

# **Preconstruction Staffing Assessment**

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for  
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## Issue Statement

The objectives of this paper are to:

- Determine the extent to which NCDOT has used in-house versus outside contract forces to perform the additional preconstruction work load associated with the Highway Trust Fund (HTF) program.
- Develop recommendations for meeting NCDOT's remaining preconstruction resource requirements associated with the HTF program.

## Background

The Highway Trust Fund significantly expanded NCDOT's capital improvement program for the period 1989 through 2002 (subsequently extended to 2007) by \$9.1 billion. Eleven percent of the HTF program funds were expected to be used for preconstruction activities associated with the resulting projects.<sup>1</sup> To handle the resulting increase in workload, NCDOT originally projected the need for 573<sup>2</sup> additional positions in preconstruction, representing a 53 percent increase in preconstruction staffing from early 1989 levels. Most of these positions were to be in roadway design, structural design, and design services units. The projected staff requirements in the preconstruction area were based on the presumption that 75 percent of the preconstruction work would be done by in-house forces, while 25 percent would be done by outside contract forces.

NCDOT originally projected the need for 784<sup>3</sup> additional positions in construction to address the HTF workload. Most of these positions were to be in the field construction units of the Division offices. Most actual construction work was projected to be carried out by outside contract forces, except in the Secondary Road Construction program. The increase in in-house construction-related staff was for materials testing and construction engineering and inspection activities.

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<sup>1</sup> NCDOT Memorandum: Data Requested for Phase II, Statewide Performance Audit, by J. T. Peacock, Jr., Chief Engineer - Preconstruction, August 14, 1992.

<sup>2</sup> NCDOT Memorandum: Manpower Study for Expansion Budget, by J.T. Peacock, Jr., State Highway Design Engineer, March 13, 1989.

<sup>3</sup> Based on staffing data provided by P.M. Watts, Construction Operations Engineer - Construction, December 1992.

## Findings

***Finding 1: NCDOT's preconstruction units have received 555<sup>4</sup> additional positions or 97 percent of their originally projected staffing needs since the HTF program began.***

Since the start of the HTF program, 555 positions have been added to the Department's preconstruction units. This represents 97 percent of the originally estimated increase in preconstruction staffing needed to address the HTF program work load.

***Finding 2: NCDOT's construction units have received 146<sup>5</sup> additional positions or 19 percent of their originally projected staffing needs since the HTF program began.***

Since the start of the HTF program, the filling of in-house construction-related positions required by the program has lagged the preconstruction staffing effort. As of the end of 1992, the Department has added 146 construction-related positions, or 19 percent of the number originally projected to be needed by the program. This is primarily due to two factors:

- Actual construction of major projects generally lags the preconstruction efforts by three to five years
- The Department's Construction and Materials Branch has taken a balanced approach to meeting the resource requirements of the HTF program by geographically allocating available in-house construction staff and increasing the use of outside contract forces

Besides adding more in-house staff, the Department has addressed the increasing construction work load resulting from the HTF program in the following ways:

- Temporary and permanent transfers of in-house construction personnel within and across division boundaries
- Project assignments across division boundaries to balance available in-house construction resources

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<sup>4</sup> Based on staffing data provided by J.T. Peacock, Jr., Chief Engineer - Preconstruction, September 1992.

<sup>5</sup> Based on staffing data provided by P.M. Watts, Construction Operations Engineer - Construction, December 1992.

- Increased delegation of CEI responsibilities lower among the in-house construction project teams, resulting in greater leveraging of construction management staff (resident engineers)
- Contract specifications that make contractors responsible for increasing aspects of project process control, such as material sampling, with Department verification and oversight
- Contract terms that allow the contractor to perform construction layout on selected projects (32 projects to date)
- Recent pilot program that uses private engineering firms to perform construction engineering and inspection functions under the oversight of NCDOT resident engineers (2 projects to date)

***Finding 3: NCDOT's preconstruction units are currently seeking to add 298 more staff to address the HTF work load.***

The Department is currently seeking to add 298 more staff to its preconstruction units over the next 15-year period, with most of the increase occurring during the next 4-year period in the Highway Design and Planning & Environmental branches. This increase is predicated on the Department having a relatively stable, elevated level of preconstruction work over the next 15-year period due to the HTF program. However, unless the HTF program is extended further, the level of preconstruction activity will likely drop off significantly over the last five years of the program, as final projects are readied for right-of-way acquisition and construction. Therefore, preconstruction staffing levels will likely be dropping in the final third of the program timeframe.

## **Recommendations**

***Recommendation 1: Additional preconstruction staffing needs of NCDOT's HTF program should be met by increased use of outside contract forces.***

The use of private engineering firms to handle peak work load requirements is a well-founded strategy for avoiding the public-sector problems of staffing up and down for varying work loads. With the Department currently contracting out only about 20 to 25 percent of preconstruction work to private engineering firms, there is significant room to expand the use of outside contract forces to address the preconstruction work load associated with the additional 298 positions sought by the Department. If this were done, the level of preconstruction work contracted out would rise to about 32 to 36 percent. This is a very reasonable level of outside contracting for preconstruction activities, particularly since the HTF program represents a 78 percent increase in the pre-1989 preconstruction work load of the Department.

This recommendation will enable the Department to more easily adjust its preconstruction activities to match the changing HTF program work load. This will be particularly important as the HTF program further matures and the level of preconstruction activities drops off.

***Recommendation 2: Additional construction staffing needs of NCDOT's HTF program should in part be met by an increasing proportion of outside contract forces.***

The Department's on-going strategy to increasingly rely on the use of private engineering firms to perform surveys, process control, and construction engineering and inspection functions should be continued. With the HTF program entering a phase of expanded construction activity, having completed a number of project plans, the Department will need to further leverage its in-house construction staff to meet the requirements of the program.

The increased use of outside contract forces to perform quality control/quality assurance functions will require continued NCDOT construction staff involvement in project oversight and verification, careful selection of vendors, and rigorous contract administration of these projects. The level of such outside contracting should be based on the following considerations:

- Focus outside contract activity on the peak load requirements of the HTF construction program
- Retain sufficient in-house capability to address the base load requirements of the HTF construction program and properly administer the outside CEI-related contracts
- Select contractors with significant experience in performing construction engineering and inspection for major road/bridge projects and familiarity with NCDOT's engineering standards and construction specifications

This recommendation will enable the Department to more easily adjust its construction-related activities to match the changing HTF program work load. This will be particularly important as the HTF program further matures and the level of construction-related activities increases.

### **Implications**

By using private engineering firms to handle more of the HTF program preconstruction and construction work load, the Department can avoid adding more staff to its already large preconstruction units while reducing the number of new in-house staff required to support the construction portion of the program. This will reduce the number of in-house staff that will need to be let go when the HTF program work load declines. It will also facilitate greater exposure of private engineering firms to the preconstruction and construction

requirements of NCDOT, which will improve the quality of their products and the efficiency of their efforts.