

Introduction

Chapel Hill Transit (CHT) identified a need to conduct an evaluation of the Transit Maintenance Division to determine if current maintenance staffing levels are adequate to meet the current vehicle service demand and maintenance requirements. Parsons Brinckerhoff's Fleet and Facilities Division (PB/FFD) was selected to perform the evaluation. On March 25 and 26, 2003 PB/FFD staff conducted a physical study at the Chapel Hill property to identify staffing needs based upon current and future system.

This report provides a summary of current staff levels, required staff level for existing fleet and proposed staff levels for any anticipated fleet expansion.

System Overview

Chapel Hill Transit provides public transportation service throughout the Chapel Hill, Carrboro, and UNC community. Chapel Hill Transit operates fixed route and demand response service within approximately a 25 square mile service area. The system produces over 140,000 annual hours of service, 2,300,000 annual vehicle miles and carries about 5 million passengers per year. Service Hours are from approximately 5:15 a.m. to 1:00 a.m. with significantly reduced service on Saturday and Sundays.

The Transit Maintenance Division operates Monday through Friday with service hours from 5:00 a.m. to 9:30 p.m. with no staff on duty Saturdays or Sundays. The Transit Maintenance Division currently maintains a fleet of 112 vehicles. This is a combination of fixed route buses, Para-transit vehicles, support vehicles and parking control vehicles as described in the following table:

| Vehicles | Assignment | Quantity |
|--------------------------|----------------------|----------|
| Fixed Route Buses | Revenue Vehicles | 83 |
| EZ Ride Buses | Demand Response | 11 |
| Support Vehicles | Non-Revenue | 8 |
| Operator Relief Vehicles | Shared Ride | 6 |
| Parking | Parking Services | 4 |
| | Total Combined Fleet | 112 |

The division is additionally responsible for all transit maintenance facility and bus zone maintenance. This includes all housekeeping, equipment maintenance, and repairs and cleaning of bus benches and shelters.

Town of Chapel Hill – Transit Maintenance Staff Analysis

The current operation conducts most of the required vehicle maintenance in-house, with major engine and transmission overhaul and body work being outsourced. Minor bodywork is conducted in-house on some vehicles requiring only the replacement of body panels.

The current maintenance staff is organized and classified based upon standard industry terminology for a mechanics division. The following table outlines the current budgeted positions and current staff operating in those positions.

| Job Title | Budgeted Positions | Vacant Positions |
|----------------------------|--------------------|------------------|
| Maintenance Superintendent | 1 | 0 |
| Maintenance Supervisor | 2 | 0 |
| Mechanics (I, II, III) | 8 | 0 |
| Bus Service Tech | 1 | 0 |
| Mechanic Helper | 2 | 0 |
| Service Attendant | 5 | 2* |
| Parts Manager | 1 | 0 |
| Admin Clerk | 1 | 1 |
| Total Staff | 21 | 3 |

*The Mechanic Helpers are currently acting as service attendants until positions are filled.

Currently there are no positions budgeted for completing facility and bus zone maintenance.

It was discovered during the data collection and staff assessment that the transit maintenance division is significantly under staffed. This has lead to the inability of the division to maintain the vehicles in accordance with the manufactures recommended maintenance and repair requirements, or maintain compliance with all applicable sections of the Code of Federal Regulations Title 49 (CFR 49). It was also apparent that the division did not meet basic industry standards for bus cleanliness, nor a level of appearance consistent with the expectations of the Town of Chapel Hill.

During informal conversations with the mechanic staff on the types of tasks and needs for staffing, it was determined that all share a low moral due to the lack of adequate staffing and skill development training. During these conversations a conclusion was developed that most of the mechanics have a great deal of experiential knowledge, but self-admittedly lack a basic fundamental understanding and operational theory of the electrical, electronic, fuel delivery and computer systems that have become common on buses in recent years.

Mechanics that cannot accurately diagnose system problems, specifically electrical and electronic will inevitably replace many good parts in the process of locating the problem. This generally means entire systems, such as Electronic Control Units (ECU's) are replaced, instead of the defective component, and the time required for getting the vehicle back in service is extended. This situation was apparent with a vehicle nearly completely disassembled in the maintenance area, for an electrical complaint. The vehicle has been out of service for over 45 days.

Town of Chapel Hill – Transit Maintenance Staff Analysis

Lack of adequate staffing has lead to priority being placed on basic maintenance tasks and employee development being placed on the “back burner”. There is a direct relation between the low moral and a perception that the maintenance management staff is unsympathetic to the needs of the maintenance mechanics.

Staffing Recommendations

Fleet Maintenance Management

The recent fleet expansions and service improvements have lead to the current fleet management staffs' marginal ability to both manage the daily functions for fleet maintenance, facility maintenance and bus stop zone maintenance, and strategic planning for future system improvements and introduction of planned new technology. This new technology for improved community service included automatic passenger counters, automatic voice annunciations, automatic vehicle locators, and real time passenger route information.

Maintenance Manager / Assistant Director

A position to be created, reporting directly to the Director of Transit Services, and responsible for strategic planning and leadership of the maintenance division. This position would then be responsible for the strategic planning and implementation of maintenance system improvements, research, integration and specification development for advanced technology, to aid in the bus systems operating improvements and planned vehicle replacement programs.

The development of this position would allow for the current Maintenance Superintendent position to oversee and manage the daily fleet and infrastructure maintenance needs.

Maintenance Supervision

Two additional maintenance supervisor positions could be utilized to oversee and manage the daily repair of vehicles in addition to conducting employee skills training and development for advancement training for the mechanics and service attendants. These positions would support additional shift assignments for an overnight and weekend vehicle maintenance shift assignments that will be addressed later in the summary.

Maintenance Support Staff

Part Clerks

The current storeroom supports all parts operations for the maintenance division with one person; the mechanics are responsible for logging parts used and researching parts when needed. The addition of one or two parts clerks would ease the burden on the current parts manager and aid

Town of Chapel Hill – Transit Maintenance Staff Analysis

the mechanics in parts issuing and research during peak times such as late afternoons and early evenings during peak maintenance work efforts.

Bus Zone Maintenance Worker

A maintenance worker position is required to clean and maintain all the bus stop zones throughout the Chapel Hill, Carrboro, and UNC communities. This would include replacement and or repair of damaged bus benches and maintenance and cleaning of bus shelters. This maintenance worker could additionally be utilized for facility maintenance efforts such as bus wash maintenance, cleaning, and lubrication of shop equipment, ect.

Vehicle Maintenance / Cleaning Staff

The manpower estimation is based upon the Transit Research Board – Report 10 Public Transit Bus Maintenance Manpower Planning. The manpower plan is a tool to determine if; (one) current staffing level are adequate to maintain the fleet, (two) provide recommendations for appropriate staff levels, and (three) used to provide a forecast for additional staff when fleet expansion occurs.

This plan utilizes specific information on the current fleet size, duty cycle and technical specifications and maintenance programs time standards, combined with industry averages for various tasks typically conducted in a transit fleet environment. Much of the task data was collected via on-site interviews with transit management staff responsible for fleet procurement and service planning, operations and maintenance.

As the fleet size and service hours have increased, the need for additional mechanics and hours of maintenance requirements has increased accordingly. The service has reached a level that maintenance staff should be available during non-revenue hours; i.e. late nights and weekends to conduct scheduled maintenance and cleaning functions. The service expansion has reached a need to for the maintenance operation to be on a 24 hour 7 day per week schedule.

Town of Chapel Hill – Transit Maintenance Staff Analysis

The plan calls for significant increases in fleet mechanic and cleaner staff. See attached model for detail.

Mechanics (I, II, III)

Five (5) additional positions are required for completing running repairs, campaign maintenance and unscheduled maintenance.

Bus Service Technicians

Two (2) additional positions are required for completing scheduled maintenance functions in accordance with manufactures recommended practices.

Service Attendants

One (1) additional service attendant position would be required to complete daily service needs.

Vehicle Detail Cleaners

This would be a new position for CHT and would require three (3) additional staff positions to complete detail cleaning of all interior and exterior of the vehicles. Detail cleaning would include gum removed, seat upholstery cleaned, all compartments cleaned out, ceilings cleaned, window frames cleaned, and rubber treated with armorall type protectant. This position is typically a position budgeted at a lesser rate than a Service Attendant.

Expansion Summary

The CHT commitment for expanded service and community support, will take a well-staffed and trained support group. Based upon the current service needs and future fleet requirements there are significant increases to maintenance staff required. This should help evenly distribute workload and lead to improved moral in addition to a better quality piece of equipment to support the communities transit needs.

If there requires priority to positions based upon immediate needs, it would be:

- Maintenance Manager
- Mechanics
- Bus Service Technicians

This would be followed by the creation of the

- Vehicle Detailers
- Parts Clerks
- Maintenance Workers

Town of Chapel Hill – Transit Maintenance Staff Analysis

The following table outlines the expansion of all positions with a complete staff total per the recommendations:

| Job Title | Current Budgeted | Expansion | Position Totals |
|----------------------------|------------------|-----------|-----------------|
| Maintenance Manager* | 0 | 1 | 1 |
| Maintenance Superintendent | 1 | 0 | 1 |
| Maintenance Supervisor | 2 | 2 | 4 |
| Mechanics (I, II, III) | 7 | 5** | 12 |
| Bus Service Tech | 1 | 2 | 3 |
| Mechanic Helper | 2** | 0 | 0 |
| Service Attendant | 5 | 1 | 6 |
| Vehicle Detailer* | 0 | 2 | 2 |
| Parts Manager | 1 | 0 | 1 |
| Parts Clerk* | 0 | 2 | 2 |
| Maintenance Worker* | 0 | 1 | 1 |
| Admin Clerk | 1 | 0 | 1 |
| Total Staff | 20 | 16 | 34 |

* New positions requiring development of job descriptions.

** The currently budgeted mechanic helper positions could be utilized to offset the expansion in the mechanic classification and reduce the total expansion number required to 3.

TRANSIT VEHICLE MAINTENANCE STAFFING FORMULA

Chapel Hill, NC

Entire Maintenance Staff Shown using 83 vehicles averaging 20500 Miles per year

The following staffing calculations are based on the Transportation Research Board's (TRB) Public Transit Bus Maintenance Manpower Planning - Report 10

GIVEN:

Fleet Size: 112 Total includes 83 Fixed route, 11EZ Rider vans, 4 Parking Services, 14 Support Vehicles)

Annual Miles 2,323,906

Peak Vehicle Requirement: 71 Fixed Route and EZ Ride

Accident Rate (per million miles): 4

Wheelchair Lift-Equipped Buses: 82 Fixe route and EZ Ride

On The Job Unavailable Time (hours per day per person): 0.83
Paid Coffee Breaks (minutes per day per person): 30
Clean-Up Time (minutes per shift per person): 20

Off The Job Unavailable Time (days per year per person): 30
Holidays (days per year per person): 11
Average Maintenance Vacation (days per year per person): 12
Absence/Sick Leave (days per year per person): 4 Sick Leave
Other Absences (days per year per person): 3 Personal Days / Emergency Leave

Percent Overtime: 7%

Hours Available/Person/Year: 2,080

Unavailable Time Expansion Factor:
[(8 hours)/(8 hours - on the job unavailable time in hours)]
x [(260 days)/(260 days - off the job unavailable time in days)] = 1.262

Adjustment Factor:

Unavailable Time Expansion Factor x (1 - overtime percentage) = 1.174

TRANSIT VEHICLE MAINTENANCE STAFFING FORMULA
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Inspection Program:

| <u>Inspection Type</u> | <u>Frequency (miles)</u> | <u>Job Time (hours)</u> | | <u>Adjustments</u> | <u>Total Hours</u> |
|------------------------|--------------------------|-------------------------|--|--------------------|--------------------|
| (A) | 6,000 | 7 | | | |
| (B) | 12,000 | 9 | | | |
| (C) | 24,000 | 12 | | | |

Inspection Hours Calculation:

| | | | | |
|-----|---|---------------|-----|-------------|
| (A) | 7 hours * (2,323,906 miles/ 6,000 miles) = | 2,711 hours x | 1 = | 2,711 hours |
| (B) | 9 hours * (2,323,906 miles/ 12,000 miles) = | 1,743 hours x | 1 = | 1,743 hours |
| (C) | 12 hours * (2,323,906 miles/ 24,000 miles) = | 1,162 hours x | 1 = | 1,162 hours |

| | |
|--------------------------------|--------------------|
| Total Inspection Hours: | 5,616 hours |
|--------------------------------|--------------------|

Body Hours

(Annual Miles/100,000) x (5.5 hours x accidents/million miles) = Body Hours

511 hours x 0.25 = 128 hours

| | |
|--------------------------|------------------|
| Total Body Hours: | 128 hours |
|--------------------------|------------------|

Engine/Fuel Hours

(Annual Miles/100,000) x (157 hours) = Engine/Fuel Hours

3,649 hours x 0.5 = 1,824 hours

| | |
|---------------------------------|--------------------|
| Total Engine/Fuel Hours: | 1,824 hours |
|---------------------------------|--------------------|

Braking System Hours

(Annual Miles/100,000) x (155.5 hours) = Braking System Hours

3,614 hours x 1 = 3,614 hours

| | |
|------------------------------------|--------------------|
| Total Braking System Hours: | 3,614 hours |
|------------------------------------|--------------------|

TRANSIT VEHICLE MAINTENANCE STAFFING FORMULA
Entire Maintenance Staff Shown using 83 vehicles averaging 20500 Miles per year

Chapel Hill, NC

Electrical Systems

(Annual Miles/100,000) x (148.5 hours) = Electrical System Hours

3,451 hours x 1 = 3,451 hours

Total Electrical System Hours: 3,451 hours

Air, Steering, and Suspension

(Annual Miles/100,000) x (90.5 hours) = Air, Steering, and Suspension Hours

2,103 hours x 1 = 2,103 hours

Total Air, Steering, and Suspension Hours: 2,103 hours

Air Conditioning and Heating

Hot and Humid: (Annual Miles/100,000) x (228.5 hours) = Air Conditioning and Heating Hours

Hot and Dry: (Annual Miles/100,000) x (83.5 hours) = Air Conditioning and Heating Hours

Cool and Mild: (Annual Miles/100,000) x (27 hours) = Air Conditioning and Heating Hours

Hot and Humid: 5,310 hours x 1 = 5,310 hours

Hot and Dry: 1,940 hours x 0 = 0 hours

Cool and Mild: 627 hours x 0 = 0 hours

Total Air Conditioning and Heating: 5,310 hours

Drivetrain

(Annual Miles/100,000) x (73 hours) = Drivetrain Hours

1,696 hours x 1 = 1,696 hours

Total Drivetrain Hours: 1,696 hours

TRANSIT VEHICLE MAINTENANCE STAFFING FORMULA
Entire Maintenance Staff Shown using 83 vehicles averaging 20500 Miles per year

Chapel Hill, NC

Cooling System

Hot Climate: (Annual Miles/100,000) x (65 hours) = Cooling System Hours
Moderate Climate: (Annual Miles/100,000) x (37 hours) = Cooling System Hours

Hot Climate: 1,511 hours x 1 = 1,511 hours
Moderate Climate: 860 hours x 0 = 0 hours

Total Cooling System Hours: 1,511 hours

Wheels and Tires

(Annual Miles/100,000) x (48.6 hours) = Wheels and Tires Hours

1,129 hours x 1 = 1,129 hours

Total Wheels and Tires Hours: 1,129 hours

Accessories

Fareboxes: Peak Vehicles x 4.5 hours = Farebox Hours
Destination Signs (Manual): Peak Vehicles x 7.5 hours = Destination Signs (Manual) Hours
Destination Signs (Electronic): Peak Vehicles x 5.5 hours = Destination Signs (Electronic) Hours
Wheelchair Lifts: Wheelchair Lift Equipped Vehicles x 10.5 hours = Wheelchair Lifts Hours

Fareboxes: 504 hours x 1 = 504 hours
Destination Signs (Manual): 533 hours x 0 = 0 hours
Destination Signs (Electronic): 391 hours x 1 = 391 hours
Wheelchair Lifts: 861 hours x 1 = 861 hours

Total Accessories Hours 1,756 hours

(13)

TRANSIT VEHICLE MAINTENANCE STAFFING FORMULA

Chapel Hill, NC

Entire Maintenance Staff Shown using 83 vehicles averaging 20500 Miles per year

SUMMARY FOR MECHANIC STAFF

| | |
|--|--------------|
| Subtotal Mechanic Staff Work Hour Requirements | 28,139 hours |
| Adjustment Factor | <u>1.174</u> |
| Total Staff Hours | 33,022 |
| Hours/Person/Year | 2,080 |

TOTAL MECHANIC STAFF (not including supervision or parts personnel) 16

VEHICLES PER MECHANIC STAFF 7.05



Peak Vehicles x 156 Hours/Vehicles = Servicing and Cleaning Hours
71 Peak Vehicles * 156 Hours/Vehicle = 11,076 hours x 1 = 11,076 hours

Total Servicing and Cleaning Hours: 11,076 hours

SUMMARY FOR SERVICING & CLEANING STAFF

| | |
|--|--------------|
| Subtotal Servicing and Cleaning Staff Work Hour Requirements | 11,076 |
| Adjustment Factor | <u>1.174</u> |
| Total Staff Hours | 12,998 |
| Hours/Person/Year | 2,080 |

TOTAL SERVICING AND CLEANING STAFF (not including supervision) 6

VEHICLES PER SERVICE & CLEANING STAFF 17.92

Vehicle Detail

Total Vehicles x 48 Hours/Vehicles = Vehicle Detail Hours
112 Fleet Vehicles* 48 Hours/Vehicle = 5376 hours x 1 = 5376 hours

Total Vehicle Detail Hours: 5376 hours

SUMMARY FOR VEHICLE DETAIL STAFF

| | |
|--|--------------|
| Subtotal Vehicle Detail Work Hour Requirements | 5,376 |
| Adjustment Factor | <u>1.174</u> |
| Total Staff Hours | 6,309 |
| Hours/Person/Year | 2,080 |

TOTAL SERVICING AND CLEANING STAFF (not including supervision) 3

VEHICLES PER VEHICLE DETAIL STAFF 37