Issue Statement

The objectives of this paper are to:

- Assess the organizational structure of the division offices and their related districts relative to established organizational criteria.

- Develop recommendations for improving the organizational efficiency and effectiveness of the division offices and their respective districts.

Background

The North Carolina Department of Transportation (NCDOT) is responsible for the largest statewide road network in the country, with over 76,975 road miles and 163,799 lane miles. This includes interstate, state, and most local roads. The Department has 13,668 personnel, of which 81 percent or 11,054 personnel are in the Division of Highways. Of this group, 76 percent or 8,400 personnel are located in the divisions across the State.

The North Carolina Department of Transportation's maintenance, operations, and construction functions are the responsibility of the Operation's Section of the Division of Highways. The Operations Section consists of the following four central office units and branches:

- Occupations, Safety, and Emergency Planning Unit

- Maintenance and Equipment Branch

- Construction and Materials Branch

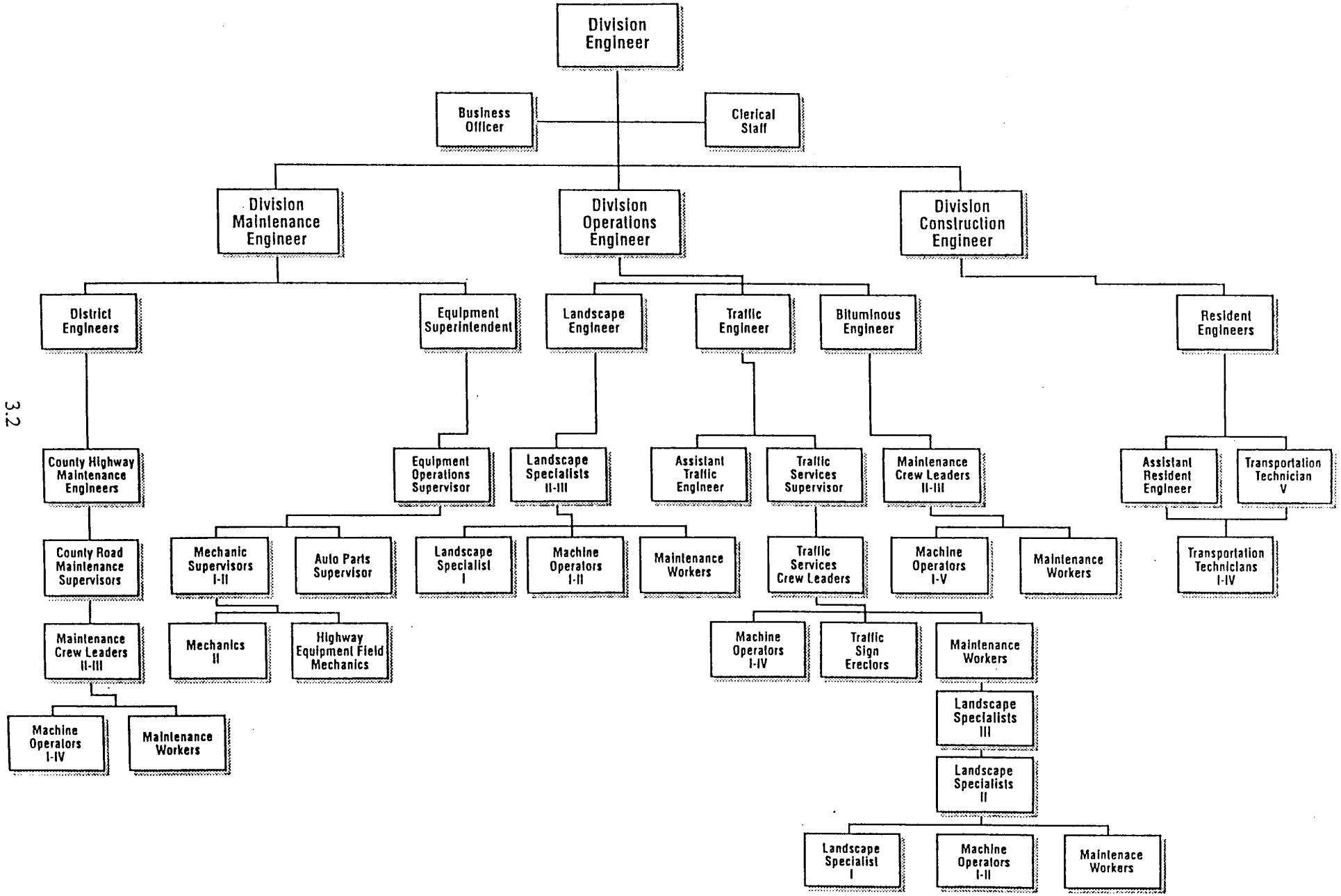
- Statewide Emergency Operations Coordinator

Most maintenance, operations, and construction field staff are located in 14 divisions, which span the entire state. Each division includes from 5 to 14 counties, with 2 to 3 districts per division. Each division is responsible for about 5,500 road-miles, 9,700 paved lane-miles, 1,200 pieces of equipment, and a staff of about 600 personnel. There are from 5 to 14 garages per division, with most counties having their own NCDOT garage/maintenance yard.

The 14 division offices report to the Chief Engineer of Operations and the Secondary Roads Officer. The organization structure of most of the 14 divisions is illustrated in Exhibit 1. Among the 14 divisions, there is some variety in the grouping of functions. Two of the

EXHIBIT 1

TYPICAL DIVISION ORGANIZATION STRUCTURE



more rural divisions combine the Division Maintenance Engineer and Division Operations Engineer into one position. Other variations are summarized below:

Alternative Reporting Relationships	Divisions
■ Landscape Engineer reports to Division Maintenance Engineer	1,4,11,12,14
■ Traffic Engineer reports to Division Maintenance Engineer	1,9,12,14
■ Bituminous Engineer reports to Division Maintenance Engineer	1,4,5,12
■ Bituminous Engineer reports to Division Construction Engineer	2,14
■ Equipment Superintendent reports to Division Operations Engineer	3,4,7,9,10

Within the major functional units comprising NCDOT's division organizational structure, there are numerous layers of management and staff. This results from the Department's geographic distribution of field maintenance, operations, and construction activities, and the hierarchy of staff classifications associated with each functional area.

During the past decade, several changes in the division organizational structure have been made by the Department. These include:

- Placing the Division Equipment Superintendent under the direct authority of the Division Engineer, instead of the central office Equipment & Inventory Control Unit (in 1986)

- Establishing the position of Division Operations Engineer in twelve of the divisions, reporting to the Division Engineer, to reduce the span of control burden on the Division Maintenance Engineer by assuming management responsibility for such functions as (in 1987):

  - Division facilities development program
  - Division-based Highway Trust Fund project development
  - Traffic engineering
  - Roadside environmental
  - Bituminous operations
  - Others, as appropriate (such as equipment maintenance)

- Eliminating inefficient, one-person equipment maintenance garages (several two-person garages remain)

- Increasing the number of maintenance districts in several of the more urbanized divisions, due to the increasing scope of the work load within these divisions.

These changes have responded to the increasing field-based work load of the Department, especially related to the Highway Trust Fund program, and the Department's desire to effectively manage this work load.

Findings

The assessment of the organizational structure of NCDOT's divisions and districts is based on the application of well-established organizational criteria. These consist of the following:

- Maintain functional alignment of responsibilities
- Avoid duplication of functional responsibilities and reporting relationships
- Include all key functions
- Distinguish policy-making and support (staff) responsibilities from operating (line) responsibilities
- Maintain a reasonable span of control for managers and supervisors
- Retain sufficient layers of management and staff to efficiently direct and perform the work

Finding 1: ***NCDOT's 14 Divisions are appropriate for the large scope of the Department's road system responsibilities.***

Exhibit 2 compares the number and scale of operation of NCDOT's 14 divisions to those of nine other state departments of transportation within the southeast. According to this exhibit, NCDOT's divisions are responsible for an average of 5,531 road miles within an average land area of 3,489 square miles. This compares to an average of 2,998 road miles and 4,829 square miles per district for the other nine states. While NCDOT's 14 divisions are 28 percent smaller in land area than their counterparts in the other nine states surveyed, they are responsible for maintaining and operating 84 percent more road miles. Thus, while certain economies of scale could be achieved by reducing the number of divisions and creating larger divisions, the large scope of NCDOT's current road system responsibilities suggests the need to retain the higher level of management oversight provided by the current 14 division structure.

Finding 2: ***Excessive management layers exist between the Division Engineer position and the county maintenance workers.***

Between the Division Engineer position and the county maintenance workers, there are five layers of management, as shown in Exhibit 1. These include:

EXHIB[illegible]

Comparison of State DOT Division Offices

State	Number of Divisions *	State-Maintained Street Mileage#	Land Area (Sq. Miles)^	Street Mileage Per Division	Land Area Per Division
Alabama	9	10,988	50,767	1,221	5,641
Florida	7	11,791	54,153	1,684	7,736
Georgia	7	17,790	58,056	2,541	8,294
Kentucky	12	27,544	39,669	2,295	3,306
Maryland	7	5,375	9,837	768	1,405
North Carolina	**14**	**77,439**	**48,843**	**5,531**	**3,489**
South Carolina	7	41,406	30,203	5,915	4,315
Tennessee	4	14,548	41,155	3,637	10,289
Virginia	9	55,727	39,704	6,192	4,412
West Virginia	10	30,662	24,119	3,066	2,412
Total	86	293,270	396,506	32,852	51,297
Average	9	29,327	39,651	3,285	5,130

* AASHTO Reference Book of Member Department Personnel & Committees 1990-1991

\# "Highway Statistics 1989" from the U.S. Dept. of Transportation - Federal Highway Admin.

^ "The Book of the States 1990-91 Edition" from The Council of State Governments

- Division Maintenance Engineer
- District Engineers
- County Highway Maintenance Engineers
- County Road Maintenance Engineers
- Maintenance Crew Leaders

This represents a large number of middle management layers. Within this structure, there is a fairly narrow span of control for the Division Maintenance Engineers (3 to 5 units) and the District Engineers (4 to 5 units). Within each division, there are currently 2 to 3 districts, each of which covers from one to 6 counties. Most districts cover from 2 to 3 counties. This contributes to the narrow span of control associated with the Division Maintenance Engineer and District Engineer positions.

Finding 3: ***The Division Equipment Operations Supervisor position represents a redundant layer of management.***

Another part of the Division organizational structure that reflects a narrow span of control is in the Division Equipment Unit. Each of the 14 divisions has a Division Equipment Operations Supervisor, who has a one-on-one reporting relationship to the Division Equipment Superintendent and manages the Auto Parts Supervisor and Mechanic Supervisors. This one-on-one reporting relationship creates uncertainty regarding the management responsibilities of the Division Equipment Superintendent, inhibits the efficient delegation of responsibilities within the Division Equipment units, and complicates management reporting within the unit.

Finding 4: ***The Landscape Specialist III position represents a redundant layer of management where reporting to the Landscape Engineer in a one-on-one relationship.***

The Roadside Environmental Unit (Landscape) in nine of the divisions has a one-on-one reporting relationship between the Landscape Engineer and the Landscape Specialist III positions. As with the Equipment Operations Supervisor position, the Landscape Specialist III position represents a very narrow span of control and is an unnecessary layer of management within this unit, where such a one-on-one reporting relationship exists.

Finding 5: ***The Department operates separate Division and county garages in the same geographic areas.***

The Equipment Section of the 14 divisions performs maintenance and repair functions for all NCDOT equipment, except for sedans which are maintained through the Department of Administration. Each division has between 5 and 10 garages, including one major division garage. In some cases, two-person garages continue to operate in certain rural areas of the State, where the distance between garages is fairly large (40 to 50 miles). In addition, there are local county garages co-located near the division garages. These latter garages represent a potential opportunity for consolidation, to reduce the overall number of garage facilities maintained by the Department.

Finding 6: ***Equipment maintenance is an integral part of the field support activities of the Department.***

The equipment maintenance function is an integral part of the field support activities of the Department. Ready access to well-maintained vehicles and the ability to quickly repair vehicles is an essential ingredient to enabling the Department's field forces to accomplish their maintenance, operations, and construction missions in a timely manner.

Finding 7: ***Division Traffic Services units lack adequate management focus on signal-related activities.***

Division Traffic Services units are variously organized, with some units having all field forces reporting to the Division Traffic Services Supervisor and others having signal-related forces assigned to the Assistant Division Traffic Engineer in a Traffic Control Technical Services unit. The latter arrangement provides a better balance of technical and non-technical traffic services personnel among the middle management positions within this unit, resulting in a more equitable span of control among these supervisory personnel.

Recommendations

Recommendation 1: ***NCDOT should retain the 14-division structure of its field forces.***

The 14-division structure of NCDOT field forces is a reasonable arrangement for ensuring proper management oversight and public accessibility, given the geographic size and functional scope of responsibilities of the Department's field activities. However, there is a narrow span of control and excessive layers of middle management between the Division Maintenance Engineer position and the County Highway Maintenance Engineer position. This provides a significant opportunity for increased efficiency in the highway maintenance area through streamlining the existing organizational arrangement.

Recommendation 2: ***The "district" layer of management within the Division Highway Maintenance sections should be eliminated.***

Under this arrangement, the County Highway Maintenance Engineers in each Division would report directly to the Division Maintenance Engineer, while the district administration, permits, and planning/design units would be consolidated into three units reporting to the Division Maintenance Engineer. In addition, from five to seven County Highway Maintenance Engineer units would report to the Division Maintenance Engineer position. This action would remove a middle layer of management and provide an opportunity to eliminate at lease three positions per district through consolidation of administrative, permits, and planning/design responsibilities on a division basis. Such positions would likely include:

- District Engineer
- Transportation Technician
- Clerk Typist

This would amount to 117 positions saved across the 14 divisions.

The recommended elimination of the district layer of management will increase the span of control of the Division Maintenance Engineer position. **To maintain a reasonable span of control, it is further recommended that those two divisions (Divisions 1 and 12) currently without a Division Operations Engineer position should establish such a position.** This will add two positions to the Division complement. In addition, all 14 Division Operations Engineer positions should have the following four units reporting to them:

- Traffic Services
- Roadside Environmental
- Equipment
- Bituminous Operations

Recommendation 3: ***The Department should eliminate the Division Equipment Operations Supervisor positions in each of the 14 divisions.***

This recommendation will maintain a reasonable span of control for the Division Equipment Superintendent while eliminating the need for 14 positions.

Recommendation 4: ***NCDOT should retain control over its non-sedan equipment maintenance functions.***

The Department should continue to be responsible for the maintenance of its non-sedan equipment fleet, as currently managed at the division level and supported at the central office, to ensure timely, on-site service to its maintenance, operations, and construction field forces.

Recommendation 5: The Department should consolidate the Equipment section resources associated with the 14 division garages and those 14 NCDOT county garages located nearby.

This recommendation would involve closing or consolidating 14 NCDOT county garages statewide.

Recommendation 6: Signal-related activities and staff resources should be assigned to the Division Assistant Traffic Engineer.

The Traffic Services sections of the 14 divisions should be aligned in such a way that the signal/traffic control personnel report to the Assistant Traffic Engineer, while the pavement marking/signs personnel report to the Traffic Services Supervisor. This realignment recognizes the increasingly technical aspects of traffic signal planning and implementation, while also providing for a more balanced distribution of Traffic Services staff among the Traffic Services supervisors.

Implications

These organizational recommendations will enable the Department to reduce its division-based staff by at least 129 positions, and perhaps up to 168 positions. This could produce an annual savings of from $4 to $6 million. A major benefit of this change will be to reduce the layers of management within the division highway maintenance area, while retaining a reasonable span of control for the remaining management positions. The Department will also be able to better rationalize its network of equipment maintenance garages by closing small, redundant facilities. While these facility consolidations will not likely lead to staff savings, there will be marginal savings due to reduced maintenance and operating costs associated with those facilities that can be closed.