar value portions of the project and leaving for another project until the time on the first is about to expire. This usually results in time extensions and increased CEI costs.

\$ Recommendation: The Department should evaluate the current production rates used in setting contract time. An upward adjustment of production rates will reflect current construction practices.

CONTRACT ADMINISTRATION

The majority of the costs of CEI are due to the size of the project teams, and this is driven by the minimum staffing requirements of the CPAM, the materials testing guide and final estimates procedures. Unless the Department initiates a process for improvement in these areas, significant reduction in CEI costs will not occur. The following are workable suggestions to relieve some of these requirements that would allow a reduction in staff.

\$ Lump sum pay items. - Use more lump sum pay items. This reduces the necessity of constant tallies of items that are labor intensive, but low in dollar value. Some examples are striping, grassing, rpms, traffic signals, and plan quantity items.

\$ Recommendation: The Department should evaluate the current pay item list to change to lump sum concept. The areas of striping, grassing, rpms, sidewalks, barrier railing and traffic signals are prime candidates.

\$ Lump sum projects. - Projects where the required scope of work can readily be defined can be accomplished using a lump sum concept for the entire project. This will reduce the effort of plan preparation and required project quantity documentation for pay purposes.

\$ Recommendation: The Department should continue to expand the use of the lump sum project concept where appropriate. Traffic signals, lighting, sign, mill and resurface in curb & gutter section, minor bridge are all examples of projects which could incorporate this concept.

\$ Revisit the materials sampling and testing guides. - It has been a number of years since the present guide has been reviewed. Does the number of tests we now require need to be done? What benefit do we get from them in regards to value? Many states, counties, cities and private enterprises get by with reduced frequency of testing that is ultimately accepted by the Department for inclusion into the state system.

\$ **Recommendation: The Department should evaluate the current materials sampling and testing frequency to target areas for reduced testing. The requirements for concrete testing could be reduced using a statistical process control. The number of density tests on roadway embankment and pipe backfill could be reduced if statistical sampling methods are initiated.**

\$ Required Staffing. - CPAM states the staffing requirements for personnel on various operations

\$ **Recommendation: Review the current CPAM staffing requirements.**

\$ Final Estimate documentation - The documentation requirements for paying the contractor can be very labor intensive. Allowing inspection personnel opportunities for mistakes.

\$ **Recommendation: The Department should review its requirements for documentation in regard to payment on pay items. The documentation should be reduced especially where the documentation costs are greater than the value of the pay item being substantiated. (temporary paint, sodding by latitude and departure, water, sign logs etc.) The amount of time and effort spent versus the economic benefit to FDOT and the contractor needs to be examined.**

COMMUNICATIONS

In any undertaking, in order to be successful there must be good communication between the parties involved. Good communication is not just the exchange of words but must also include the concept being relayed in the use of those words. The size of the Department and the Consultant industry makes this goal hard to achieve. The following are recommendations to work toward a common understanding throughout the Department and the Consultant industry.

\$ Combined Meetings - One of the biggest complaints from the consultant industry is the inconsistency between Districts. The administration of CCEI is perceived to be done eight different ways by eight different Districts. These differences not only affect consultants working in multiple Districts, but also affect other Districts. Negotiations are handled in one way by a District and then in another way in a different District. Discussion of differences, problems and solutions in a statewide joint session will reduce problems between Districts.

\$ **Recommendation: The Department should hold joint sessions between FDOT CCEI Engineers & Contractual Services to develop consistent scopes,**

administration and contracts as well as developing ideas and methods to improve.

\$ Partnerships -The Department holds liaison meetings with FICE on a quarterly basis. The diversity of disciplines in the group makes it difficult to focus on CEI issues.

\$ **Recommendation: Hold joint meetings with State Construction, Contractual Services & FICE in relation to CCEI issues only. This would provide a format for specific CCEI challenges to be worked on jointly.**

\$ State CCEI Engineer - The work program for consultant CEI is only slightly less than the consultant design work program, yet design has three full time employees coordinating project manager training and supporting the districts. Construction has one position spending 30% of their time on Consultant CEI. Consistency between the districts and coordination with the other DOT offices would be best served by at least one full time position. As well as the need to study and proactively implement ways to improve this significant program.

\$ **Recommendation: Create a full time Consultant CEI Engineer within the State Construction Office in Tallahassee to oversee the program.**

\$ Construction Project Manager Role and Training - The role of the construction project manager in regards to the definition of Aresponsible charge@ is not very well defined. This can lead into two extreme methods of management of either no management or micro management of the consultant by the construction project manager. Additionally, the Department has no formal training program or courses for construction project managers. Some of the construction project managers are unaware of details in the concepts of overhead and business management. This can lead to ill feelings and misunderstandings in the process of negotiations.

\$ **Recommendation: The Department should seek to define the concept of “responsible charge” for the construction project managers. The department hires professional firms to manage projects and should allow them the ability to do such where the traditional definition of duties of government is not violated. Also, the Department should develop formal training courses to educate its construction project managers in concepts needed for managing consultants. This training should include topics on management, business accounting, overhead, business audits, tort litigation, time extensions, supplemental agreements, etc. to improve project administration consistency.**

OPTIMIZING CONSULTANT CEI CONTRACTS

Over the years, consultant contracts have been staffed in accordance with Department directives. This means that the numerical levels of inspectors and engineers assigned solely to the project(s) in a consultant contract are greater than their counterparts within the Department. In addition, the consultant contract has come to include administrative personnel such as the office

engineer, secretary and compliance officer that the Department normally provides through the Resident offices. The difference is that the consultant personnel are only concerned with the project(s) in the consultant contract while the department personnel work on a larger number of projects gaining efficiencies in staffing. The Department, in this same time frame, has also steadily added requirements to the consultant scope of services. These include, public information services, environmental requirements, asphalt plant inspectors, geo-technical services and QA/QC requirements. As a result of consistently adding scope to CCEI contracts, the cost of CEI services has increased. The following are methods to optimize Consultant CEI contracts.

\$ Enhanced Contract Grouping - This is a means by which multiple projects are grouped into one CEI contract. This makes better use of project personnel such as senior project engineer, project engineer, office engineer and secretary/resident compliance officer (rco) by having them split their time between several projects, more in line with what in house personnel are required to do. The most cost effective groupings are those that have projects under construction concurrently, providing an overlap in schedules. This would mimic the same staffing efficiencies gained by in house resources. Another concept would have a large project grouped with several smaller ones that would start and end within the time frame of the larger contract.

\$ Recommendation: The Department has written and distributed guidelines to the District Construction Engineers for implementation. The suggested limits are thirty to fifty million dollars in construction costs and projects in a time period covering thirty-six consecutive months or approximately three fiscal years. Due to the uncertainty of the five-year work program in years four and five it is difficult to forecast required needs beyond this time frame. The Industry is concerned about equitable distribution of the work with this concept.

\$ Advertising contracts as corridor or geographical area units. This would allow the Department to add or remove projects from a project within a limited area to account for changes in the letting plan and still maximize the use of staff. Many times a contract is awarded to a consultant, but changes to the letting plan cause a gap between included project construction periods. By allowing the inclusion of a project, the Adead@ time in the contract can be minimized. This creates a more stable environment for the consultant staff and is a more effective use of the staff.

\$ Recommendation: The Department has written and distributed guidelines to the District Construction Engineers for implementation. Contractual Services has written advertising language for placement on the Florida DOT web site when requesting services.

\$ Residency concept - this is an extension of the District-Wide assigned contract. It increases the threshold from \$1,000,000 over two years to \$10,000,000 over five years (two million per year) and the maximum work order amount from \$250,000 to \$400,000. This concept would maximize the use of administrative functions while

allowing the addition of mid sized projects to the contract. It also minimizes the impact of smaller projects that historically have been too small to let for consultant services, but have put a greater impact on in-house construction inspection forces. It adds flexibility in meeting the changing workload within a construction residency. The Department personnel did not reach consensus on the need for the concept. Industry is not sure of the impacts of this concept.

\$ Recommendation: Amend the rule to allow use of this concept where appropriate.

\$ Revised minimum qualifications for personnel - This concept suggested lowering the minimum qualifications for certain positions to allow more flexibility in the selection and bring a larger pool of personnel into the work force. Targeted primarily at the inspector, inspector aide and senior inspector positions. It would aid in the recruitment and employment of vocational technician graduates, high school graduates and newly graduated engineering students into the ranks of the uncertified inspector positions. This is an attempt to effect a change in the supply and demand of qualified personnel.

\$ Recommendation: The Department in conjunction with the industry has revised the qualifications. The State CEI Coordinator will distribute to the District CEI Engineers for implementation.

\$ Advertising projects with target budget - Under this concept, the Department would advertise a project and specify the amount to be targeted for the contract. This would be listed as a dollar value or a percentage of the programmed construction estimate. The short-listed consultant firms would then complete the competition for the project (technical, oral or both), with this constraint in mind. Their proposal would indicate how the firm would achieve the target and provide the required services. Additionally, this allows the consultant firms to understand the budget constraints of the Department and propose staffing plans that combine position functions for maximum benefit and least cost to the Department. By giving more control of the development and use of their own resources the Department should receive services in a more cost effective manner. In order to maintain a level playing field for the competition, the Department will need a concise scope and should publish an expected staffing need in the request for services. An extension of this concept is to provide an incentive to the selected CCEI. This would be to include a second follow on project, with a targeted CCEI cost, which would be added to the consultant contract subject to acceptable performance on the incomplete project and achievement of the target percentage at time of negotiation. This concept would be limited in application.

\$ Recommendation: The Department should continue to explore this concept. Contractual Services is working with Districts and Industry to refine the concept.

\$ In-house Consolidation - Consolidate CEI functions under in-house personnel or in District-Wide assigned contracts. Some of the administrative or specialty functions that have been placed in CEI contracts might be more effectively handled by having existing in-house personnel provide them. An example would be the Resident Compliance Officer (RCO). In-house RCOs currently handle multiple projects. If the existing staff cannot handle the additional workload from the consultant side, it may be cost effective to supplement their efforts using services provided by a temporary services contract. This type of contract is competitively bid and the overhead is typically lower than a major engineering firm. Other functions that might be better served by District-Wide contracts are the asphalt plant inspector, public information, geo-technical, survey and environmental specialists.

\$ Recommendation: The Department should have each District review its work load for incorporation of the concept where appropriate. District Two is currently using this concept for Asphalt plant inspectors. Also, they are experimenting with Department personnel providing the RCO function on a consultant contract.

LUMP SUM CONSULTANT CEI CONTRACTS

This type of contract is allowed and has the potential for reducing costs in several ways. First there is a reduced administrative cost in the monthly invoicing costs, which are greatly simplified.

Secondly, by having a lump sum fee it encourages the consultant to look for ways to keep the costs of the project down and these savings are passed on to the public through a lower fee. Potential problems with this type of contract include modifications to the contract if required by changes in the construction contract. Also, there is a potential for abuse by the consultant in a lump sum contract versus a cost plus for level of services provided. In addition, this type of contract has not usually been used for CEI contracts and therefore, the various parties within the DOT are not familiar with its implementation. There are not many guidelines within the Department for this type of contract and care will have to be taken to insure consistency within a district and between districts. The lump sum concept can only be applied when the required scope of services, including duration are well defined.

\$ Recommendation: The Department should explore this lump sum concept on a limited basis to acquire knowledge for incorporation into cost plus contracts. District Six has already begun this experiment on two contracts. Through this type of contract, experimental methods may be attempted by the consultant to gain efficiencies. The lessons learned can then be incorporated into future Department CEI contracts.

OVERHEAD COSTS

Salaries and the overhead costs applied to them are the two largest items in consultant contracts and have done more to increase costs than anything else. In the last five years overhead rates have increased from 100 percent (100%) of raw salaries to the newly implemented 114 percent (114%) for field office overhead. Social Security Tax, Federal Withholding Tax, and Workers Compensation are components of overhead that the industry has no control over. The following are areas to examine for reducing consultant overhead.

\$ Make consultants agents of the state – Controversial within the Department, but liability costs for agencies representing the Department are increasing their overhead costs. These costs include insurance and legal fees defending suits brought as a result of construction projects. Several CEI consultants provided numerous examples where they spent a minimum of \$50,000 to \$75, 000 just to simply defend a case that is clearly a non-issue.

\$ Recommendation: Strengthen existing policy to have firms engaged in CEI for the department recognized as an agent of the state to reduce litigation expenses.

\$ New training - The Department is developing new certification requirements. The consultant industry is estimating the proposed training changes will cost the entire construction industry in excess of \$35 million to re-certify their employees. The consultants face increased costs for certification registration fees, increased travel expense, in addition to the lost billable time of the individuals. Time spent training is

considered an overhead cost. It may also have the effect of specializing inspectors requiring more inspectors on each job. This appears to be directly opposite of the quest the Department is trying to take, which is to make more effective use of existing personnel and reduce costs. The Department should consider as a minimum, grand fathering in currently certified inspectors. These changes and costs are a great concern too not only the consultant industry but also FDOT District personnel. No one seems to know what benefit the new program will bring, but do anticipate grave problems and added expense. This much concern should not be brushed aside.

\$ Recommendation: Allow the existing certifications to be valid with a three-year period for implementation of the new certifications. Allow the consultant industry to charge time to the Department for training if the participant is currently assigned to an FDOT project and the training is FDOT specific.

\$ Selection Requirements. - The selection process used by the Districts from the approved Department procedures governs competition for contracts. Each District's acquisition process has nuances unique to the District. Some Districts require technical proposals and oral presentations. Some require written technicals in addition to questions and answer sessions. Many ask for plan evaluations that are in fact reduced construct ability reviews. By establishing clearer guidelines for oral and technical presentations overhead costs can be kept down. (Note: The Executive Committee of the Department has established guidelines for the process). Projects with estimated fees less than two million dollars (\$2,000,000.00) are to be awarded on the basis of either a written technical or oral competition. Those above two million dollars may require both a written and oral presentation with District Secretary approval. Recommendations for the size of a team in the competition and the use of question and answer over presentation type sessions have also been made. Oral presentations are the most expensive due to the travel costs and key personnel time. Some districts are also using a pre-proposal checklist in lieu of a written technical.

\$ Recommendation: Continue dialogue with the industry to determine more efficient and consistent methods for selection.

\$ Electronic invoicing - This reduces the cost of invoicing, both in labor and administrative type expenses. It also reduces the time between submittal and payment resulting in faster cash flow. The department is currently working to implement the Contract Invoice Transmittal System (CITS).

\$ Recommendation: Continue with the implementation of CITS.

\$ Simplify fee proposals - The Department and Industry is currently working to have office consumables be a percentage of direct labor. This would eliminate the tedious aspect of negotiating consumable expenses that are very predictable (i.e. pens, paper, toilet paper, etc.)

\$ Recommendation: Continue to work with FICE thru their CEI subcommittee and Contractual Services to implement the concept. District Professional

Services Administrators have been advised a draft formula is available for voluntary usage if both parties agree in an effort to reduce the work effort in negotiation.

SALARIES

Salaries, overhead, operating margin and Facilities Capital Cost of Money (FCCM) make up 90-95 percent of the contract costs in a consultant contract. Since salaries form the basis of all contracts, all fluctuations affect the entire contract. Historically, the Department has paid salary costs in two ways, actual rates and contract rates. Either way a maximum limiting fee is established to pay for the services throughout the life of the contract. It is the increases in salaries and overhead, which have gained the most notice in the past year. There are several reasons for the increases in salaries requested by industry.

They are:

\$ Job market - Florida has had a large consultant work program the past decade and it is currently at a point where the demand for qualified people has out stripped their availability. This has resulted in firms having to pay more to retain personnel. In addition personnel have been moving between projects looking for those projects with higher salary rates than what they are currently making. Additionally, some consultants have had to resort to a recruitment bonus to entice personnel into the CEI field.

\$ **Recommendation: None**

\$ Competition - CEI projects, unlike design, are won based on the specific personnel making up the project team. This has created competition between firms to acquire or retain staff, especially those with successful track records in winning projects.

\$ **Recommendation: None**

\$ Uncertain job location - Although this topic may seem to be in disagreement with the argument that the current work program has created a great demand for personnel, it is still true that in private industry there is always the concern about where and when the next project will be or start. Also, unlike in-house personnel, personnel in the CEI sector are faced with relocating to the next project, having protracted periods of non-employment, and generally uncertain futures. These have conspired to keep the wages paid to certain positions in the private sector higher than their counterparts in the public sector.

\$ **Recommendation: None**

\$ Pay raises - The Department has historically funded projects based on a 3% cost of living increase or escalation. A few districts have tied this increase to the Consumer Price Index (CPI). Consultants are not constrained to keep their increases to the FDOT standard 3% escalation. Consultant raises range from 5% to 10%. The 10% level is generally for promotions. This raises the average salaries in job classes much higher than the Department expects. The Department is considering establishing a consistent policy of using the CPI plus 1 percent yearly for contract escalation. At present this would amount to a 3.4% escalation for CCEI contracts. The Consultant Industry did not accept this proposal.

\$ Recommendation: The Department should continue discussing the issue working thru the FDOT/FICE Task Team on Negotiations.

\$ _____

\$ Contract rates vs. Actual rates - Actual rate is where the Department matches the salary being paid by the consultant to its employee dollar for dollar. However, if the Department believes the rate is too high, it will only pay a reduced rate. Contract rates consist of negotiated rates for positions based on the averaging of actual salaries by job class in the firm. The Inspector General's Office believes there is a high potential for abuse with the use of contract rates.

\$ Recommendation: Go to all Contract rates. This will allow for easier implementation into the CITS program. Also, reduces the time involved in negotiating salaries.

\$ Longer contracts - While still grouping projects in contracts to be worked concurrently, additional projects can be included to increase the overall duration and efficiency of the assignment. This will provide some stability in the workforce, since they know that they will be working in one location for more than a year, and remove the concerns of where the next job is coming from thereby reducing personnel turnover and job "hopping" to get an easy increase. **Recommendation: Examine establishing a five-year term for some CEI groupings.**

\$ Career path establishment - Develop positions within contracts to allow more entry-level personnel from the high schools, vocational schools and colleges. These can be inspector aides, junior inspectors, inspectors that may not have all the certifications required on projects, but can still perform tasks under the supervision of an experienced inspector or engineer. Also identify how an inspector can move to senior inspector levels, from there to an office engineer or project engineer. Develop RCO type personnel into more technical areas like an office engineer.

\$ Recommendation: Personnel Qualifications are under Revision.

\$ Job jumping - The Department award a bonus for project completion to CCEI personnel. Like the Department's contractor incentives for completing work early, this concept would reward a project team for staying together until the assignment is over. Currently there are no real controls or incentives to prevent individuals from leaving a project before it is over to go to a higher paying firm, assignment or promotion.

\$ Recommendation: None