PREFACE

FROM THE

NORTH CAROLINA STATE AUDITOR

This study of the State's psychiatric hospitals was mandated by the General Assembly in Section 12.35A of Chapter 213 of the 1998 Session Laws. The General Assembly outlined work to be performed in two broad phases: confirmation and update of previous work done by MGT of America, Inc. on the psychiatric hospitals, and examination and assessment of the overall mental health delivery system for the State.

The Office of the State Auditor was asked to oversee this important study by retaining and managing the work of an outside consultant. In late February 1999, we contracted with Public Consulting Group, Inc. (PCG) to perform this work. The interim report for Phase I was mandated to be submitted by May 1, 1999, with the final report due not later than December 1, 1999.

This report represents PCG's interim findings and conclusions relative to Phase 1, confirming and updating the previous study's recommendations for the State's psychiatric hospitals. While PCG was able to accomplish an amazing amount of work in a very short period, we should caution the reader that this report does not contain firm recommendations as to the number or type of beds needed, nor the proper location for the hospitals. Personnel from the Office of the State Auditor, the Department of Health and Human Services, and PCG agreed that to make such recommendations at this time would be premature.

PCG needs time to complete its examination and assessment of the overall mental health delivery system before it can address these fundamental questions. The proper role and use of the State's psychiatric hospitals will depend on the structure of the mental health delivery system. The hospitals are just one component of that system. Therefore, PCG has properly identified potential issues surrounding the hospitals that will need to be reexamined as work on Phase II proceeds. Our goal is to develop a blueprint for the delivery of mental health services in North Carolina. This report is the first step in that process.

Respectfully submitted,

Ralph Campbell, Jr.
State Auditor

April 30, 1999

(This page left blank intentionally.)

TABLE OF CONTENTS **Page**

EXECUTIVE SUMMARY

North Carolina's mental health services system is at a critical juncture. As its four state hospitals grow increasingly outdated and expensive to operate, best practices and nationwide trends argue for a more community based approach to caring for individuals with mental illness. The Division of Mental Health, Developmental Disabilities, and Substance Abuse Services (DMHDDSAS) recognized this in hiring MGT of America, Inc. (MGT) to conduct a hospital efficiency study, dated March 2, 1998. Pursuant to Section 12.35A of Chapter 213 of the 1998 Session Laws, the Office of the State Auditor hired Public Consulting Group, Inc. (PCG) in February 1999 to continue this analysis. Our contract is broken into two phases: in this Phase I interim report we analyze the capital needs of the current state hospital system, and the projected demand for beds both in terms of the number and service type. The final report will be complete December 1, 1999. During Phase II (April 1999 – March 2000), we will undertake a comprehensive assessment of community capacity. The two must be viewed together in order to provide the full assessment necessary to make decisions about major changes in the system.

This report on Phase I is limited to analyses of the following:

- Facility Construction and Renovation
- Community Services Options
- State Hospital Bed Demand
- Federal Disproportionate Share (DSH) Revenue Projections

This Phase I scope of work included the review and verification of associated recommendations presented in the MGT study of March 2, 1998. PCG has reviewed MGT's methodology and findings, and has collected new information on the topics above. We believe that that MGT did a thorough analysis of many key issues, but that the limited scope of their contract prevented a comprehensive review of these topics.

This report provides a more comprehensive review, which will be further developed in Phase II of our consultation. In short, we have concluded that state hospital patients would be best served through the construction of new state hospital facilities, rather than renovating existing hospitals. We believe that new construction, rather than renovation, is also the most cost efficient approach to updating facilities. Our projected costs for new construction are comprehensive, and are twice as high as those indicated in the MGT study.

In Phase I we do not attempt to recommend the ideal number or location of future state hospitals. This cannot be determined until the completion of our Phase II analysis on the capacity of communities to provide mental health services locally. We do, however, concur with MGT's findings that the State should consider moving individuals with substance abuse problems, and geriatric and youth populations into community based settings. We go further and suggest that adults with acute and long-term mental illness may also be moved out of state hospitals. The impact of these changes on state hospital bed demand is dependent on completion of our Phase II analysis.

The body of this report provides detail on PCG's approach and the following key findings:

I. FACILITY CONSTRUCTION AND RENOVATION

- Building new, efficient patient care facilities is likely to be more cost effective over time than renovating existing state hospital buildings. Broughton Hospital may be the exception, where extensive renovation may be more cost-effective. A hybrid option for patient residential ward areas that combines extensive renovation with adjacent new construction is a possible alternative to all new construction, but requires further study. All capital investment options rely on cost-effective reuse of existing buildings for certain non-residential patient programs, administrative office space and other support functions.

- PCG estimates the cost of new construction of state hospitals assuming current bed capacity to be $494 million. Assuming a reduced bed capacity consistent with recommendations in the MGT Report, the cost estimate is $297 million. If the State were to choose a renovation option instead, PCG estimates the costs to be $386 million at current capacity, and $246 million at reduced bed capacity.

- PCG's estimates of square footage construction costs and space per bed requirements are higher than MGT's. In addition, MGT did not fully capture the campus-wide cost of a) infrastructure repair and modernization, and b) renovation/reuse, decommissioning, mothballing, demolition, or disposition of surplus building capacity.

- New hospital construction should be completed in the context of a system-wide masterplan, once future demand for state hospital beds is determined.

II. COMMUNITY SERVICES OPTIONS

- It is clinically appropriate to pursue plans to move the majority of youth, geriatric, and substance abuse patients out of state institutions and into community settings, as MGT recommended. This approach is consistent with national trends and best practices.

- PCG believes that significant numbers of adult inpatient beds could also be moved to community settings. This option was not considered in the MGT report.

- A thorough analysis of community capacity to develop new services must be completed before recommendations for downsizing state hospital beds are developed.

III. BED DEMAND

- An analysis of North Carolina's hospital utilization trends, and experience in peer group states, strongly suggest that a significant reduction in state hospital beds could be responsibly undertaken for all populations served, once appropriate community resources and area program management structures are consistently in place.

- During the past ten years, North Carolina's four state hospitals have steadily declined in census by approximately 4% per year. During the same time period the number of admissions increased by 3% per year, almost twice the rate of growth of the State's population. The average length of stay has declined considerably at all state hospitals, allowing them to serve more patients.

- A review of state hospital use in a nine state peer group survey shows that North Carolina's utilization rate for adult beds is 20% higher than the peer group average. Five states in the survey have bed use rates substantially below North Carolina's, two are comparable and two are higher. North Carolina's admission rate is the second highest of the group, more than twice the average rate.

IV. FEDERAL DISPROPORTIONATE SHARE HOSPITAL (DSH) REVENUE PROJECTIONS

- Federal Disproportionate Share Hospital funds will not be sufficient to fund all new hospital construction in just three years, as projected by the MGT Report. PCG believes that MGT's DSH projections for 1999-2002 are underestimated. In 2002, the difference in our two projections is almost $19 million.

- DSH funds should not necessarily be relied upon for new hospital construction because a) they are subject to Congressional cuts, and as such are not reliable, and b) for the past several years North Carolina deposited DSH in the State's General Fund, using it for operating, not capital costs.

(This page left blank intentionally.)

SECTION I:

Facility Construction and Renovation

PUBLIC CONSULTING GROUP, INC.

(This page left blank intentionally.)

SECTION I. FACILITY CONSTRUCTION AND RENOVATION

OVERVIEW

North Carolina currently operates four multi-building state hospitals, serving over 2,200 clients. The hospitals were constructed between the 1850's (Dorothea Dix) and the 1940's (Umstead), and have been renovated to various degrees over the years. The only new hospital construction is the Barrett Building at Umstead, which is two years old. Each hospital serves a distinct catchment area:

- Broughton Hospital in Morganton serves the 35 counties in the Western Region.
- John Umstead Hospital in Butner serves the 16 counties in the North Central Region
- Dorothea Dix Hospital in Raleigh serves the 16 counties in the South Central Region
- Cherry Hospital in Goldsboro serves the 33 counties in the Eastern Region

Many of the hospital buildings are structurally sound, and in some cases historically significant. However, their layouts, featuring small and fragmented wards, result in inefficient staffing and generally provide sub-optimal residential and care settings for patients. Moreover, the vast majority of buildings have significant deficiencies in Americans With Disabilities Act (ADA) compliance, the Joint Commission on Accreditation of Healthcare Organizations (JCAHO) compliance, and other generally accepted life safety and clinical standards. Many buildings contain asbestos, and do not have updated utilities.

In this section of our report, PCG and Hoskins, Scott & Partners (architects), provide cost estimates for various alternatives for renovating or rebuilding North Carolina's state hospitals. Throughout, we make reference to earlier construction cost estimates developed in the previous report on the same topic by MGT of America, Inc.[1] As part of their analysis, MGT projected that 949 patients could be moved to community-based settings, and that the state hospitals could be downsized accordingly. As a point of reference, PCG uses MGT's downsizing estimates in the "Reduced Bed Capacity" estimates in this Section. In Sections 2 and 3 of our Report, PCG analyzes the potential scope of movement of populations out of the state hospitals. However, as we make clear throughout this Report, we cannot project final numbers of individuals to be moved out of state hospitals until we explore the capacity of community programs to provide necessary services. This analysis will not be completed until Phase II of our engagement, which extends from April 1999 to March 2000.

Methodology: PCG's analysis included on-site reviews at each of the four hospitals; interviews with administrators, physical plant, and direct care staff; review of relevant site and building plans; review of updated summaries of facility-generated repairs and capital improvements (funded and

[1] Efficiency Study of the State Psychiatric Hospitals, Interim Report. MGT of America, March 2, 1998.
As a point of reference, MGT recommended that North Carolina construct new inpatient/direct care buildings at all four hospitals, retaining the Barrett Building at Umstead. Their projected new construction cost was $154 million (Reduced Beds Option) and $252 million (Current Beds Option). They further suggested that the State retain, repair and improve sufficient buildings and infrastructure at each campus to support hospital functions. The first ten years of maintenance, repair and capital replacement costs vary from $25 million (New Construction, Reduced Beds Option) to $200 million (All Renovation, Current Beds Option). MGT also recommended decommissioning certain existing, outdated buildings.

proposed); review of scope and budget for capital projects funded and/or underway; review of the MGT report and a conference call with key personnel from MGT and O'Brien/Atkins Architects. Our estimates of capital costs were developed as follows:

- Preliminary repair, capital improvement and modernization costs for existing buildings and systems were developed using a square foot or systems-based cost analysis. The data were adjusted based on recent projects and facility and agency-reported data. This cost methodology is an alternative to the MGT's exclusive use of facility and agency-reported data, and was performed to provide an informative comparison to MGT's analysis.
- Preliminary cost estimates for new construction were generated utilizing the same methodology as MGT (cost/square foot and square foot/bed estimates) incorporating updated assumptions.
- Our estimates include ancillary costs associated with the renovations, such as demolishing and otherwise disposing of unusable buildings.

FINDINGS

All findings reference construction and renovation options that are summarized in the Cost Overview section on Pages 12 and 13. Detailed spreadsheets for each hospital are provided in Appendix A.

1. ***PCG concurs with MGT that building new, efficient patient care facilities (New Construction Option) is likely to be more cost effective over time than renovating existing state hospital buildings (Renovation Option). Broughton Hospital may be the exception, where extensive renovation may be more cost-effective. At all four hospitals, continued minor and incremental renovation of patient areas is not recommended as an alternative to extensive capital investment.***

- Despite their age, many existing patient buildings have been or are capable of being renovated to meet basic life-safety and other modern codes. However, even extensive renovation of these buildings will not correct certain significant design problems that affect patient and staff safety, staffing efficiency, and other operational cost efficiencies.[2] Examples:

    - poorly-shaped ward-layouts and ward sizes prevent optimal supervision of patients by direct care staff,

[2] Dix and other hospitals have performed recent renovation projects that provide excellent examples of renovation cost-benefit. The following comparison is based on recent renovation experience (1997-98):

What $95/square feet renovation buys on a typical patient ward
Minimum compliance with life safety code, including fire alarms, fire dampers, other safety code items.
Partial sprinklers (maybe).
Partial ventilation and duct work to improve ventilation.
Minor retrofit of existing off-corridor gang bathrooms to approach HP access (shower floors, HP stall, privacy doors).
Selected new doors, paint, non-secure dropped ceilings, non-secure surface lighting.

What $95/square feet renovation does not buy
Required re-formatting of patient bedrooms from 4-beds to 2-beds.
Required off-bedroom access to HP accessible toilet.
Relocation of nursing station to provide better visual access to ward.
Full sprinkler, fire and smoke safety features.
Adequate heating/air conditioning and fresh air volumes.
Full asbestos removal.
Secure ceilings and lighting.
Wear-resistant and secure finishes and new hardware.
New thermally-efficient windows.
Refurbished elevators and secure access to off-ward activity areas.
ADA Compliance

- patients have little or no direct access to off-unit program areas, secure outdoor recreation areas, visitor reception and other active treatment amenities,
- vertical and horizontal circulation are unacceptable, compromising security and creating long travel distances for essential daily trips.

- A combination of newly-constructed patient care buildings and utilization of selected existing buildings, where possible, is recommended. PCG concurs with MGT that many existing buildings are suitable for use for non-residential patient programming, office space, and other support functions.

2. ***PCG estimates the cost of all New Construction of state hospitals with current bed capacity to be $494 million. Assuming a reduced bed capacity consistent with recommendations in the MGT Report, the cost estimate is $297 million. If the State were to choose the Renovation Option instead, PCG estimates the costs to be $386 million at current capacity, and $246 million at reduced bed capacity.*** PCG's cost estimates are higher than MGT's (see Footnote 1) due to a number of factors:

- *PCG estimates New Construction costs for patient care buildings at $225 per square foot. MGT appears to have estimated costs at $180 per square foot (1998 dollars).* While their estimate is not inappropriate, PCG believes that it is on the lower end of an acceptable range. All budget estimates should be revised after a detailed feasibility study or preliminary design stage – closer to the actual date of construction. Actual estimates for the same projects are very sensitive to geographic location and will vary from campus to campus.

- *The MGT study did not fully capture the campus-wide cost of a) infrastructure repair and modernization, and b) renovation/reuse, decommissioning, mothballing, demolition, or disposition of surplus building capacity.* This adds considerable costs to all options. *(See Finding 4 for more detail).*

- *PCG used larger space-per-bed standards than MGT.* PCG's options assume 650 square feet per inpatient bed for residential wards and closely-related space. An additional 400 square feet per bed is estimated for administration and support, not necessarily within inpatient buildings, for a facility-wide total of 1,050 square feet/bed overall. MGT's size standard for new patient care buildings is 600 – 700 square feet per patient bed. This adequately accommodates patient care space, but does not accommodate the bulk of administrative space, major activity areas, rehabilitation, and other support services, large cafeteria, gymnasium, central kitchen, laundry, materials management, central pharmacy and other campus-wide infrastructure. Typical space ratios for multi-building public sector hospital campuses may average 1000 to 1200 square feet per bed or higher, including all related support and administrative space.

    - With this in mind, it is appropriate that PCG's New Construction Options carry significant budget items for repair and retrofit of existing buildings for the above ancillary, non-residential uses. Our New Construction Option, then, is actually new construction + selective reuse of existing buildings. For example, the New Construction Option for Cherry Hospital, in which a new inpatient residential building is constructed at 650 square feet per bed, must also include reuse of existing buildings representing over 300-400 square feet per patient bed. Under this option, buildings to be used for administration and support space (and decommissioned for inpatient use) may include Royster, Woodard and others; hence, cost estimates for baseline repair and re-fit of these buildings must be included in the New Construction Option cost estimate.

3. ***A Renovation-New Construction "Hybrid" Option may be a possible alternative to the All-Renovation and New Construction Options, but needs further detailed study.***

- Building small new additions for residential use to existing older buildings, combined with "gut" renovation of these older buildings for day program and office space may be a viable alternative for creating higher quality patient care space at certain hospitals. These new additions could "in-fill" in the courtyards between existing buildings, providing a more efficient design layout than straight renovation, but probably not as efficient as all new construction. This option is probably most feasible at Cherry Hospital (in-fill within the courtyards of the "U" buildings) and at Umstead Hospital (in-fill between the various "barracks" ward buildings).

- The feasibility and cost benefit of this option requires extensive further study. Significant cost savings are not likely. The chief advantages of this option over all new construction may be the ability to better utilize any past infrastructure upgrades (recently-upgraded chillers, power plant, laundry, etc.) and to minimize the increase of overall campus building volume.

4. Under all capital investment scenarios, the campus-wide cost of a) infrastructure repair and modernization and b) renovation/reuse, decommissioning, mothballing, demolition, or disposition of surplus building capacity requires further detailed study.

- Under all capital investment scenarios (All-Renovation, New Construction or Hybrid), there are two additional areas of significant capital costs inherent to maintaining very large, aging and out-moded campuses:

    - Maintaining/replacing aging campus-wide infrastructure and systems, and
    - Stabilizing the large volume of "extra" square footage on campus that is not needed for efficient hospital operations.

- The MGT report reflects agency-reported repair and capital replacement costs. The source of this information is accurate but may be incomplete. Also, demolition and mothballing costs are not included. Further discussion follows below.

4a. Campus-wide Infrastructure Modernization and Repair

- Each of the four state hospitals has a significant volume of real estate (200-300+ acres, 60-100+ buildings, 800,000 to 1 million square feet of building space).

- Despite substantial capital investment over the years, repairs have not kept up with the deterioration of these extensive real estate assets. Typical infrastructure and systems liabilities include:
    - replacement of 30+ year-old heating plants, cooling plants, utility distribution lines, energy management controls, ventilation systems, inefficient windows and doors,
    - removal of asbestos and other environmental hazards,
    - ADA compliance for interiors and site,
    - sprinklers, life safety, other code improvements,
    - numerous roof replacement, building envelope repairs, elevator refurbishment,
    - parking and road repairs.

    Despite constant and valiant repair and modernization efforts, these problems have only been partially addressed.

- To capture the cost of necessary repairs and improvements, the MGT study relied on several sources: statewide facility inspections (FCAPs), facility-generated repair/improvement requests (OC-25s), and the agency six-year capital investment plan.

- These sources are generally reliable but probably do not capture the entire horizon of deferred maintenance, environmental, and code compliance liability. This is because of the priority-based nature of these documents: due to limited funding only highest priority items were documented, and important but lower-priority items were often omitted. (Source: interviews with facility based personnel).

- Items labeled "Maintenance, Repair and Renovation" and "Capital Replacement" were included in the analysis of the 10-year estimated cost of operations. For the reasons stated above, these costs probably do not capture full infrastructure and systems needs.

- PCG's preliminary analysis of infrastructure costs is presented in the Capital Cost Estimates section.

4b. Stabilization of Surplus Volume: Renovation, Mothballing, Demolition or Disposition.

- Generally speaking, each hospital has significantly more square footage of building space than it actually needs (albeit space that is poorly suited to hospital uses).

- Most campuses have buildings that are abandoned and in need of immediate demolition, buildings that are only partially unoccupied, and buildings that have been turned over to other public sector tenants.

- Cost estimates for a 30-year capital investment in any of the hospital campuses should include costs for stabilizing this surplus space, including repair and renovation which allows leasing, mothballing, and demolition.

- The New Construction Option in particular actually adds square footage to campuses that are already over-sized, exacerbating the problem.

- The MGT cost-benefit analysis assumed decommissioning certain buildings at each campus, but did not include demolition or mothball costs.

The following are PCG's preliminary cost estimates for accommodating all patient care in a safe, code-compliant, therapeutic hospital environment. As is common with public development projects, a thirty-year investment horizon is assumed. Two bed-capacity scenarios are presented. These are identical to MGT's assumptions in order to allow comparison between MGT and PCG findings. PCG's cost estimates are generally higher than MGT's due to a number of factors, including use of a larger space-per-bed standard and incorporation of a broader scope of renovation, demolition, mothballing and infrastructure replacement. (The detailed analysis that created these cost estimates are found in Attachment A).

Reduced Bed Capacity
Concept level costs (1999 dollars in millions)

	Bed Capacity	Renovation (A.1)	New Construction (B.1)	Hybrid (C.1)
Dix	247	55.8	69.2	Not applicable.
Broughton	423	90.4	103.2	Not applicable.
Umstead	256	44.4	50.3	48.8
Cherry	361	55.5	73.8	65.4
Totals	**1287**	**$246.1**	**$296.5**	

Current Bed Capacity
Concept level costs (1999 dollars in millions)

	Bed Capacity	Renovation (A.2)	New Construction (B.2)	Hybrid (C.2)
Dix	429	$85.5	$106.1	Not applicable.
Broughton	632	125.4	145.6	Not applicable.
Umstead	513	85.8	106.0	94.2
Cherry	661	89.3	136.5	105.1
Totals	**2235**	**$386.0**	**$494.2**	

Key Assumptions:

- All options assume 650 square feet per inpatient bed for residential wards and closely-related space. An additional 400 square feet per bed is estimated for administration and support, not necessarily within inpatient building, for a facility-wide total of 1,050 square feet/bed overall.

- To maximize investment value, New Construction Option always includes reuse of certain existing campus buildings for administration, support or non-residential program space, as well as reuse of certain infrastructure features wherever possible.

- Hybrid Option C assumes reuse of certain older inpatient buildings for future inpatient use, providing that these buildings are fully renovated and that new, attached "in-fill" construction provides an opportunity for new and more-efficient ward designs.

- Construction costs are generally estimated using the square foot cost method. Various dollar-per-square foot costs are used for different types of buildings and different levels of build-out or renovation. These assumptions are then adjusted up or down based on actual conditions at each campus. Our basic (non-adjusted) assumptions are as follows:

$225/sf	New construction of inpatient care buildings
$180/sf	Total renovation existing patient care building
$100/sf	Major renovation
$65/sf	Minor renovation II
$25/sf	Minor renovation I
$3.50/sf	Demolition exclusive of asbestos and other hazards.
Varies	Mothballing
Itemized	Major infrastructure improvements (e.g., replace power plant, chillers) and environmental compliance (e.g. asbestos removal)

- An effort was made at each campus to follow a logical investment scenario for the campus as a whole. For example, buildings slated to receive investment are generally clustered together and designed to utilize recent infrastructure investments.

- Buildings not utilized are assumed to require demolition, renovation for other use, or some level of mothballing.

- All costs are estimated assuming a 30-year horizon of investment.

- All costs are preliminary only. At the appropriate time, campus masterplans should be developed for each hospital. Masterplans should be followed-up by preliminary design and more detailed cost estimates for individual projects.

- Cost estimates utilized by MGT and PCG are ***Estimated Construction Cost***, which reflects actual construction and related site work, but does not include such necessary items as design, advertising, owner's project supervision, security, relocation, furnishings, major movable equipment, etc. These estimates need to be increased to reflect ***Total Project Cost*** utilizing appropriate multipliers commonly used for public construction projects in North Carolina.

CONCLUSIONS

Capital Planning and Investment

- Once bed volumes are established for each campus, **the State of North Carolina should initiate long-range campus investment strategies or masterplans for each campus.** These strategies should set priorities for investment, repair and replacement, define locations for new construction, identify buildings for surplus or demolition, and establish an overall budget and timetable for implementation. Other goals include: identify total infrastructure upgrade budgets for each campus in conjunction with FCAP and OC-25 process; prioritize energy improvements that have speedy "payback" periods; evaluate possibility of downsizing individual campuses. Plans may include selective demolition, disposition of surplus underutilized assets, transfer of assets to other governmental or quasi-public agencies.

  The need for an overall strategy for capital investment affects the on-going design work for a new hospital building at Dorothea Dix. The bed configuration at Dorothea Dix should not be finalized

until PCG finishes its Phase II analysis of Community Service Options and develops bed demand projections for both the number of beds and types of units needed in that region.

The historic significance of the Broughton, Cherry, and Dix campuses is likely to play an important role in planning for the renovation and/or reuse of these hospitals. Historic preservation guidelines will limit changes to building exteriors and may restrict demolition. These factors must be taken into account in the master planning for these campuses.

- **Construct new inpatient/direct care buildings and/or conduct extensive renovations to accommodate bed need.** Requires detailed evaluation of Hybrid Option as an alternative to all new construction. PCG's preliminary cost estimates for new construction are included herein. Preliminary design for each project will help define more specific costs.

- Provide sufficient dollars for **renovation of those existing buildings which, along with new construction, are required to accommodate hospital operations**. PCG's preliminary cost estimates for renovation are included herein. Further detailed study is needed.

- Provide sufficient dollars for **modernization and repair of infrastructure** required to support campus operations for a 10-30-year horizon. PCG's preliminary cost estimates for renovation are included herein. Further detailed study is needed.

- Provide sufficient dollars for **renovation/reuse, decommissioning, mothballing, demolition, or disposition of surplus building capacity.** PCG's very rough and preliminary cost estimates for these are included herein. These cost estimates should be a product of the facility masterplan.

Real Estate Asset Management and Operations

The following options are aimed at lowering overall state operating costs by coordinating the operations needs of state agencies with the portfolio of existing capital assets.

- Initiate an **interagency campus planning effort** to coordinate the real estate needs of human services, criminal justice, educational, environmental and other agencies. The state hospital campuses are significant real estate assets whose surplus capacity may provide opportunities for expansion, re-use or consolidation with other state agencies.

- Initiate an **interagency operations planning effort** with the goal of evaluating possible opportunities for cost-effective consolidation of core services operations. For example, shared laundry has been tried and is currently successful. Other possibilities include: food service via cook-chill (some attempts with mixed success), energy generation, and pharmacy. This effort should be linked to campus investment plans, providing a rational, economics-driven framework for capital investment. (Note: Interagency efforts typically require a significant leadership role by central finance authorities to ensure success of the effort.)

- Establish consistent practices for charging tenant agencies the **actual cost of space leased** at state hospitals.

- Create **incentives** for campus facility managers to implement energy savings and revenue-generating capital improvements by allowing campuses to retain savings and revenue (after deduction of capital investment costs). Encourage downsizing of space, which results in reduced carrying costs by providing dollars for mothballing and demolition.

- Consider establishing a **Mental Health Land Trust** for the income derived from commercial uses of state hospital properties, e.g. Dix. The Land Trust would be empowered to make prudent investment decisions from which income could be used for developing the growth of community mental health services. A model for this vehicle exists in the Alaskan mental health system.

Facility Design

- Where New Construction is planned, create a single **design standard** for new construction across multiple hospitals. In the event that new patient care buildings are built at multiple sites, there is a considerable opportunity to set a "Best Practice" standard across all projects. This is not necessarily a design prototype or "cookie-cutter" approach but a set of standard specifications and design criteria.

- Create a **design advisory team** consisting of individuals from all affected campuses. Include clinical/nursing, operations and engineering staff.

- Conduct a **Post-Occupancy Evaluation of the Barrett Building** at Umstead, soliciting the experience of nursing, operations and engineering staff and their opinions about what works and what doesn't work at the State's newest inpatient building.

(This page left blank intentionally.)

CAMPUS-BY-CAMPUS FINDINGS

(This page left blank intentionally.)

Umstead Hospital Snapshot

- Former US Military hospital (c. 1940's) with barracks-type open wards linked by a continuous corridor system.
- 200-acre campus, 72 buildings, 900,000+ square feet of building capacity.
- Buildings underwent structural renovations (1948-1970) to replace wood interior structures with steel, concrete, terrazzo floors, aluminum single-pane windows.
- Wards have since been non-uniformly subdivided.
- Overall, space is fragmented. Ward sizes too small and isolated.
- Extremely poor ward layout results in inefficient staffing and multiple safety issues.
- Minimal life safety code met as a result of recent improvements.
- Serious emergency evacuation issues throughout.
- Rapid deterioration of buildings continues despite ongoing repairs, although base building structures are generally sound.
- Asbestos widespread in interiors (ceilings) and utility lines.
- High level of non-compliance with ADA and many JCAHO standards, including patient room occupancy, toilet locations.
- Boilers, chillers, utility distribution, controls need replacement. These items have excellent payback periods (less than five years).

Barrett Building:

- Two-year old patient care building (Admissions Unit; approximately 150 beds).
- Excellent design and layout overall. Efficient staffing.
- Numerous small deficiencies such as durability of finishes and layout of admissions area.
- One- and two-patient bedrooms. Code-compliant bathrooms.

PCG Findings: Umstead

- PCG concurs with the following findings by MGT: Except for the Barrett, buildings are outdated and cannot provide efficient patient care. Barrett is generally the model of what an adult psychiatric ward configuration should look like. Although renovation is a constant activity, it does not result in older units being more efficient. In addition, we emphasize the following:

- Very large overall building capacity, more than required by hospital operations. Some space now leased out.

- Significantly underutilized real estate asset.

- Barrett Building

  Finishes at Barrett are commercial grade and not generally durable enough to withstand the wear-and-tear common to a psychiatric inpatient setting. Examples are non-reinforced drywall, suspended ceiling tile, vinyl-applied baseboard, non-ceramic shower stalls. These are not items which *must* be replaced, but a higher level of ongoing repair and replacement must be expected if these items are not corrected.

  Staff feels that there is insufficient space for conferences, storage, and housekeeping supplies.

Emergency admissions area not designed adequately for a high level of security and visibility, and the wear-and-tear typically required for high-management patients.

PCG Conclusions: Umstead

- **PCG agrees with MGT that incremental renovation of existing older buildings for patient care uses at Umstead is not recommended. New Construction is the preferred option, along with maintenance of Barrett and extensive repair and modernization of infrastructure.**

- **The Renovation-New Construction Hybrid Option may be possible at Umstead: needs further study.** Building small new additions to existing older buildings, combined with gut renovation of existing buildings may be a viable alternative here. These new additions could "infill" in the courtyards between existing buildings, provide a more efficient (but probably not optimal) design layout. The cost-benefit of this option requires further study.

- **The Barrett Building is generally well-designed, but the building requires additional investment to correct certain deficiencies in the quality of interior finishes and security features. These improvements are essential to protecting the long-term value of this capital asset**. The State should conduct a post-occupancy evaluation of the building. This evaluation should produce a scope of work and detailed cost estimate for correcting certain deficiencies including interior finishes and hardware in the inpatient units and bathrooms, and security and layout problems in the emergency intake/admissions area.

- **Umstead's extensive underutilized real estate calls for additional tenants or immediate downsizing.** Umstead's large capacity of space suitable for renovation to office or light industrial standards may be an asset for other public or private tenants. This is a significantly underutilized real estate asset that could benefit from a regional analysis of potential public or private tenants.

- **Selective demolition may lower ongoing carrying costs.** If no reuse by public or private tenants is possible, the State should consider selective demolition to lower carrying and operating costs.

- **Close proximity of other state and federal institutions warrants a regional interagency planning effort focused on possible joint real estate uses and combined facility operations (for example, regional food service).**

Cherry Hospital Snapshot

- Founded in 1880's as hospital for African-Americans. Segregated until 1965.
- 344-acre campus, 800,000+ square feet of building capacity, compact multi-building cluster, bisected by major street.
- Newer patient buildings date to 1939 (Woodard, U1, U4), 1951 (U2-U3), 1962 (Royster, McFarland).
- U Buildings, although not identical, share poor ward layouts. This results in inefficient staffing and multiple safety issues. Royster pinwheel format, poorly designed but slightly less problematic.
- Minimal life safety code met as a result of recent improvements. $13 million invested across many buildings covered core fire alarm, smoke dampers, smoke penetration, one hour fire ratings. Did not cover sprinklers, adequate ventilation, baths, room size, etc.
- Ward renovations included dropped ceiling to conceal utilities: creates security and safety problems.
- Serious emergency evacuation issues throughout.
- Rapid deterioration of buildings continues despite ongoing repairs, although base building structures are generally sound. High quality terrazzo floors in many locations.
- Asbestos mostly in utility lines.
- High level of non-compliance with ADA and many JCAHO standards, including patient room occupancy, toilet locations.
- Patient buildings extremely clean and well-maintained despite poor design and wear-and-tear problems.
- Distant youth facility planned to be relocated closer to core campus.
- Numerous large masonry buildings in need of immediate demolition.
- Boilers rebuilt in 1988. New chillers very recently installed and/or underway (Spring 1999, supports seven buildings).
- Cherry provides high temperature hot water to O'Berry Center.
- Utility distribution, controls need replacement.
- O'Berry Center and correctional facility are adjacent and form mega-campus.

PCG Findings: Cherry

- PCG concurs with the following findings by MGT: Cherry's patient care buildings are outdated and cannot provide efficient patient care. Due to physical configuration of patient care buildings, the number of direct care staff cannot be reduced. Elevators throughout are too few, too small and too slow. Patients who live in U buildings are prohibited normal patterns of living in several areas. Nurses' stations are enclosed, too small, and do not allow observation of the wards. In addition, we emphasize the following:

- Cherry's recent investment in its Power Plant (1988), chillers (1999), and reasonably newer buildings (1962) make this hospital an excellent candidate for integrating new construction of inpatient buildings with reuse of existing buildings and infrastructure.

PCG Conclusions: Cherry

- **Cherry's recent infrastructure improvements (power plant, chillers) and relatively newer buildings makes it an excellent candidate for continued public investment.**

- **PCG agrees with MGT that incremental renovation of existing older buildings for patient care uses at Cherry is not recommended. New Construction is the preferred option, along with extensive repair and modernization of infrastructure.**

- **Renovation-New Construction Hybrid Option may be possible at Cherry: needs further study.** In-fill of the courtyards in selected existing U-buildings, coupled with gut renovation, may provide a more cost-effective alternative to all-new construction. The cost benefit of this option requires further study.

- **Selective demolition may lower ongoing carrying costs. Some demolition is needed ASAP to avoid vandalism, fire, collapse.**

- **Close proximity of other human services and correctional institutions warrants a regional interagency planning effort focused on possible joint real estate uses and combined facility operations. For example:**

    - Cherry's food service facility renovation was originally intended to provide meals for other state users, but was discontinued. A re-evaluation of this is recommended.

    - Cherry's laundry now provides outside services, but still appears to be working at only a fraction of total capacity.

    - Possible reuse of U buildings for office or non-residential program space if these buildings are not renovated for inpatient beds.

Dorothea Dix Hospital Snapshot

- Founded in 1856, extensively added-to and rebuilt over 125 years.
- 350-400-acre downtown campus, 1.2 million square feet of building capacity across 137 buildings, with many buildings in central hilltop cluster.
- Substantial volume of space (multiple buildings) used by DHHS and other state agencies.
- Core patient complex (McBryde 1920's and 1950's) consists of a dozen linked buildings.
- Ward renovations included hard-walled dropped ceiling to conceal utilities.
- High level of non-compliance with ADA and many JCAHO standards, including patient room occupancy, toilet locations.
- Serious emergency evacuation issues throughout.
- Rapid deterioration of buildings continues despite ongoing repairs.
- Only a fraction of inpatient units (McBryde North) have been substantially renovated, including all applicable safety codes, certain ADA work in bathrooms, fully addressable fire alarm system, supply and return air in each room, sprinklers, emergency generator and fire pump, and new energy management controls. These renovations have not addressed patient room size (3-4 beds), bathroom location, ward layout, windows, elevators and other important issues.
- Geriatric patients are located in buildings that do not have lavatories in patient bedrooms, bathrooms are located on corridors, and bedrooms lack call buttons and other amenities.
- Forensic patients (pre-trial and adjudicated) and youth housed in very inadequate buildings (Spruill, Williams) without elevator and HP access, and only minimal code compliance.
- Only small portion of buildings, including most high-rise portions of McBryde, have sprinklers.
- Extensive asbestos throughout, especially in utility lines.
- Numerous large masonry buildings in need of immediate demolition.
- Boilers and chillers old and in need of modernization.
- Utility distribution, controls need replacement.

PCG Findings: Dix

- PCG concurs with the following findings by MGT: The patient care buildings are out-dated and cannot provide efficient patient care for another 30 years. Due to physical configuration of patient care buildings, space, not patient acuity, drives staffing, and the number of direct care staff cannot be reduced. Horizontal and vertical circulation is extremely poor. Very long corridors require smoke partitions that create security problems. Elevators are too few and not well located. Physical deterioration of building envelopes and mechanical systems requires substantial effort to maintain. Ward configurations and circulation problems prevent patients from normal patterns of living in several areas, especially outdoor recreation and family visiting. Nurses' stations are typically enclosed, too small, and do not allow observation of the wards. In addition, we emphasize the following:

    - McBryde and other 20th century buildings on campus are capable of renovation for office and program space. Many buildings have already been converted, and extensive renovation of McBryde wings for office uses is currently underway (Spring 1999).

    - Fire safety, patient evacuation and extreme building deterioration are critical issues which need addressing immediately in many campus buildings. For example, during the PCG site visit, a 12 X 12 foot roof section of an occupied, low-rise maintenance shop collapsed and crashed to the floor below.

PCG Conclusions: Dix

- **PCG agrees with MGT that incremental renovation of existing older buildings for patient care uses is not recommended. New Construction is the preferred option.**
  Dix's high infrastructure repair and modernization cost and difficulty in integrating new patient-care construction within the hilltop complex suggest off-hill location of new patient care buildings. Stand-alone power and utilities vs. hook-up to existing should be evaluated. Existing campus buildings (to be renovated) could be incorporated into the new patient-care complex**.**

- **The New Construction Option is bolstered by likelihood of finding acceptable new uses for hilltop complex.** Unlike the other hospitals, Dix's prime location provides many opportunities for non-residential reuse of existing buildings. Moderate renovations, including windows, sprinklers and elevators could accommodate additional public or private-sector office space or educational uses, among others.

- **The Renovation-New Construction Hybrid Option is not promising here, due to the height, density and large size of the McBryde complex.**

- **Selective demolition may lower ongoing carrying costs. Some demolition is needed ASAP.**

- **Close proximity to the downtown, excellent transportation routes, NC State University, research and development, and other institutions warrants continued extensive campus-wide reuse planning and evaluation of combined facility operations (e.g. food service).**

- **A campus-wide master plan process should continue to focus on at least three important issues:**
  - an on-campus location for the new patient care facility which allows for growth and flexibility,
  - the financial feasibility for economic reuse of core campus buildings (e.g., for non-hospital uses), and
  - the scope and dramatic cost for repair, modernization, environmental remediation and demolition of aging campus infrastructure, and identification of the proper source of funding for this endeavor.

Broughton Hospital Snapshot

- Founded in 1882, extensively added-to and rebuilt over 100 years. On average, contains the oldest operating buildings in the state system.
- 300-acre campus, 1.1 million square feet of building capacity across 104 buildings, with majority of buildings in several multi-building clusters arranged around the original asylum building (Center/Avery Building).
- Avery (1882) is one of the oldest buildings in state system still used for inpatient care. Although fully renovated decades ago to replace wood interior structures with fire-retardant steel and concrete floors and supports, this renovation pre-dated modern life safety and patient care codes.
- The newest inpatient care buildings on campus (Jones, Taylor) date to the 1950's.
- Rapid deterioration of buildings continues despite ongoing repairs.
- Renovations have also been continuous, including recent projects in the 1970's, 1980's and 1990's. These have mostly focused on safety and air conditioning. Despite this work, only a fraction of inpatient units have been renovated to include fire sprinklers (for example, parts of Avery and Harper are sprinklered). Jones and Avery Buildings have addressable fire alarm systems, installed in the 1990's. Most other buildings have older zoned systems. Emergency generation is spotty or nonexistent.
- These renovations have not addressed patient room size (3-4 beds), bathroom location, ward layout, windows, elevators and other important issues. A high level of non-compliance with ADA and many JCAHO standards remains.
- Asbestos is present in flooring materials (VAT) and throughout those utility lines that have not been recently repaired.

PCG Findings: Broughton

- Despite the Avery complex's age and code-compliance shortcomings, the building is in overall good condition and contains certain design features which are valuable for quality patient care, such as large amounts natural light and generally spacious ward areas. We believe that extensive renovation of Avery and certain older buildings on the campus may be a preferable alternative to the New Construction Option.

- The historic 19th century Avery complex[3] and most other 20th century buildings on campus are also capable of renovation for program and office space for both hospital, governmental and non-governmental uses.

- Fire safety, patient evacuation and building deterioration are critical issues which need to be addressed on an interim basis until funds for major renovation are provided.

- PCG agrees with MGT findings that extensive repair and replacement of campus utilities and aging infrastructure is required as soon as possible.

[3] The Center Building is similar in age and design to dozens of original asylum buildings around the eastern United States and Great Britain. The design is roughly based on an "Asylum Design" textbook promulgated by British physician Thomas Kirkbride in the 1870's. Although majestic in character on the exterior, the interior format of these buildings is difficult to convert to hotel, educational, light industrial or retail space. Several examples of conversion to office space can be found. Many of these buildings around the U.S. have been abandoned by mental health agencies and are still vacant, partially destroyed by fire, and/or currently deteriorating.

PCG Conclusions: Broughton

- **PCG believes that extensive renovation of portions of the historic Avery complex and certain early 20th century buildings may be the most cost-effective alternative for accommodating patient care.** The feasibility of the Renovation Option over the New Construction Option must be explored by a detailed analysis of whether ward units can be redesigned to accommodate modern codes, patient privacy and staffing economies.

- **Although the Renovation Option appears preferable, certain patient care activities may not be optimally accommodated through renovation of older buildings.** In particular, PCG believes that the complex security needs of the emergency intake and forensic inpatient functions may be better served through addition of new structures placed adjacent to existing patient care buildings.

- **The Hybrid Option is probably not promising at Broughton, with the exception of the new high security structures mentioned above and other minor new additions to existing buildings** (elevator towers, outdoor recreation yards, etc.).

- **Selective demolition may lower ongoing carrying costs.**

- **If New Construction is selected over the Renovation Option, economic reuse of the existing historic complex must be considered.** Historic preservation restrictions will likely prevent demolition and allow only few changes to building exteriors. Due to local economic conditions, the demand for this type of space by potential non-hospital tenants is probably not high, thus creating a challenge for the reuse of any such space that is or may become surplus to hospital operations. Under a New Construction scenario, if no reuse of the older buildings is immediately possible, the State will encounter extensive long-term holding costs, including heating and security for largely vacant buildings. The lack of a clear strategy for reuse of this historic campus further argues for continued use of the buildings for patient care and against the construction of a large replacement hospital.

- **A campus-wide master plan process should focus on the following important issues:**
  - The feasibility and cost-benefit of redesign and extensive renovation of Avery and other older buildings for patient care,
  - An implementation plan for the complex task of phasing-in renovations while the campus is at full operational capacity,
  - The scope and dramatic cost for repair, modernization, environmental remediation and demolition of aging campus infrastructure, and identification of the proper source of funding for this endeavor.

SECTION II:

Community Service Options

PUBLIC CONSULTING GROUP, INC.

(This page left blank intentionally.)

SECTION II: COMMUNITY SERVICE OPTIONS

OVERVIEW

North Carolina serves a variety of populations in its four state hospitals, including adults with acute care needs, adults with long-term care needs, youth, geriatric individuals, individuals in forensic units, and individuals with substance abuse problems. As the peer group states analysis in section III. of this report illustrates, policies about treating individuals in state hospitals versus in community settings differ across states. Few states treat all of these populations in their state hospitals.

Most states, including North Carolina, have reorganized the way their mental health systems operate by establishing a local governance structure with a wide array of community services. Development of comprehensive systems of care that ensure access to a full array of community services to prevent hospitalization and rehospitalization, is a priority to be addressed in many communities. Recent advances in behavioral healthcare programming such as assertive community treatment teams (i.e. Programs of Assertive Community Treatment, or PACT models) for individuals with chronic mental illness and wrap-around treatment services for children, make community service provision the optimal choice in many cases. In virtually every state that PCG has been involved in planning state hospital downsizing, consumer and family preference has been strongly in favor of community based alternatives to inpatient care. In addition, a Connecticut-based study focusing on the experiences of long-stay hospital patients returning to the community found that clients strongly preferred the community-based alternatives to inpatient hospitalization. A number of factors were cited: the importance of having freedom, perceived lack of safety in the hospital, greater privacy related to private living space, proximity to family and the importance of being in their home communities. Still, it is PCG's experience that consumers and families remain quite concerned about access to appropriate community programs (especially if residential services are required) and to inpatient care , if necessary.

This section of our report will present our findings concerning the *potential* movement of some groups of individuals out of state hospitals and into community treatment. It includes our review of the recommendations made by MGT of America in their report on the same topic. Note that PCG's Phase I findings are based on the ability of individuals to thrive in community settings, rather than on the specific steps necessary for North Carolina to develop and provide those services. Significant additional assessment will be necessary to understand and quantify the potential service needs of the populations to be transitioned to the community and the State's ability to develop the necessary resources. *The analysis of community capacity to serve individuals in need of services will be completed during the next phase of our work.*

FINDINGS

1. Many of the individuals currently residing in North Carolina's four state hospitals, in all levels of care, could be treated at the community level if services were available.

a. Individuals with Substance Abuse Problems: Services for individuals with substance abuse problems should be provided in community based treatment environments dedicated to that purpose. In the absence of more appropriate settings, state hospitals have often been called on to fill the void. In most cases, state hospitals are not properly staffed or clinically prepared to play this role. In our peer group survey, four states (out of nine) do not provide discrete alcohol and drug abuse services in state hospitals, although we are certain that all state hospitals serve dually diagnosed consumers, including those with serious substance abuse histories. We strongly support MGT's basic recommendation to move these services out of the hospitals, though we think the current method of identifying the population has produced a significant overestimate of individuals requiring inpatient substance abuse services. Because of the high incidence of co-occurring substance abuse among the seriously mentally ill, development of specialty programs to provide extended treatment for these dually diagnosed individuals will be an important and necessary component of a revised system of care.

b. Geriatric Population: It appears that most of the geriatric population at the state hospitals requires custodial and medical care, not psychiatric treatment. In our peer group survey, we determined that five states (out of nine) do not provide services designed specifically for geriatric consumers. We agree with MGT that these services can be provided more cost efficiently in the community and support the idea of developing funding mechanisms to encourage placement in skilled nursing facilities, nursing homes, and other appropriate environments. However, we are concerned about maintaining a geri-psychiatric evaluation component within the state hospitals. This resource would become a magnet for individuals with complex conditions who would be difficult to place following their evaluation, leading to a re-population of the geriatric long-term service. Development of an evaluation component in community hospital settings is the preferred option. Also, it is likely that some intermediate care will need to be provided for this population. However, it should be limited to individuals without major medical complications who are experiencing an exacerbation of a long-term mental illness and are likely to return to a higher level of functioning. The services provided to these individuals would be essentially the same as those provided to the adult rehabilitation group.

c. Youth Population: MGT's recommendation to close all Youth Units at the state hospitals requires further evaluation, though we strongly agree with the general direction of moving as many of these services into the community as possible. The concern is the extent to which services are provided in community-based settings. Both DMHDDSAS and the North Carolina chapter of the National Alliance for the Mentally Ill (NAMI) have expressed alarm about dismantling the Youth service in its entirety. We do not know at this point whether that concern reflects their assessment of the current system, knowledge about initiatives that have failed in the past, or doubts about the potential of community providers to step up to the challenges inherent in this type of system change. In PCG's nine state peer group survey, it appears that four states, Kentucky, Ohio, Pennsylvania and Massachusetts, have acted on a comparable policy to remove youths from their state hospital systems. Moving acute care to the community certainly makes sense as does developing additional therapeutic foster care and residential programs to facilitate aftercare and decreased length of stay. Still, it is likely that many of the children and adolescents would continue to require highly secure, highly structured programming. It is clear that the current programs should not be closed before new programs are available.

As we begin to address the questions of "what programs" and "where," we must be clear about for "whom" we are designing this system. There are multiple decisions to be made in regard to the following groups: individuals with primary substance abuse problems, juvenile offenders,

individuals currently in out-of-state placement, Willie M., Thomas S., and others. How the group is defined will (and should) play a large role in determining the design of the final model of care.

d. Adult Inpatient Population (with Acute and Longer-Term Needs): PCG recommends consideration of movement of adult inpatient services into the community, as well. Although this service was not included in the MGT report, models of care such as the Program of Assertive Community Treatment (PACT) have been shown to be successful in significantly reducing lengths of inpatient hospitalization while improving continuity of care.[4]

Additionally, in North Carolina, approximately 22% of the state hospital bed days are used for admissions of fewer than 30 days (including admissions for substance abuse treatment). The state peer group survey shows that North Carolina has the highest admission rate among the ten states; in fact, the rate is more than twice the average of the group. Reduction of acute care admissions at state hospitals will require the development of local emergency care services, including hospitalization, throughout the State. This is an approach that has been employed successfully by states in our peer group survey as well as other states.

2. North Carolina's mental health system does not <u>currently</u> have the capacity to treat all of these groups of individuals at the community level; proposals to move entire populations into the community are not realistic and do not constitute an implementation plan.

Each population group requires a specific evaluation that discerns patterns of need, including service types, patient volume, and service location. For instance, the "youth" population is really several distinctly different sub-populations with specific service needs. Some of these individuals are younger children with multiple disabilities. Some are adolescents with severe conduct and substance abuse disorders and yet others are adolescents with severe and unremitting psychotic symptoms. The types of programs needed in the community vary greatly depending on the characteristics of the sub-group. Generally, multiple programs are necessary to meet the needs of each population. The analysis is further complicated by the importance of providing services as close to the families and community of origin as possible. This often necessitates developing similar programs in multiple sites. Input from area programs, providers, consumers, advocates and other stakeholders who will be involved in building the extensive community service infrastructure is key to this process, and like all of the issues mentioned, must be analyzed separately for each individual population group.

[4] Dincin, J., Wasmer, D., Sobeck, L., Cook, J., and Razzano, L. *Impact of Assertive Community Treatment on the Use of State Hospital Inpatient Bed Days*; Hospital and Community Psychiatry, 93Sept.44(9):833-838

Movement of Substance Abuse Services into the Community

Discussion

Although the State of North Carolina has rescinded the designation of psychiatric hospitals as substance abuse treatment centers, the current practice within the provider community does not reflect that change. Individuals treated in community based residential programs have been shown to have lower one- and two- year readmission rates than individuals who received hospital based residential care. This finding was even more significant among individuals with dual diagnosis.[5] MGT has taken a step in the right direction by identifying the clinically inappropriate practice of hospitalizing addicts and individuals with other substance abuse problems in the state mental hospitals. New services and increased capacity in current substance abuse treatment centers must be developed to successfully implement any new policy that denies access to the hospitals for this difficult to manage group. An extensive and collaborative planning effort that involves consumers, providers and advocates will be necessary as well.

The MGT Report provides a compelling argument for requiring community based substance abuse service providers to deliver treatment to patients who are intoxicated, still actively using drugs, and/or who threaten violence to themselves or others. The North Carolina Department of Health and Human Services (DHHS) supports the recommendation in their Response to the Efficiency Study Report, and NAMI of North Carolina has not opposed this recommendation in their response of 9/7/98. Implementation of the recommendation, however, is more complex.

MGT suggests that writing a policy requiring treatment access at the local level will change the current and long-term practice patterns of providers in the State. We agree that this change would have some impact and some additional cases will be taken, but the recommendation does not address the core issue: a true continuum of services to meet the needs of this population must be developed. In a 1995 study, a DMHDDSAS work group (USS Report, March 1995) reviewed 466 individuals admitted to Umstead Hospital with a primary substance abuse diagnosis and an average length of stay of seven days (chosen from a larger sample). They concluded that 80% of these individuals "look very similar to persons now being served at the community level." In other words, many of the patients being hospitalized would be admitted to Alcohol and Drug Addiction Treatment Centers (ADATC's) if room was available at the time of admission to the state hospital. And, the remaining 20% or so would require services at the state hospital because of the existence of a co-occurring mental health disorder. Although the report is four years old (and the data used was from 1993), the MGT report indicates that much of the situation remains the same. Clearly, greater capacity and a broader array of treatment services are needed at the community level, across the State.

A collaboration between the mental health and substance abuse community that allows for a full discussion of the issues and concerns of stakeholders, including providers, consumers and family members, must occur in advance of policy writing. Under the best of circumstances, this process will be lengthy and will require strong administrative support and leadership in order to bring these often divergent treatment philosophies together.

Experience of Other States in Moving Substance Abuse Services into the Community

Integration between the mental health and substance abuse services and providers are not yet fully realized in most states nationwide. This has served as a barrier for the provision of comprehensive treatment services for persons with primary substance abuse disorders. For example, Massachusetts

[5] Moos, R., King, M. and Patterson, M. *Outcomes of Residential Treatment of Substance Abuse in Hospital- and Community-Based Programs;* Psychiatric Services 96Jan.47(1):68-75

previously designated funding that limited how and where these services were provided for each disorder. With the onset of the Medicaid managed care carve out (1993) for mental health and substance abuse services, the State sought to bring these two funding streams together to improve access and coordination of treatment services for individuals with substance abuse problems. The carve out enables mental health services to be managed separately from general health services. This has proved to be successful in the development of a comprehensive continuum for substance abuse treatment (funded by Medicaid) which includes; substance-capable crisis stabilization beds; psychiatrically- enhanced detoxification, residential rehabilitation, intensive outpatient and outpatient substance abuse services and integrated community treatment teams.

In the State of Pennsylvania, front line clinical staff were cross-trained to evaluate patients with primary substance abuse disorders, co-occurring psychiatric disorders and patients requiring detoxification as part of the development of enhanced crisis services. Pennsylvania adopted a modified version of the ASAM Criteria as the treatment approach. This program is generally considered to be a best practice model program within a managed care system.

The State of Delaware, supported by a grant from the Robert Wood Johnson Foundation, is planning a long term managed care program providing integrated mental health and substance abuse services in the community. Implementation will occur through a phased-in process over several years to allow the provider system to prepare, train staff and administer an integrated community services system, reducing reliance on Delaware Psychiatric Center.

In Alaska, a SAMHSA grant is underwriting the planning and implementation of a community based comprehensive emergency services system for consumers receiving mental health and/or substance abuse services. Moving integrated acute care to the community is expected to reduce Alaska Psychiatric Institute bed demand by about 20%.

The Center for Mental Health Services (CMHS) Managed Care Initiative has established national standards, practice guidelines, workforce competencies and training curricula for treatment of individuals with co-occurring disorders. This document and the approach it takes for developing an integrated system of care is consistent with MGT's recommendations. Several other states have received a Community Mental Health Center (CMHC) systems development grant to build state-wide consensus around the principles stated in the managed care initiative report, and to begin a plan for implementation community based detoxification and continuing substance abuse treatment services.

Next Steps: Phase II Tasks and Products

The following work should be completed prior to the development of a policy that will require the treatment of individuals with substance abuse problems in the current ADATC's and community based substance abuse programs. PCG will conduct these analyses during Phase II of the project.

- Understanding of the relationship between existing mental health and substance abuse services within the State of North Carolina and analysis of the community attitudes and support for the development of these services in the community;

- Analysis of the current capacity of the ADATC's and community based providers to accept and treat this patient population;

- Analysis of the current staff training needs as they relate to the reasons identified by MGT as to why there is a continued high rate of substance abuse treatment at the state hospital;

- Analysis of the regulations that govern commitment laws and how they will impact the ability of ADATC's and community providers to accept involuntary patients; and,

- Analysis of the need for specialized programming for the individuals with dual diagnosis, pregnant women, medically compromised geriatric individuals, HIV-positive individuals and adolescents.

Movement of Geriatric Long-Term and Nursing Facility Services into the Community

Discussion

MGT's recommendation to close geriatric services at the state hospital and move these programs to community based providers is generally consistent with current best practice models for this population. A study focusing on the care and treatment of older adults in state hospitals warns that "*inappropriate levels and types* of community services may result in heretofore preventable psychiatric hospitalizations of people with severe and chronic illness" (emphasis added)[6]. Therefore, in order to implement the recommendation, careful analysis of multiple service delivery models must be developed, reviewed and discussed. The complexity of this patient population, including individuals with complicated medical and psychiatric needs, requires a collaborative and detailed planning approach involving several health care disciplines. The planning phase must allow for time to map out a comprehensive service delivery system incorporating different levels of care and support services in strategic geographical locations.

The MGT report is comprehensive in describing the current services provided at the state hospitals, and makes a strong case for the need for more. The facilities themselves are antiquated and not conducive to effective patient care. In order to implement this recommendation, a complete analysis of the geriatric community provider system will need to be completed which would evaluate: the capacity to treat and maintain the geriatric population in the community and identify the gaps that exist in the current service delivery system that are barriers to success. This analysis would require and must include the current geriatric care providers, advocates and families.

MGT has made the strong recommendation that geriatric patients and patients suffering from Alzheimer's and other dementias would receive more appropriate treatment in the community. The DMHDDSAS and NAMI of North Carolina support this recommendation. MGT's recommendation is based on its observations of patient care at the four state hospitals. While the analysis and report of current services is comprehensive, there was no analysis of the current community provider system to conclude that appropriate treatment is available in the community, that there is support among geriatric provider organizations to implement this recommendation, or what the cost impact would be to fill in the gaps. The needs of this population require extensive resources that at the time of initial evaluation are typically best delivered in an acute care setting that provides immediate access to medical and psychiatric services. Community based hospitals well suited to provide this service are often resistant to developing programs due to the uncertainty that exists surrounding the availability of timely discharge to less intensive levels of care when medically indicated. MGT described this long-term care population as the prime group to move out of the state system and preserved the evaluation and acute level of interventions as being maintained at the state hospital. Although there is a place for evaluative services within the state system, it is more cost effective and normalizing to provide the initial acute care services within the community hospital system. Our experience has been that building a continuum of care for geriatrics that is community based and utilizes the community based acute care providers as the hub for each geographic region has been a successful model.

[6] Semke, J., Fisher, W., Goldman, H. and Hirad, A. *The Evolving Role of the State Hospital in the Care and Treatment of Older Adults: State Trends, 1984 to 1993;* Psychiatric Services 96Oct.47(10):1083

Experience of Other States in Moving Geriatric Services into the Community

Other states have successfully moved their acute geriatric services from the state hospital to the community and subsequently developed enhanced ambulatory and outreach services for patients returning home. Nursing facilities in other states are required by regulation to provide treatment that includes nursing care and treatment for mental illness. However, recent quality monitoring of ambulatory, geriatric partial hospitalization programs by the federal government has resulted in the identification of serious deficiencies in the actual service provision. Systematic and diligent oversight of geriatric programs for quality of care and treatment delivery is essential to making this a success.

Implementation of changes in the location of services for this population requires careful consideration. The fragile health status of geriatric residents at state hospitals, many of whom have had very long, multi-year inpatient stays, must be protected throughout the transition. This has led states to do individualized transition planning, maintenance of peer groups throughout the transition and movement of staff with patients. This has, at times, led to a slow moving process to protect the health and well being of residents who have grown dependent upon their state hospital care givers.

Next Steps: Phase II Tasks and Products

Phase II involves multiple analyses outlined below that will set the framework for developing a strategic plan for a continuum of geriatric services that is community based in the State of North Carolina.

- Analysis of the current geriatric populations within the state hospitals with regard to diagnostic categories, programmatic needs, medical complexity and geographic origin to develop community program design options;

- Analysis of the community based services currently available across the continuum of geriatric care, identification of service delivery gaps;

- Development of a process to gather input and data from consumers, advocates and providers of how to reorganize the geriatric provider system in North Carolina to serve consumers coming from state hospitals;

- Analysis of the training needs of the community based providers and the resources available within the state for providing a comprehensive training program; and,

- Analysis of the current regulations that govern nursing facilities and the barriers that exist that would inhibit full implementation of community based programs.

Movement of Youth Services into the Community

Discussion

PCG believes that children and adolescents can be better served when treated in community settings, closer to home, school and other local resources. However, it is not at all clear that the services needed to treat this specific population are either available or possible given current resources. On the contrary, it appears likely that despite recent progress, there is still a significant lack of resources in the community for youth in psychiatric distress, both acute and longer duration. Discussions with state hospital officials provide anecdotal information on the use of out-of-state contracted programs for children and adolescents. This suggests two related themes: a) services can be provided outside of a state hospital setting and b) these services do not exist in sufficient quantity in the North Carolina community system. The state hospital programs appear to perform numerous functions including acute evaluation, long-term care, incarceration and rehabilitation of juvenile offenders and individuals with substance abuse problems. A closer look at the service needs of the individuals in the Youth Units is clearly the first step, but it is extremely unlikely that more than a small percentage of this group could be appropriately treated and contained in existing community programming. Replacement of some of the Youth Unit functions is probably desirable and may be possible over time, but it will require an extended period of development and significant additional resources.

MGT's finding that "children and adolescents could be better served in community-based facilities" is also its basic assumption in regard to this particular recommendation. That is, MGT was not asked to, and did not conduct, an independent evaluation of available resources to determine that better services are available, but rather concluded from its observations that the present situation was untenable. Increased stigmatization, exposure to potential abuse by other patients, and inappropriate services for adolescents with substance abuse problems were the primary reasons given. For these and additional reasons, numerous states and consumer advocacy groups have come to similar conclusions. Most would agree, however, that the state hospital services, imperfect as they might be, are sorely needed, and not dispensable unless, and until, alternatives are in place in community settings.

MGT recommended closing all of the Youth Units in the state system. Our experience in other states suggests that this would be difficult, though not impossible. In its response to the report, a DMHDDSAS work group comprised of agency personnel, provider representatives, and consumer advocates (9/98) firmly disagreed with the idea of closing the Youth Units though it did imply that some re-assessment of services was in order. NAMI North Carolina (9/98) essentially came to the same conclusions. The work group referred to these Units as the "safety net" for patients and providers alike and questioned MGT's methods in coming to its conclusion saying,

> "It appears that this recommendation was made without data to support the conclusion. Additionally, no argument was advanced that moving services to the community would achieve either treatment or cost efficiency."

The response from DMHDDSAS also indicated that the population currently using state hospital resources was "at the most extreme end of the continuum," essentially "children and adolescents whose treatment needs periodically or persistently exceed the greatly expanded community based service capacity."

Our review of the MGT Report and the DMHDDSAS response suggests that neither position is fully supportable by available data or an understanding of similar efforts in other states. There are not sufficient community programs currently in existence in North Carolina to implement the MGT plan in its entirety. The MGT analysis, however, suggests that a considerable portion of the state hospital beds are being used for individuals on their first or second inpatient admission and for other acute services. This is contrary to DMHDDSAS intention and a function that could be readily transferred to community

services/general hospitals with the proper training and financial support. Replacement of other services is possible, also, though the time frame for implementation might be longer.

Experience of Other States in Moving Youth Services into the Community

Many states have moved their youth services from state hospital to community settings with a wide range of outcomes. In fact, several states have moved all child and adolescent services from state hospital settings to contracted community providers. For example, the state peer group survey shows that state hospitals in Kentucky, Ohio, Pennsylvania and Massachusetts do not serve youth. We offer the following lessons brief overview from our direct (and current) experiences in Massachusetts and Hawaii:

- The provision of acute care evaluation and treatment for children and adolescents has been quite successful in Massachusetts through the development of specialized units in general hospitals.

- Despite the development of new, contracted Intensive Residential Treatment Programs, one of the primary difficulties in the Massachusetts system is finding an appropriate placement for children and adolescents who require intermediate and long term care. It is not unusual to find several children waiting on acute units for slots in intermediate care programs. This can have serious funding implications for the hospitals.

- The Hawaii system has had a great deal of difficulty developing its acute services. General hospital programs have struggled to provide the level of staffing and treatment intensity necessary to serve this group.

- Experiences in both states underscore the difficulty of trying to provide services to sub-populations of different types concurrently (i.e. conduct/anti-social vs. psychotic/PTSD).

- Both systems have had trouble providing services to older adolescents with severe conduct and substance abuse disorders. Massachusetts has fared somewhat better in diverting juvenile offenders to specialty programs or the juvenile justice system.

- Both systems have struggled to develop community-based services of the type and quantity necessary for a smooth transition from acute, inpatient care.

In addition, a South Carolina based study considered a community mental health center with a disproportionately high state hospital admission rate for children and adults. A community-based crisis stabilization program was developed to offer day-time and after hours crisis response. This approach when adequately funded, was found to be very effective in reducing child/adolescent admissions to the state psychiatric hospital[7].

In 1988, New York State imposed a moratorium on the development of new psychiatric beds for children due to a lack of objective criteria for evaluating certificate of need applications. The program development that followed was guided by a principle offered by the American Academy of Child and Adolescent Psychiatry: that children should be admitted to inpatient care only during periods of the most critical need and after less restrictive alternatives have been considered.[8]

[7] Ruffin, J., Spencer, H., Abel, A., Gage, J. and Miles, L. *Brief Report: Crisis Stabilization Services for Children and Adolscents: A Brokerage Model to Reduce Admissions to State Psychiatric Facilities*; Community Mental Health Journal93Oct.29(5):433-440

[8] Grosser, R., Armstrong, M., and Hornik, J. *Developing New Certificate of Need Regulations for Inpatient Care of Children in New York State*; Hospital and Community Psychiatry, 91Aug.42(8):829-833

In conclusion, it is PCG's observation that the child and adolescent services recommended by MGT can be provided effectively in community settings. Other states have demonstrated that establishing a full continuum of community care is dependent upon committed and adequate planning, funding and skilled resources to building the system. PCG believes this to be a challenging but worthwhile goal.

Next Steps: Phase II Tasks and Products

The following analyses and processes will set the stage for the development of a North Carolina approach to the provision of intensive psychiatric services for children and adolescents:

- Understanding of DMHDDSAS plans to reorganize the Youth service system including the process of gathering input from consumers and providers.

- Analysis of current functions served by Youth Units at the state hospitals.

- Analysis of service needs of the child and adolescent population at the state hospitals. In particular, an assessment of acute care utilization and the specific difficulties in treating this group in the community will serve as a basis for determining the feasibility of replacement units. Again, much of this information should be available from DMHDDSAS.

- Analysis of community capacity to provide intensive services. Requires collecting data on the types of services currently available and assessing service gaps, provider attitudes toward developing more intensive services, and resources required for these increased service demands.

- Analysis of funding available for planning (including support from private foundations and federal grants) and implementing community alternatives (Medicaid, Medicare, savings from projected downsizing of state hospitals, savings realized from returning youth from out-of-state placements). We expect that one of the major obstacles in developing specialty programs in the community will be identifying enough individuals to populate the programs at a cost-effective level. For this reason as well as the general clinical preference to treat children in their home environments, it will be necessary to consider Youth who are currently in out of state placements. Given the many issues surrounding the treatment of Willie M. and Thomas S. status cases, this process may be complex.

- Analysis of community commitment and support for new program development.

Movement of Adult Inpatient Services into the Community

Discussion/Experience in Other States

Adult inpatients are the largest group of service utilizers in the state hospital system. The experience of many other states suggests that there should be an expanded focus on this group. Successful community implementations and substantial hospital reductions of adult inpatient care have occurred in Wisconsin, Ohio, Massachusetts, Connecticut, New Hampshire and Rhode Island. In addition, New York State's Community Reinvestment Act (implemented in December, 1993) uses funds saved from downsizing the state operated psychiatric hospital system to create more community based services for persons with severe mental illness.[9] These efforts have generally focused on two major initiatives: moving acute care services to the community and developing integrated intermediate/tertiary care continuum linking state hospital rehabilitation with Assertive Community Treatment (ACT) and other progressive community services. The "Unified System of Services Report," (DMHDDSAS, March, 1995) which looked at patterns of admissions at Umstead Hospital made similar observations. The peer group state survey also suggests that there is room to shift more adult care effectively into the community.

A major intervention in many of the states mentioned is the development of community based acute psychiatric services. The acute service systems developed include 24 hour, 365 days/year emergency services, general hospital based acute psychiatric units, and a variety of other diversion programs. Working together, this system of services is responsible for initial assessment, extended evaluation, crisis intervention, and brief treatment including psychopharmacological treatment and referral to community resources. In many systems, the initial assessment identifies individuals with substance abuse problems and channels them to alternative services. Individuals requiring inpatient care are admitted to the acute service for an average of 10 – 14 days, and occasionally for extended stays. If their condition requires continued care, they may be admitted to the state hospital.

In most cases, the programs are designed and developed by community agencies and institutions in partnership with the State or area mental health authority and funded through third parties and state grants or per diem payments for uninsured individuals. Over the past 5 to 10 years, there have been numerous planning and implementation grants from various government sources (SAMHSA) and private foundations (Robert Wood Johnson, Annie E. Casey) that have been used for this purpose. Some North Carolina communities have taken advantage of these programs.

Initial inquiries in North Carolina suggest that some area programs have been more successful than others in developing an acute care continuum and effectively limiting the use of the state hospitals to intermediate and tertiary care. This same result has been achieved statewide in many places. One of the key factors in implementing this type of plan is the willingness of general hospitals to develop the necessary inpatient resources. Preliminary anecdotal findings indicate that North Carolina hospitals are presently underutilized, perhaps by as much as 50%. In other states where this type of pressure to survive exists, we have found previously disinterested institutions developing progressive, new attitudes about serving the mentally ill. There may be a window of opportunity for pursuing a strategy to expand adult acute care in community settings. This could have an impact on Wake and Durham County utilization, as well as Cherry and Umstead Hospitals. We note, for example, that Umstead opened a new 150 bed building three years ago, solely for acute admissions.

PCG has observed an important state hospital dynamic that often comes with moving acute care to the community: In re-defining their mission to the provision of intermediate and tertiary care, state hospitals experience an upsurge in morale, professionalism and quality of patient care. Often they find this new, more focused mission to be consistent with staff strengths and interests. In many states where we have provided consultation, the state hospitals have become progressive participants in rehabilitative treatment

[9] Swidler, R., Tauriello, J. *New York State's Community Mental Health Reinvestment Act*; Psychiatric Services 95May46(5):496-500

working closely with community services such as Programs of Assertive Community Treatment (the PACT model) to re-integrate long term and re-hospitalized severely mentally ill individuals to community living. Forensic mental health services are also a component in most of these institutions.

Next Steps: Phase II Tasks and Products

Phase II will include the following analyses to promote a better understanding of this population and to develop a framework for the development of community based services to better meet its needs.

- Analysis of the current adult inpatient population within the state hospitals, including diagnoses, service needs, and medical complexity;
- Assessment of existing community based long term and acute care services that treat these individuals, including exploration of an expanded role of community hospitals;
- Identification of service delivery gaps that could impede the movement toward community based care; and
- Assessment of the Area Program potential to overcome these challenges.

Conclusions

The options offered in this section are starting points in the design of a hospital reduction/community development strategy. The focus of this Phase I report is heavy on the hospital side and light on the community services side. Our early research suggests few, if any, of the hospital reduction recommendations made by the consultants (MGT or PCG) could be successfully implemented given the configuration of the community service system at this time. Few Area Programs and their respective community service systems are currently prepared to develop service alternatives able to absorb these individuals. This is not an unusual starting point. Still, many of the recommendations make good sense from a clinical perspective if DMHDDSAS and area programs were to invest in an extended, coordinated and well designed process of developing appropriate replacement services in the community. In our view, it is premature to speculate on the ultimate configuration and number of beds that would continue to be needed in the regional facilities. However, the system will be able to downsize significantly, shifting resources where they are needed to the community to divert state hospital admissions and provide residential and inpatient services also to the home.

It is important to remember that systems change affects the lives of individuals with vulnerable conditions and their families. This is a serious responsibility. Careful planning is required in all facets of this project and new services should be in place before the beds are shut down. Building new or expanded community alternatives to hospitalization is a complex project involving multiple parties, new business arrangements, and new ways of thinking and working together. It will require state agencies and Area Programs to develop coordinated strategies that reconcile state-wide goals with local implementation capabilities.

SECTION III:

Bed Demand

PUBLIC CONSULTING GROUP, INC.

(This page left blank intentionally.)

SECTION III. STATE HOSPITAL BED DEMAND

OVERVIEW

North Carolina has an established state hospital system in which all public inpatient care is provided at four state hospitals. There are no other public beds available either through local mental health centers or county facilities. Published summary data on how state hospital beds are used reveal trends in utilization over the past five to ten years. There is virtually no data available at this time that can be used to project state hospital bed demand from a consumer need point of view. Also, the capacity of the Area Programs to provide alternative care and reduce reliance on inpatient hospital care has not yet been assessed. Since both of these issues will be investigated in Phase II of our consultation (April 1999 – March 2000), we present an analysis of state hospital bed supply and historical utilization in this Phase I report.

This section of the report will discuss our findings and data concerning trends in how North Carolina's state hospital beds have been used and the results of a nine state group survey on the number and use of state hospital beds. In addition, we have attempted to analyze geographic utilization patterns within the data available and informed by the findings of recent national research studies on demand for psychiatric inpatient care.

We have reviewed the bed demand recommendations and methodology in the recent report by MGT of America. MGT was not required to perform an independent analysis of hospital bed demand based either on historical patterns of utilization or on epidemiological models. The baseline capacity levels from which their reductions were computed were the current FY 1998 "operational" bed counts for each hospital. We were not able to duplicate their methodology since MGT staff relied heavily on the first-hand knowledge of the nursing staff in each hospital ward. They developed a cumulative record of these information sources, which became MGT's main tool for organizing consumers, staff and facilities into comparable structures for analysis. Problems of definition were compounded by inadequacies of the hospital and DMHDDSAS information systems that hampered data-gathering and analysis, particularly of staffing and costs. MGT noted numerous inconsistencies in accounting practices and utilization documentation requiring reliance on local unit staff to confirm documentation.

MGT's recommendations for reducing the number of beds by 43%, state-wide, ultimately rest on several assumptions:

- Some types of patients who now receive hospital inpatient services could be more appropriately treated in community settings. Furthermore, sufficient service capacities now exist or could be developed in the communities that would absorb this consumer population.
- The current (1998) supply of "operational" beds for each class of direct-care units/services across hospitals state-wide is at least adequate and sometimes in excess of needed capacities. That is, there is no identified latent demand for services that is not currently being met (or is being inadequately met elsewhere) due to limited hospital resources. All recommendations are based upon new reductions from the current operational baseline.
- Implicit in the analysis is the assumption that the demand for psychiatric inpatient services is directly proportional to the population sizes of counties in each hospital's catchment area, but is subject to differing referral practices of Area Programs.

The first assumption is primarily a clinical and treatment approach issue that is dealt with in Section II – Community Services Options. PCG has examined the other two assumptions within the limitation of the data made available to us by DMHDDSAS. The results of our analysis are documented below.

FINDINGS

PCG is not yet in a position to project the future hospital bed demand that the State should be prepared to meet. This will come at the end of Phase II. However, the trends and state comparison findings noted below demonstrate that there is considerable room to responsibly downsize the state hospital system once community resources and an appropriate Area Program management structure are in place.

1. ***During the past ten years, the number of beds in use on July 1 at all state hospitals has declined steadily – 4% per year – from 2,845 beds in 1989 to 2,066 in 1998. There is some evidence that this declining may be leveling off in 1999.***

   This decrease has occurred at all state hospitals during the past five years. The rate of annual decline at Cherry, Broughton and Dix was between 4.4 and 4.5% per year. Umstead was declining at a rate of 2% per year until January, 1997, when the Butner Alcohol and Drug Treatment Center (BADTC) was added to the Umstead bed count.

2. ***During the past ten years there has been an overall growth in state hospital admissions – about 3% per year from 10,891 in FY 1989 to 14,464 in FY 1998. At the same time the State's population grew by only 1.7% per year.***

   This finding must be tempered by variations at each hospital in recent years. For example, the 27% increase of admissions to Umstead in FY 1998, was fueled largely by the addition of BADTC beds. In addition, during the past five years, the number of admissions to Broughton and Cherry have slightly declined. Still, the state hospital system has experienced a 33% increase in admissions in the past decade, almost twice the rate of population growth.

3. ***The factor that has enabled the average daily census to fall while admissions (and discharges) rise, is a decline in average length of stay that PCG estimates to be 7% per year during the past decade.***

   This has accelerated in recent years. Detailed, hospital specific information available since FY 1994 shows that the mean length of stay has dropped 12% per year, from 103 days in FY 1994 to 66 days in FY 1998. Significantly, this decline has occurred while hospitals were discharging geriatric consumers and other consumers with very long lengths of stay, measured in years.

4. ***During the past four years slightly more than half (56.5%) of all admissions were discharged within fourteen days; almost three quarters (72.3%) were discharged within 30 days. PCG estimates that in FY 1998 approximately 22% of all state hospital bed-days have been used for admission of 30 days or less.***

   The use of state hospitals for short lengths of stay has been relatively constant during the past four years, with some variation across the campuses. The median length of stay at Cherry, Broughton and Dix has varied between 9 – 12 days while Umstead has declined steadily from 32 days to 17 days. We may assume that as hospitals have been successful at discharging long-term patients, more beds and resources are being used for short-term care across all services.

5. ***The review of state hospital use in the nine state peer group survey shows North Carolina's utilization rate of 32.3 beds used per 100,000 adult population to be considerably above the total peer group utilization rate of 26.3 beds per 100,000 adults. Five states in the survey have rates substantially below North Carolina's, two are comparable, and two significantly higher.***

   This data does not include public resources invested in community services, nor does it consider the availability of private hospital beds accessible to DMHDDSAS consumers.

6. ***North Carolina's admission rate of 243.5 per 100,000 adults is the second highest of the peer group states. The lowest rate is 25.5 admissions per 100,000 adults, and the average for the group is 110.3.***

   The high admission rates underscore the trend noted above, of increasing reliance on state hospitals for short-term care.

7. ***A review of North Carolina's geography and state hospital utilization indicates that population alone is not a predictor of hospital use and that other variables (distance from the hospital and availability of physicians) are statistically significant explanators of inter-county differences. A review of a number of national research studies further demonstrates that projecting public mental health service demand on county population alone is an epidemiologically weak approach.***

PCG DATA COLLECTION AND ANALYSIS

PCG Data Collection

In North Carolina, PCG pursued two parallel tracks of data gathering. In an effort not to duplicate MGT's efforts, PCG requested copies of various MGT source material and requested DMHDDSAS to supply relevant socio-economic data on Area Program populations, the January 5, 1998 ARBS reports and multiple years' admission and discharge records from the four state hospitals. Unfortunately, we did not receive the data in time for this report.

The information that has been available to PCG that has been used for our analysis includes:

- the March 2, 1998 MGT final report – Efficiency Study of the State Psychiatric Hospitals;
- Annual Statistical Report on North Carolina Psychiatric Hospitals for fiscal years 1994 through 1998;
- the 1998-1999 American Hospital Association Guide;
- published studies including:
  - Swartz, Wagner et al, "Administrative Update: Utilization of Services – Comparing Public and Private Mental Health Services", Community Mental Health Journal, April 1998;
  - Roth, et al, "Administrative Update: Impact of State Mental Health Reform on Patterns of Service Delivery", Community Mental Health Journal, December 1997;
  - Witkin et al, "Trends in State and County Mental Hospitals in the U.S. From 1970 to 1992", Psychiatric Services, October 1996.
- published data from the National Center for Health Statistics, the Substance Abuse and Mental Health Services Administration, and the National Institute of Mental Health;
- comparative information supplied to PCG by other state Divisions of Mental Health.

North Carolina Trends

All of the data available to us on state hospital utilization has been limited to a review of the FY 1994-98 Annual Statistical Report of North Carolina Psychiatric Hospitals. The trend analysis outlined below shows a steady decline in use of state hospital beds throughout North Carolina. There are, however, some recent signs that this downward trend has slowed, and, perhaps leveled off. We are not yet in a position to understand if this is due to changes in service demand or limitations of supply.

- The ten-year trend in North Carolina's psychiatric hospital services shows 3% annual growth in the number of inpatient admissions, from 10,891 in FY89 to 14,464 in FY98. (see Charts #1 and #2) After a number of relatively flat years between Fiscal Year (FY)94 (12,899) and FY97 (12,781) the number of admissions rose by 13% in a single year. This increase is partly the result of a change in an accounting rule: as of January 1, 1997, the Butner Alcohol and Drug Treatment Center (BADTC) was included under the Umstead Hospital facility code, making the number of North Central residents served in FY98 appear to increase by 27% over FY97. In the same year, however, admissions rose 12% for the Eastern region and 16% for South Central, and contracted 2% for the Western region.

  A similar set of phenomena accounts for FY96-FY97 admissions increases: +4% overall, +13% North Central, +5% South Central, -4% Eastern, -1% Western.

- The overall growth of the general population for the State of North Carolina between calendar years 1995 and 1997 was +1.7% per year, with most robust growth occurring in Union (Western), Johnston, Wake (South Central), Brunswick and Pender (Eastern) counties. Mecklenburg (Western), the State's largest county, experienced +2.7% per year growth. The general population growth for the four catchment areas were +1.6% per year for Umstead (North Central), +1.2% Cherry (Eastern), +1.7% Broughton (Western), +2.2% Dix (South Central).

- The ten-year trend in persons served is +1.8% per year. Between FY97 and FY98, the change was +12%, due again to BADTC. Because this is smaller than the growth in the number of admissions, we might infer that the proportion of consumers readmitted within the same year has also increased. The Annual Reports available to PCG display the opposite of the expected readmission pattern: the percentage fell from 56.8% in FY94 to 53.5% in FY97 and rose again, slightly, to 53.7% in FY98. We cannot determine whether this is due to transfers, readmission to different hospitals, readmission in different years or some other effect.

- Despite the ten-year increase in the number of admissions, the annual July 1 snapshot of the resident- and on-leave- population for the four hospitals has fallen by 4% per year, from 2,845 in FY89 to 2,066 in FY98. The June 30, 1998 resident- and on-leave- population of 2,119 suggests an increase in FY99, which should be watched. As a point of comparison, the total number of operational beds used by MGT as a baseline for the State was 2,236.

Chart #1:

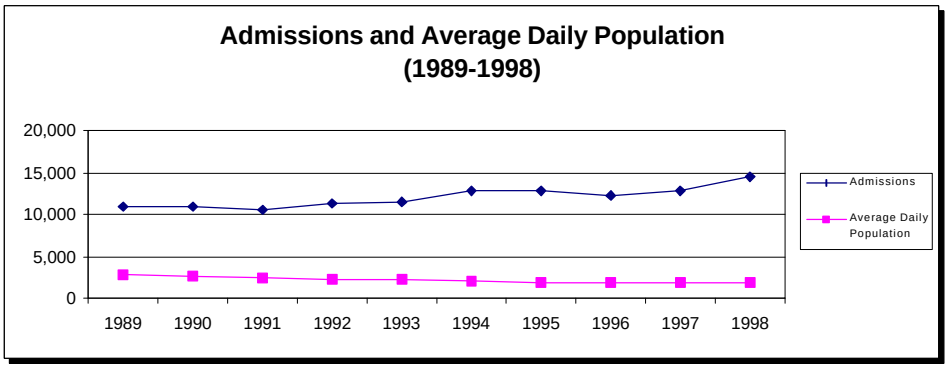


Chart # 2

North Carolina Psychiatric Hospitals

(data from DMHDDSAS Annual Reports)

Region		FY89	FY90	FY91	FY92	FY93	FY94	FY95	FY96	FY97	FY98	Annual Trend*
All	Admissions	10,891	11,008	10,646	11,285	11,548	12,899	12,836	12,321	12,781	14,464	3.0%
	Persons served	13,736	13,775	13,276	13,858	14,017	15,237	15,072	14,383	14,814	16,530	1.8%
	AD Book (July 1)	2,845	2,767	2,630	2,573	2,469	2,338	2,236	2,062	2,033	2,066	-4.0%
	AD Resident Popn	2,747	2,593	2,470	2,348	2,214	2,123	1,935	1,853	1,865	1,842	-4.7%
	ALOS (computed)						103	111	83	72	66	-12.4%
N (Umstead)	Admissions						2929	3140	3104	3515	4455	10.0%
	Persons served						3520	3711	3671	4069	5043	8.4%
	AD Book (July 1)						591	571	567	554	588	-0.4%
	ALOS						124	97	87	72	45	-20.7%
	Median LOS						32	35	35	24	17	
E (Cherry)	Admissions						2776	2573	2495	2392	2670	-1.5%
	Persons served						3387	3191	3045	2918	3199	-2.0%
	AD Book (July 1)						611	618	550	526	529	-4.4%
	ALOS						97	177	85	72	97	-8.6%
	Median LOS						12	11	10	10	10	
W (Broughton)	Admissions						4405	4071	3645	3617	3542	-5.4%
	Persons served						5073	4665	4165	4163	4095	-5.3%
	AD Book (July 1)						668	594	520	546	553	-4.5%
	ALOS						112	107	69	56	92	-9.9%
	Median LOS						9	9	10	11	11	
S (Dix)	Admissions						2609	2857	2865	3011	3498	6.6%
	Persons served						3065	3298	3273	3406	3880	5.2%
	AD Book (July 1)						456	441	408	395	382	-4.5%
	ALOS						70	74	96	93	42	-7.6%
	Median LOS						12	10	10	9	9	

Annual trend = compound growth rate computed from the slope of the regression line fitted to the logarithm of the time series.

- The factor that has enabled the average daily census to fall while the number of admissions (and discharges) rises is a declining average length of stay (ALOS). Statewide, the mean length of stay has dropped over 12% per year for the last four years, from 103 days in FY94 to 66 days in FY98. PCG estimates that this is part of a ten-year decline of 7% per year. The Annual Reports note the recent discharges of many long-term consumers. In FY98, Broughton discharged 171 geriatric consumers whose average stay had exceeded three years and two MR consumers who had averaged twelve years. In FY97, similar numbers pertained to Dix: 148 geriatric consumers whose ALOS at discharge was 951 days. In FY95, Cherry: 139 geriatric discharges with an ALOS over three years. Again in FY98, Cherry discharged 110 geriatric consumers averaging 987 days.
- The median length of stay of all discharged consumers, PCG estimates, has not fallen. This fact, combined with the declining mean LOS, suggests that a diminishing number of very long-term consumers are being discharged, but that the proportion of shorter-term (1-14 days) consumers being discharged remains unchanged at about 57%. Statewide, the proportion discharged between 15 and 30 days seems to have grown by 5% over four years as LOS for everyone above them has declined.

Hospital Variation

A great deal of information can be lost, however, in the averages. As Chart # 3 illustrates, Umstead's median LOS has always been the highest of all the hospitals by a wide margin. Though it has fallen precipitously in FY97 and FY98, this appears to be due almost entirely to the inclusion of over 1100 new BADTC cases of 30 days or less (following an increase of over 500 in the second half of FY97). Dix seems to have made a consistent effort over four years to discharge former 8-30 day consumers within 7 days. The proportion of consumers in the shortest term increased by 13%, while a similar decline registered in the next higher categories. (see Chart #4).

At Broughton and Cherry, the episodic discharges of long-term geriatric consumers caused their discharge ALOS temporarily to rise. Cherry has seen its proportion of short-term discharges increase by 8% over four years, while Broughton has gone just as far in the opposite direction. Further, these two hospitals displayed declining admissions and persons-served over the last five years – about 2% per year for Cherry, over 5% per year in the case of Broughton – opposite to the state-wide trend.

Length of stay is a complex concept that is difficult to analyze facility-wide. For that reason, PCG has re-examined some of the Unit-specific hospital comparisons prepared by MGT. These reveal a few dramatic differences between institutions on the treatment of consumers in ostensibly the same classes of "Units". These differences raise questions about the validity of the Unit definitions, the acuity or co-morbidity of consumers in the same Units at different hospitals, and the treatment philosophies of the various institutions. Until these contributing factors can be understood, apples-to-apples comparison of North Carolina hospitals to one another or to external standards will be suspect.

North Carolina Psychiatric Hospitals

(data from DMHDDSAS Annual Reports)

Chart # 3

Hospital		FY94	FY95	FY96	FY97	FY98
Umstead	Admits	2,960	3,170	3,173	3,727	4,611
	Discharges	2,975	3,175	3,189	3,713	4,574
	Median LOS	32	35	35	24	17
Cherry	Admits	2,513	2,414	2,349	2,211	2,470
	Discharges	2,506	2,477	2,373	2,207	2,442
	Median LOS	12	11	10	10	10
Broughton	Admits	4,137	3,827	3,442	3,426	3,628
	Discharges	4,209	3,898	3,417	3,386	3,674
	Median LOS	9	9	10	11	11
Dix	Admits	3,289	3,425	3,357	3,417	3,755
	Discharges	3,307	3,462	3,361	3,444	3,721
	Median LOS	12	10	10	9	9
Total	Admits	12,899	12,836	12,321	12,781	14,464
	Discharges	12,997	13,012	12,340	12,750	14,411

LOS - All Hospitals	FY94	FY95	FY96	FY97	FY98
1-7 days	27.3%	29.8%	29.5%	27.1%	27.8%
8-14 days	29.2%	27.6%	27.5%	27.3%	29.2%
1-14 days	56.6%	57.5%	57.0%	54.4%	57.0%
15-30	15.1%	13.6%	13.9%	17.2%	19.1%
31-60	14.6%	15.9%	15.7%	15.7%	12.6%
61-90	4.4%	4.0%	4.2%	4.0%	3.3%
91-180	4.2%	3.8%	4.2%	3.9%	3.8%
181-365	2.0%	1.9%	2.2%	2.5%	2.1%
365+ days	3.2%	3.3%	2.7%	2.3%	2.1%

North Carolina Psychiatric Hospitals

(data from DMHDDSAS Annual Reports)

Chart # 4

LOS		FY94	FY95	FY96	FY97	FY98
Umstead	1-7 days	14.8%	11.4%	13.1%	12.4%	14.8%
	8-14 days	27.0%	25.6%	25.9%	23.8%	28.7%
	15-30	7.9%	8.4%	7.7%	18.0%	26.1%
	31-60	30.3%	36.1%	35.6%	30.4%	19.6%
	61-90	7.2%	7.5%	7.2%	6.1%	3.9%
	91-180	6.2%	5.0%	5.0%	3.9%	3.3%
	181-365	2.7%	2.5%	2.8%	3.4%	2.1%
	365+ days	4.0%	3.5%	2.7%	2.0%	1.5%
Cherry	1-7 days	27.7%	32.9%	33.8%	31.6%	30.3%
	8-14 days	29.1%	24.8%	28.4%	31.9%	33.4%
	15-30	18.3%	17.0%	15.2%	12.5%	13.7%
	31-60	10.9%	10.3%	9.1%	10.1%	9.6%
	61-90	4.6%	3.6%	3.7%	4.0%	3.4%
	91-180	4.2%	4.4%	4.2%	4.4%	4.1%
	181-365	2.3%	2.4%	2.5%	2.4%	2.3%
	365+ days	3.0%	4.6%	3.2%	3.1%	3.3%
Broughton	1-7 days	35.2%	38.1%	32.2%	26.4%	27.8%
	8-14 days	29.5%	31.0%	31.9%	32.5%	30.5%
	15-30	12.8%	10.5%	14.2%	19.3%	18.5%
	31-60	10.8%	9.4%	10.2%	11.0%	11.4%
	61-90	3.5%	2.5%	3.2%	2.5%	3.0%
	91-180	3.7%	3.7%	4.6%	4.1%	4.2%
	181-365	1.6%	1.5%	1.5%	2.0%	2.1%
	365+ days	2.9%	3.2%	2.1%	2.0%	2.4%
Dix	1-7 days	28.4%	35.2%	39.5%	40.9%	42.2%
	8-14 days	30.9%	27.7%	23.9%	22.8%	25.8%
	15-30	22.0%	19.3%	18.7%	17.5%	14.8%
	31-60	8.2%	8.7%	7.1%	7.8%	7.0%
	61-90	3.0%	2.9%	2.7%	3.3%	2.7%
	91-180	3.2%	2.3%	3.2%	3.3%	3.7%
	181-365	1.5%	1.5%	2.0%	2.0%	2.2%
	365+ days	2.8%	2.3%	2.9%	2.3%	1.7%

Estimate from means and medians the proportion of each Unit / Disability that are acute care (1-14 days)

	Umstead	Cherry	Broughton	Dix	Total
Alcohol	47%	57%	62%	81%	57%
Drug	47%	69%	67%	96%	59%
MR	54%	100%	38%	44%	51%
MH kids	33%	54%	37%	27%	38%
MH adults	46%	54%	54%	57%	53%
MH geri	23%	35%	35%	21%	29%

For example:

- The median length-of-stay of a continuing high management consumer at Cherry 1,167 days, in contrast to 170 and 407 at Dix and Umstead. MGT did not report consumer diagnoses or presenting conditions by Unit, but these would be particularly useful here.
- The median length-of-stay of a continuing rehabilitation consumer at Umstead is 562 days, versus 222 and 227 at Broughton and Cherry.
- The median length-of-stay of a continuing "youth" Unit consumer at Umstead is 74 days, as compared to 27, 34 and 48 days at Cherry, Broughton and Dix, respectively.
- The median length-of-stay of a continuing "geriatric long-term" consumer at Broughton is 782 days, as compared to 151, 272 and 369 at Umstead, Cherry and Dix, respectively.

PCG attempted to infer additional detail from the available length-of-stay information to estimate the proportion of each Unit's episodes that could be characterized as "acute care" – that is, LOS of 1-14 days, as well as LOS of 15-30 days. These, in some circumstances, might be considered the easiest services to deliver in an alternative community setting. PCG estimates that these admissions account for 22% of all state hospital bed days. The cost incurred by these short stays are disproportionately high for the hospital, as well as the consumer, and serious consideration should be given to development of acute care for adults in community hospitals.

Public Inpatient Care in Peer Group States

Methodology

For a group of ten states selected by North Carolina for comparison, PCG collected detail on staffed beds, use of state hospital beds for populations such as youth, substance abuse and geriatric patients, admissions data, discharge data and information regarding population average length of stay. The states surveyed for comparison were: Georgia, Illinois, Kentucky, Massachusetts, Michigan, Missouri, Ohio, Pennsylvania, South Carolina and Virginia. To obtain the data, PCG contacted the state mental health oversight agency for each state, and spoke with individuals familiar with and having access to statistical data regarding the state psychiatric hospitals. For nine out of ten states, PCG was successful in locating and working with a contact to assemble some of the desired data. Georgia was not able to respond to our request for data within the timeframe needed for the development of this report.

PCG collected detailed written information to validate counts and confirm telephone conversations with state staff. As expected, states categorize state hospital beds in a variety of ways, and PCG attempted to understand the various state categorizations, and fit them into broader categories.

Response

The number of hospitals in each state and the inpatient services provided vary widely from state to state. For example, Massachusetts, Kentucky, Pennsylvania and Ohio do not serve children and adolescents patients in their state hospitals (Chart 5). Illinois recently closed down a children and adolescent state hospital, but continues to serve a small number of children in its adult facilities. Only five states have discrete alcohol and drug abuse services, although it is certain that all state hospitals have consumers with dual diagnosed mental illness and substance abuse service needs. Only four states have discrete geriatric services. Common to all states are service units designed for adult acute and long term care as well as forensic services.

The use of state hospitals, including public Community Mental Health Centers (CMHC's), for adults is reviewed in Chart 6. There is a range of utilization from 16.08 inpatient beds per 100,000 adults (Ohio) to 49.60 inpatient beds per 100,000 adults (Virginia), with average utilization rate of 26.29. North Carolina, at 32.34 beds per 100,000 adults is 23% higher than the peer group average. Four states are substantially lower than North Carolina, two are comparable and two are substantially higher.

At 243.48 admissions per 100,000 adults, North Carolina is the second highest of the peer group, more than twice the average of 110.37 admissions per 100,000 adults. The bed use and admissions data is displayed on Charts 7a and 7b.

CHART 5

PUBLIC INPATIENT CARE IN PEER GROUP STATES

ALL STATES IN PEER GROUP SURVEY – INPATIENT SERVICE TYPE MATRIX

STATE	INPATIENT SERVICE TYPE					
	Youth	Adult Acute	Adult Long Term	Geriatric	Alcohol and Drug	Forensic
Illinois	X	X	X			X
Kentucky		X	X			
Massachusetts		X	X			X
Michigan						
Missouri	X	X	X	X	X	X
North Carolina	X	X	X	X	X	X
Ohio		X	X	X		X
Pennsylvania		X	X		X	X
South Carolina	X	X	X		X	X
Virginia	X	X	X	X	X	X

Notes:
1 –Michigan data was not provided.

Chart 6

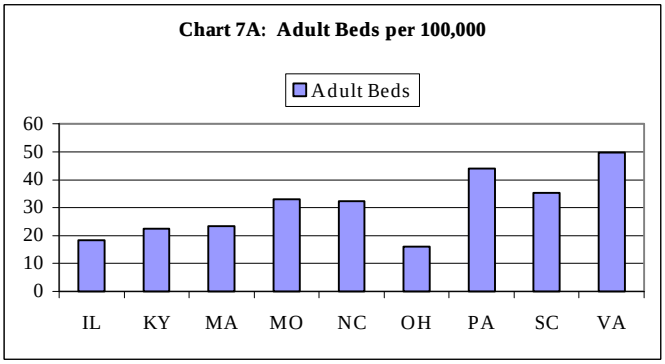
Public Inpatient Care in Peer Group States

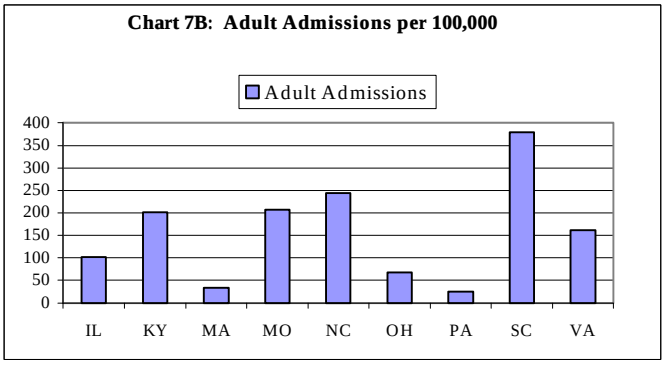
STATE ADULT BED UTILIZATION AND ADMISSION BY POPULATION
(State Hospital and State-Run CMHCs Only)

STATE	POPULATION 1995 Projected Census	% 18+	ADULT BEDS CAPACITY	ADULT ADMISSIONS	BEDS AND ADMISSIONS PER 100,000 INPATIENT ADULT BEDS	INPATIENT ADULT ADMISSIONS
ILLINOIS	11,830,000	73.58%	1601	8836	18.39	101.52
KENTUCKY	3,860,000	74.82%	648	5811	22.44	201.21
MASSACHUSETTS	6,074,000	76.42%	1084	1540	23.35	33.18
MICHIGAN	9,549,000	73.62%	NA	NA	NA	NA
MISSOURI	5,324,000	74.04%	1304	8158	33.08	206.95
NORTH CAROLINA	7,195,000	75.00%	1745	13138	32.34	243.48
OHIO	11,151,000	74.35%	1333	5587	16.08	67.39
PENNSYLVANIA	12,072,000	75.90%	4040	2256	44.09	24.62
SOUTH CAROLINA	3,673,000	74.30%	960	10362	35.18	379.70
VIRGINIA	6,618,000	75.64%	2483	8109	49.60	161.99
TOTAL	77,346,000	74.73%	15,198	63,797	26.29	110.37

Notes:

Illinois - The total Adult Beds figure excludes Chester, a stand-alone forensic facility
Michigan - Michigan has sent data, but PCG not yet received it
North Carolina - The total Adult Beds figures are from MGT's report, and the admissions data is from the FY 98 NC Psychiatric Hospitals Annual Statistical Report
South Carolina - The total Adult Beds figure excludes the ICF/MR at South Carolina State Hospital and the NGRI unit at William S. Hall Psych Institute.
(The total Adult Admissions data is estimated from proportion of child to adult beds)





County Analysis

PCG has attempted to analyze MGT's third assumption – that state hospital use is driven by catchment area population size. Using a number of different variables and tests outlined below we have concluded that population alone is not a predictor of hospital use and that other variables are statistically significant contributors to utilization rates.

In an attempt to better understand the geography of state hospital utilization, PCG mapped and statistically modeled the limited information available on a county-by-county basis. A number of obvious patterns emerge:

- Broughton is the only one of the four hospitals located centrally in its catchment area. This estimation, unfortunately, can only be made "by eye" currently. The notion of "centrality" is therefore strictly geometric and does not take into account population centers.
- Populous counties are referring the highest numbers of hospital admissions within each catchment area. This can be used to visualize the numbers of current consumers who would be affected by changes in the location of treatment. (see Map # 1)
- The referral rate per 100,000 county population is not uniform across the State. However, this pattern appears to be more orderly than would be expected from random variation. Distance to the hospital (as the crow flies) as well as population density seem to play some role. (see Map # 2).

These patterns can be tested statistically. PCG used county-specific data that is available, but somewhat out-of-date. A simple regression model emerged that explained 20% of the inter-county variation. The dependent variable was persons-served in the state psychiatric hospitals per 100,000 county population for 100 NC counties in FY98. The following independent variables were tested:

- straight-line distance from the county center to the hospital serving the catchment area
- percent one-person households among county households, 1980
- percent single female head-of-household among county households, 1980
- percent non-white population in the county in 1988
- physicians per 100,000 county population, 1985
- hospital beds per 100,000, 1985
- nursing home beds per 100,000, 1986
- per capita income, 1985
- median household income, 1979
- percent of persons in the county below the poverty level, 1979
- population per square mile, 1984.

These variables were chosen because they were related to hypotheses that had been described in the research literature. Clearly, a number of different mechanisms are simultaneously at work – prevalence of mental illness, service-seeking behavior, public versus private service choices, provider referral practices, physical access, facility capacity – which this model makes no attempt to isolate.

Three independent variables emerged as statistically significant explanators of inter-county differences – meaning that the others, however seemingly plausible, did not. The three significant variables and their effects on persons-served per 100,000 were: a) straight-line distance to the hospital (negative); b) physicians per 100,000 (positive); and, c) population per square mile (negative).

These results would not have been obvious. We might have expected admissions to have been inversely related to distance, particularly with the large Raleigh, Durham population center feeding Dix and Umstead. After accounting for distance, however, the remaining effect of population density is negative, meaning that

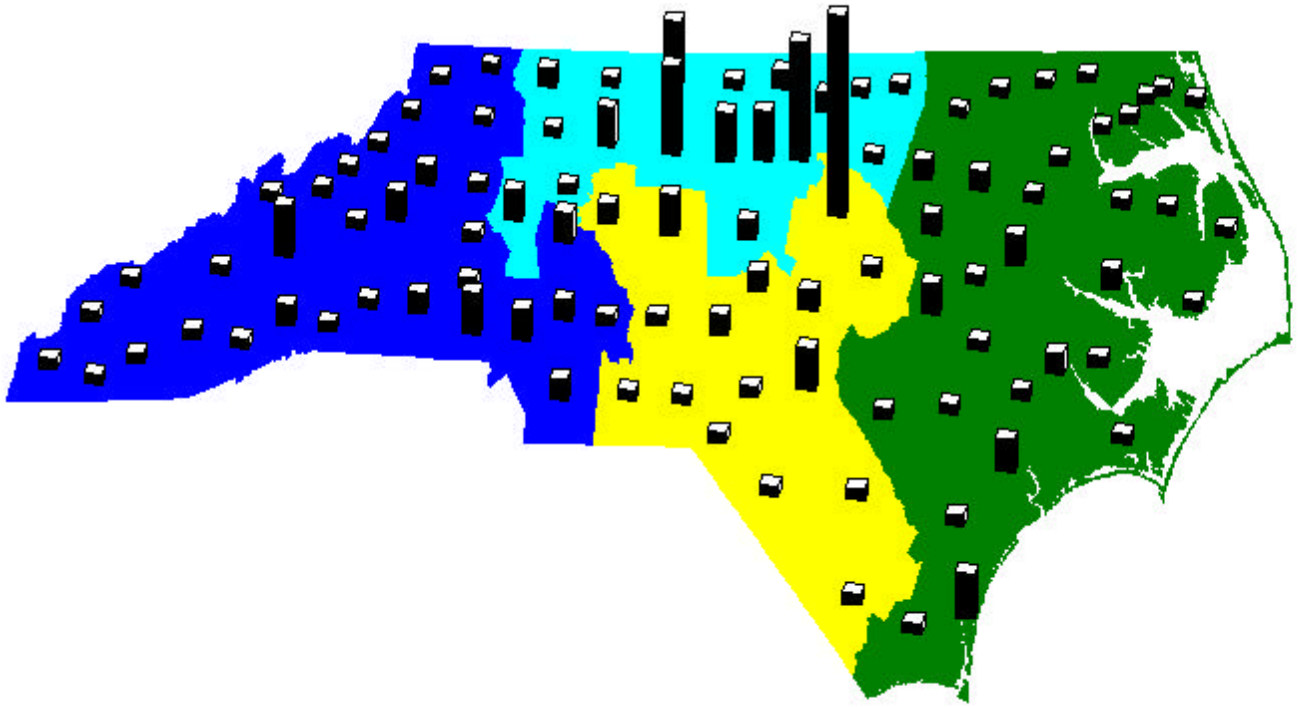
rural areas are contributing more consumers per 100,000 than are urban areas. This finding cannot be taken at face value and must be analyzed further, but it could be describing the comparative scarcity of alternative providers in rural areas. (We might just as well have expected the opposite effect: urban areas serving as magnets for the mentally ill, particularly for those recently discharged consumers who are the most likely group to be re-admitted.) The number of physicians per 100,000 seems to be describing not the number of treatment facilities that could serve as alternatives to the state hospital system (which would cause it to have the opposite sign), but perhaps the number of physicians who may be available to diagnose mental illness and refer consumers to state hospitals.

Since we had plotted inter-county distances, we were also able to make some estimates of straight-line travel for current consumers of each hospital. The average straight-line distance to Broughton for consumers residing in counties in the Western region was 45 miles; to Umstead in the North Central region, 43 miles; to Dix in the South Central region, 33 miles; and to Cherry in the Eastern region, 48 miles. These averages are weighted, however, by the current consumer mix at each hospital. To the extent that DMHDDSAS chooses to influence the referral rate from each county, these averages would change. To illustrate with round numbers, if Wake County referred 800 rather than 1600 consumers to Dix, the average mileage for consumers residing in the South Central catchment area would be 41 miles. If all of the current consumers from the South Central region had to travel to Umstead, their average distance would be 50 miles.

(This page left blank intentionally.)

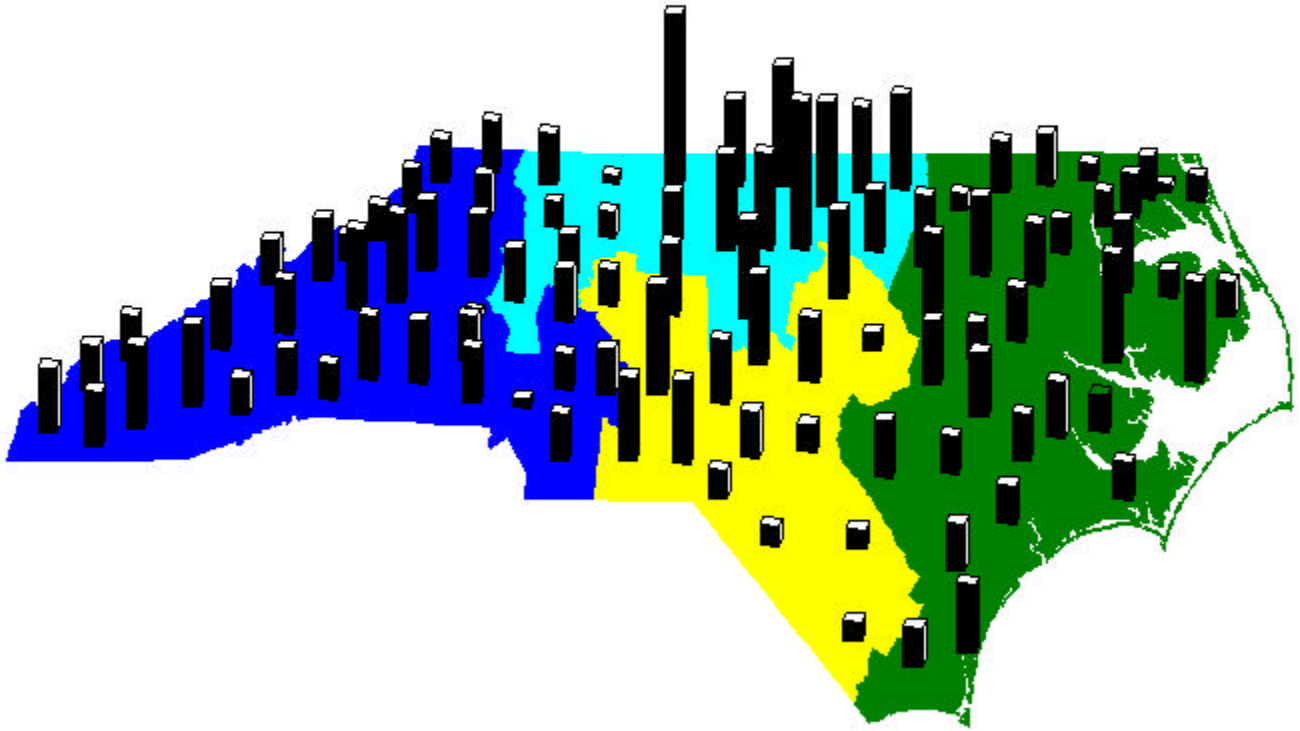
MAP # 1

FY98 Admits to North Carolina State Psychiatric Hospitals



MAP # 2

FY98 Admits per 100,000 County Population to North Carolina State Psychiatric Hospitals



Prevalence of SPMI and Determinants of Psychiatric Hospitalization – Literature Review

A number of research studies are available to assist us with our county-specific analyses of historical admission rates to North Carolina's state psychiatric hospitals and with our planning for future capacity in Phase II. From these studies, PCG draws two principles to guide bed demand forecasting in North Carolina:

- basing public mental health needs assessment on county population alone is an epidemiologically weak and possibly unsound approach;
- basing mental health needs assessment on the rates of persons currently receiving treatment is likely to perpetuate historical inequities.

In short, projections of recent hospital utilization are necessary to give us a reasonably precise understanding of supply. It is a required starting point. Recent research shows we need another way to begin thinking about demand.

Rothbard, Schinnar and Hadley, [10,11,12] in their hospitalization study of 1,377 consumers who used the City of Philadelphia's public mental health system in FY85-86, hypothesized that predisposing factors associated with prior service use could be significant determinants of subsequent hospitalization and length of stay. They developed risk equations using 24 socio-demographic characteristics, clinical attributes, prior utilization of mental health services and provider characteristics. The strongest determinants of hospitalization were found to be predisposing factors associated with prior treatment such as past history of drug abuse, and self-reported presenting problems such as auditory hallucination. Interestingly, neither prior inpatient days (among the past treatment factors) nor diagnosis of schizophrenia (among the presenting problems) were significant for predicting hospitalization for this group. Medicaid reimbursement, however, was a significant enabling factor.

Kent, Fogarty and Yellowlees[13] surveyed seventy-two studies that dealt with heavy use of psychiatric services and the patient and delivery system characteristics that contribute to it. Among the factors that they described were demography, chronicity, diagnosis, social factors, and the pre-hospital, in-hospital and post-hospital treatment factors.

Kamis-Gould and Minsky[14] used social area analysis (SAA) to develop predicative formulas for demand for mental health services in 53 service areas in New Jersey. Standardized county mental health need scores were integrated into a step-down model for the prevalence of severe and persistent mental illness. The researchers reported that:

> " the SAA-based proportional need model was the most useful and most acceptable to state-level managers and community providers alike.... First, the model produced quantitative findings that had face validity.... Second, all stakeholders recognized that population size alone could not be used as a measure of need.... The use of population and rates-under-treatment projections in conjunction with synthetic estimates turned out to be a useful, conceptually appealing and economical approach to needs assessment...."

[10] Schinnar, A.P. & Rothbard, A.B. (1992). High-risk Clients and Mental Health Care Management. Socio-Economic Planning Sciences 26:2, 103-110.
[11] Schinnar, A.P., Rothbard, A.B. & Hadley, T.R. (1992). A Prospective Management Approach to the Delivery of Public Mental Health Services. Administration and Policy in Mental Health 19:4, 291-308.
[12] Rothbard, A.B. & Schinnar, A.P. (1996). Community Determinants of Psychiatric Hospitalization and Length of Stay. Socio-Economic Planning Sciences 30:1, 27-38.
[13] Kent, B.A., Fogarty, M. & Yellowlees, P. (1995). A Review of Studies of Heavy Users of Psychiatric Services. Psychiatric Services 46:12, 1247-1253.
[14] Kamis-Gould, E. & Minsky, S. (1995). Needs Assessment in Mental Health Service Planning. Administration and Policy in Mental Health 23:1, 43-58.

Goodman and Haugland[15] also employed social area analysis, at the zip-code level, using 1980 census data to identify areas containing populations at high risk of mental illness. The authors based their approach on the Mental Health Demographic Profile System and the 1980 Health Demographic Profile System, both developed by the National Institute of Mental Health (NIMH).

The NIMH-sponsored Epidemiological Catchment Area (ECA) Study is an extensive community survey conducted in five American communities. One of these is Durham, North Carolina. Swartz, Wagner, et al[16] have used ECA data recently to predict differential use of private versus public outpatient mental health services.

Kessler, Berglund, et al[17] combined ECA data with information from the National Comorbidity Survey to produce formulas estimating the prevalence of SMI within subgroups of the population defined on the basis of county-level sociodemographic variables available from the U.S. Census.

Finally, Goldsmith, Wagenfeld, *et al*[18] used county-level data to examine the supply side, rather than the demand side, of the service capacity equation. They used county-level data from the U.S. Census combined with the 1983 and 1990 NIMH Inventories of Mental Health Organizations and the NIMH Mental Health Directories from the same years to model the availability and volume of mental health services.

While none of the above studies attempted to allocate inpatient psychiatric hospital resources *per se*, they established foundations for understanding total demand for services, which can be used as the bases for the making difficult trade-offs between demand and supply, and particularly for allocating scarce resources among alternative modes of care.

PCG CONCLUSIONS

1) The MGT Study projected the number of state hospital beds needed to create a more efficient state hospital system. It did not include an independent analysis of hospital bed demand based either on historical patterns of utilization or on epidemiological service need models.
2) Data quality concerns, as identified by MGT and PCG, create barriers to DMHDDSAS' ability to measure historical utilization and cost, and to plan future capacity without looking at other demand factors.

---

[15] Goodman, A. & Haugland, G. (1994). Mental Health Service Needs Assessment. Administration and Policy in Mental Health 21:3, 173-197.

[16] Swartz, M.S., Wagner, H.R., Swanson, J.W., Burns, B.J., George, L.K. & Padgett, D.K. (1998). Administrative Update: Utilization of Services – I. Comparing Use of Public and Private Mental Health Services: The Enduring Barriers of Race and Age. Community Mental Health Journal 34:2, 133-144.

[17] Kessler, R.C., Berglund, P.A., Leaf, P.J., Kouzis, A.C., Bruce, M.L., Friedman, R.M., *et al* (1996). The 12-Month Prevalence and Correlates of Serious Mental Illness (SMI). in Manderscheid, R. & Sonnenschein, M.A, *eds.* Mental Health, United States, 1996, U.S. DHHS, 59-70.

[18] Goldsmith, H.F., Wagenfeld, M.O., Manderscheid, R.W. & Stiles, D.J. (1996). Geographical Distribution if Organized Mental Health Services in 1983 and 1990. in Manderscheid, R. & Sonnenschein, M.A, *eds.* Mental Health, United States, 1996, U.S. DHHS, 154-167.

3) MGT's recommendation to reduce state psychiatric hospital bed availability by 43% across four facilities, is insufficiently supported by either DMHDDSAS supply data or community resource demand data. However, a review of North Carolina utilization trends and experience in peer group states suggest that a significant reduction in state hospital beds could be responsibly undertaken once community resources and Area Program management structures are consistently in place.

Next Steps

The demand for state hospital beds should be revisited once the community capacity analysis is completed in Phase II.

(This page left blank intentionally.)

SECTION IV:

Federal Disproportionate Share (DSH) Revenue Projections

PUBLIC CONSULTING GROUP, INC.

(This page left blank intentionally.)

SECTION IV. FEDERAL DISPROPORTIONATE SHARE (DSH) REVENUE PROJECTIONS

OVERVIEW

As the Facility Construction and Renovation section of this report detailed, the cost of renovating and/or constructing new hospital facilities in North Carolina will range from $246-296.5 million, assuming that bed capacity will be reduced substantially. In the absence of such a reduction and assuming current capacity, the cost would range from $386-494 million. PCG does not recommend a funding source for this undertaking. However, we believe that it is important to clarify projections of federal revenue that are related to the mental health service system in the State. This is especially relevant since the earlier consultant report on the state hospital construction by MGT of America, Inc. (MGT) recommended that construction could be funded entirely by using Federal Disproportionate Share Hospital (DSH) revenue.

FINDINGS

1. ***Federal DSH Funding Will Decline Substantially Over the Next Several Years***
   DSH is the primary source of federal reimbursement for the cost of treating low-income adult individuals in state psychiatric hospitals (classified as Institution for Mental Diseases). In Federal Fiscal Year (FFY) 1998 North Carolina received approximately $133 million in DSH funds that were related to services provided at psychiatric hospitals. These funds are expected to decline substantially over the next several years based on recent federal legislation, including the Balanced Budget Act of 1997. This reduction will effect all states, not just North Carolina. PCG projects that, between FFY 1998 and 2002, the DSH revenue for psychiatric hospitals will decline from its current level of $133 million per year, to $94.4 million per year. This is a minimum of $18.6 million less than the projection developed in the MGT Study. In FFY 2003, PCG projects that it will decline even further, to $81 million. If the General Assembly were to earmark DSH funding for new hospital construction, as MGT suggested, it is important to take note of PCG's lower projections.

2. ***Federal DSH Funding is Not a Reliable Source of Funding for Hospital Renovation and/or Construction***
   For the past several years, the North Carolina General Assembly has deposited DSH revenue into the State's General Fund, to support general state operating costs, rather than earmarking it for mental health services. Removing millions of dollars of DSH revenue and using it for one-time capital costs would decrease funds that may be relied upon for general operating purposes by that amount. This is a real impact on the General Fund which was not considered in the MGT Report, but which is key to the financing strategy.

   Even if DSH were earmarked for capital construction, one cannot guarantee that Congress will maintain DSH even at the reduced levels discussed above and detailed below. The federal legislative trend since 1991 has been to reduce DSH payment adjustments, and new approaches to ratcheting down DSH payments emerge every few years. The Medicaid DSH provision, seen ten years ago as an innovative way of extending health coverage, now has declining support on Capitol Hill. While current Medicaid law would allow North Carolina's psychiatric hospital DSH allocation to increase at the rate of inflation from a low of $81 million in FFY 2003, the next Congress could impose new limits. A new President and a new Congress might even decide to scrap DSH entirely. In conclusion,

this is not a good time for North Carolina to plan for new uses for DSH funding; most other states are planning for its decline.

DETAILED EXPLANATION OF PCG'S DSH PROJECTIONS

This section details PCG's projections for DSH revenue over the next several years. Since using DSH as the source of funding for new hospitals was a key recommendation of the MGT Report, we explain in detail the differences in our projections.

PCG's DSH projections are based on the most recent federal legislation, including the legislative and associated regulatory changes resulting from the Balanced Budget Act of 1997. The major changes to the DSH program within past years are:

- 1991 legislation that created an overall ceiling on what North Carolina could spend each federal fiscal year (FFY) on DSH payment adjustments;

- 1993 legislation that created a hospital-specific ceiling consisting of each hospital's allowable uncompensated care costs; and

- 1997 legislation (Balanced Budget Act) that reduced North Carolina's overall DSH ceiling and limited the percentage of the overall ceiling that it could use for psychiatric hospitals.

The results of our application of these rules are shown in the chart below. Note that the top column includes total DSH. The projected allotments for state psychiatric hospitals are a subset of this and are shown in middle column. We show MGT's projections of the psychiatric hospital allotments in the bottom row for comparison purposes.

Anticipated Federal DSH Allotments to the State Psychiatric Hospitals (in millions)

	1997	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**% Change 1997-2002**	**% Change 1997-2003**
Total Federal DSH Allotment	$311	278	272	264	250	236	245.4	24.1%	21.1%
PCG's Estimate of Federal DSH Allotment to State Psychiatric Hospitals[2]	$149	133	***133***[1]	***126***[1]	***120***[1]	94.4	81	36.6%	45.6%
MGT's Estimate of Federal DSH Allotment to State Psychiatric Hospitals[3]	$149	133	133	126	120	113		24.2%	

[1]The numbers in bold italic may not be realized, as they are dependent upon the hospitals' respective expenditures for uncompensated care during those years. If total expenditures do not reach prescribed levels, the full DSH payments will not be leveraged.

[2]Applies 1997 changes in Federal Medicaid Legislation that lower the proportion of DSH allotment to psychiatric hospitals beginning in FFY 2002.

[3]Assumes proportion of DSH allotment to psychiatric hospitals remains constant.

In developing the projections above, PCG applied the 1997 legislation's reduction in the psychiatric hospital proportion of DSH to 40% of total DSH in FFY 2002 and to 33% in FFY 2003. (MGT did not take these limits into account. Rather, they assumed that the 1997 legislation would allow the psychiatric

hospital proportion to remain at 47.7-48% through FFY 2002). PCG found that the allotment for psychiatric hospitals in FFY 2002 will be $94.4 million FFP (40% of the overall ceiling of $236 million FFP). This is $18.6 million FFP less than the $113 million FFP (47.8% of $236 million FFP) projected by MGT.

The allotment for psychiatric hospitals in subsequent years (2003 and beyond) will be even lower. This is important to note if DSH funding is to be used for new hospital construction, which would likely extend into these years. If the inflation adjustment in the overall ceiling allowed under the 1997 legislation for FFY 2003 turns out to be 4% (the actual adjustment is tied to the Medical Consumer Price Index and cannot be determined until FFY 2002), the overall ceiling will be $245.4 million FFP. The psychiatric hospital proportion will fall to $81.0 million FFP (33% of $245.4 million FFP). This is $32 million FFP less than $113 million FFP projected by MGT for FFY 2002.

Note 1 on the chart refers to hospital specific limits on DSH that were promulgated in the 1993 legislation, which may result in North Carolina not realizing the full amount of revenue for FFY 1999-2003 that is shown in the chart. Attempting to make an exact computation of this rule is an arduous accounting task if HCFA instructions are strictly applied. However, we conferred with the North Carolina Division of Medical Assistance regarding the hospital-specific limits. They concurred with us that long-term projections are hazardous, but did advise us that the hospitals may not have sufficient costs of uncompensated care to leverage the full potential FFY 1999-2001 DSH allotments for psychiatric hospitals ($133, $126, and $120 million FFP respectively).

CONCLUSION

North Carolina's financial strategy for mental health services in the next century, and particularly new hospital construction, should not be predicated solely on the use of DSH payments in FFY 2002 and beyond. Even if the Legislature does approve use of DSH for capital construction, it is likely that the revenues will be substantially lower than predicted by MGT. As such, it would require more than MGT's estimate of 3 years of DSH revenue to fully fund new hospital construction.

DSH is a primary stream of operating funding that can be directly tied to the provision of mental health services in North Carolina. Other sources are Medicare, Medicaid, and private insurance. On the capital side, the only long-term asset of the mental health system is the value of land and buildings at the current state hospital campuses. The State may want to consider various methods of harnessing these assets to subsidize renovation and construction costs. This could be achieved in various ways, including selling the assets and establishing a trust fund for the proceeds, or leasing the assets (long-term) for economic development purposes and using the proceeds to partially fund new construction.

IMPLICATIONS FOR PHASE II ANALYSIS

The foregoing analysis on DSH revenue does not have implications for PCG's Phase II analysis; however, it does raise questions regarding future levels of federal support for mental health services in North Carolina. Phase II recommendations to change the configuration of the mental health system may slightly offset DSH reductions by leveraging new federal Supplemental Security Income (SSI) beyond the levels currently received by state hospital patients. Some individuals, whose care is currently reimbursed by DSH payments in the state hospitals, may be eligible for increased SSI payments (approximately $600 per month) when they move to a community based setting. PCG's Phase II report will provide further analysis on the changes in revenue streams for individuals moving from state hospitals and into community settings.

(This page left blank intentionally.)

ATTACHMENTS

(This page left blank intentionally.)

Public
Consulting
Group, Inc.

Study of
State Psychiatric Hospitals and
Area Mental Health Programs

Appendix A:
Construction Options
Cost Estimates

Broughton Hospital: Option A Revised

Re-use of existing campus with no new construction

Assumptions:	1. All patient residential, activity and support space will be in existing buildings 2. Renovation costs per MGT study are assumed to be the maintenance repair and renovation cost over the 30 year life of the improvements 3. Accordingly, the MGT study carried a total 30 year renovation cost of $72 million for reduced beds and $85.9 million for current beds. 4. "Capital Replacement" (exhibits 9-5 and 9-6) is assumed not to be applied against renovation costs at the campuses 5. Existing space re-used for programs will be fully renovated as needed 6. Residential space will occupy 650 sf/bed; support and program space will occupy 400 sf/bed 7. The existing patient care buildings are mostly of fireproof construction and range in condition. 8. The configuration and layout of the Avery Building complex is reasonably suited, with renovation, for inpatient mental health units 9. The present boilers are in good condition and can be re-used as is. 10. Chillers and distribution systems are in poor shape and will be replaced for the new/ reno facility 11. Asbestos piping insulation is present throughout the utility distribution systems.

Option A.1: Reduced Beds

	sf/ bed	No./ beds	total sf	Avery Bldg	Avery Admin/ ctr	Marsh Taylor, Beall rt/ot, voc	Jones Scroggs Harper	McCambell Hoey, Saunders Morrison	Misc Outlying Bldgs	Service Bldgs	Bldgs not in Use	TOTAL
				261217	46815	88427	193281	112079	104492	179660	138017	1,123,988
Residential Units	650	423	274950	261217			13733		-			274,950
Program Space	400	423	169200	0		21728	147472					169,200
total	1050		444150	261217		21728	161205					444,150
Campus Infrastructure					46815					179660		226,475
Mothball/ Unused						66699	32076					98,775
Demolition								112079			138017	250,096
Sale/ transfer									104492			104,492
Construction Cost (d.)	$/sf			180	as is	180/ 45	180/ 45	3.5	as is	as is	3.5	
Total $				47019060	0	6912495	30460320	392277	0	0	483060	$ 85,267,211
Add for asbestos removal (g)				1697911	0	574776	1256326.5	728514			897111	$ 5,154,637
											TOTAL	**$ 90,421,848**

d. New construction $225/sf (excluding major site and site utilities); total renovation ($180/sf); major renovation ($100/sf); minor renovation ($65/sf); demolition ($3.50/sf) exclusive of asbestos, etc; mothballing ($1.50/sf per year for 30 year life or $45/sf);

g. Asbestos removal primarily for piping insulation carried at allowance of $6.50/sf

Broughton Hospital: Option A.2 Revised

Re-use of existing campus with no new construction

Option A.2: Current Beds

	sf/ bed	No./ beds	total sf	Avery Bldg	Avery Admin/ ctr	Marsh Taylor, Beall rt/ot, voc	Jones Scroggs Harper	McCambell Hoey, Saunders Morrison	Misc Outlying Bldgs	Service Bldgs	Bldgs not in Use	TOTAL
				261217	46815	88427	193281	112079	104492	179660	138017	1,123,988
Residential Units	650	632	410800	261217			127565	22018	-			410,800
Program Space	400	632	252800	0	8596	88427	65716	90061				252,800
total	1050		663600	261217	8596	88427	193281	112079				663,600
Campus Infrastructure					38219					179660		217,879
Mothball/ Unused												-
Demolition											138017	138,017
Sale/ transfer									104492			104,492
Construction Cost (d.)	$/sf			180	180/ as is	180	180	180	as is	as is	3.5	
Total $				47019060	1547280	15916860	34790580	20174220	0	0	483060	$ 119,931,060
Add for asbestos removal (g)				1697911	304298	574776	1256326.5	728514	0	0	897111	$ 5,458,934
											TOTAL	**$ 125,389,994**

d. New construction $225/sf (excluding major site and site utilities); total renovation ($180/sf); major renovation ($100/sf); minor renovation ($65/sf); demolition ($3.50/sf) exclusive of asbestos, etc; mothballing ($1.50/sf per year for 30 year life or $45/sf);

g. Asbestos removal primarily for piping insulation carried at allowance of $6.50/sf

Broughton Hospital: Option B Revised

New construction for residential space/re-use of existing program space

Assumptions:	1. Residential space will be all in new construction 2. The new construction cost budgeted by MGT study is $49.6 million for reduced beds and $75.8 million for current beds 3. Option B revised carries new construction at $225/sf. and renovation costs as noted 4. The existing space used for programs will be gutted and fully renovated 5. The renovation/ new mix will be approximately 2/3 new to 1/3 renovated space 6. The 30 year renovation cost budgeted by the MGT study is $34.1 million for reduced beds and $49.6 million for present bed level 7. Residential space will occupy 650 sf/bed; support and program space will occupy 400 sf/bed 8. The existing patient care buildings are mostly of fireproof construction and range in condition. 9. The configuration and layout of the Avery Building complex is reasonably suited, with renovation, for patient care space. 10. The present boilers are in good condition and can be re-used as is. 11. Chillers and distribution systems are in poor shape and will be entirely replaced for the new/ reno facility 12. Asbestos piping insulation is present throughout the utility distribution systems. 13. Some opportunity exists for transfer of unused facilities to other agencies

Option B.1: Reduced Beds

	sf/ bed	No./ beds	total sf	New Construct	Avery/ Admin/ Ctr	Marsh Taylor, Beall rt/ot, voc	Jones Scroggs Harper	McCambell Hoey, Saunders Morrison	Misc Outlying Bldgs	Service Bldgs	Bldgs not in Use	TOTAL
					308032	88427	193281	112079	104492	179660	138017	1,123,988
Residential Units	650	423	274950	274950					-			274,950
Program Space	400	423	169200		169200							169,200
total	1050		444150									444,150
Campus Infrastructure					46815					179660		226,475
Mothball/ Unused					92017							92,017
Demolition						88427	193281	112079			138017	531,804
Sale/ transfer									104492			104,492
Construction Cost (d.)	$/sf			225	180/ as is/ 45	3.5	3.5	3.5	as is	as is	3.5	
Total $				61863750	34596765	309495	676484	392277	0	0	483060	$ 98,321,829
Add for asbestos removal (g)				0	1404098	574776	1256326.5	728514			897111	$ 4,860,824
										TOTAL		**$ 103,182,653**

d. New construction $225/sf (excluding major site and site utilities); total renovation ($180/sf); major renovation ($100/sf); minor renovation ($65/sf); demolition ($3.50/sf) exclusive of asbestos, etc; mothballing ($1.50/sf per year for 30 year life or $45/sf);

g. Asbestos removal primarily for piping insulation carried at allowance of $6.50/sf

Broughton Hospital: Option B.2 Revised

New construction for residential space/re-use of existing program space

Option B.2: Current Beds

	sf/ bed	No./ beds	total sf	New Construct	Avery/ Avery Admin/ ctr	Marsh Taylor, Beall rt/ot, voc	Jones Scroggs Harper	McCambell Hoey, Saunders Morrison	Misc Outlying Bldgs	Service Bldgs	Bldgs not in Use	TOTAL
					308032	88427	193281	112079	104492	179660	138017	1,123,988
Residential Units	650	632	410800	410800					-			410,800
Program Space	400	632	252800		252800							252,800
total	1050		663600	410800	252800							663,600
Campus Infrastructure					46815					179660		226,475
Mothball/ Unused					8417							8,417
Demolition						88427	193281	112079			138017	531,804
Sale/ transfer									104492			104,492
Construction Cost (d.)	$/sf			225	180/ as is/ 45	3.5	3.5	3.5	as is	as is	3.5	
Total $				92430000	45882765	309495	676484	392277	0	0	483060	$ 140,174,079
Add for asbestos removal (g)				0	1947498	574776	1256326.5	728514			897111	$ 5,404,224
											TOTAL	**$ 145,578,303**

d. New construction $225/sf (excluding major site and site utilities); total renovation ($180/sf); major renovation ($100/sf); minor renovation ($65/sf); demolition ($3.50/sf) exclusive of asbestos, etc; mothballing ($1.50/sf per year for 30 year life or $45/sf);

g. Asbestos removal primarily for piping insulation carried at allowance of $6.50/sf

Cherry Hospital: Option A Revised

Re-use of existing campus with no new construction

Assumptions:	1. All patient residential, activity and support space will be in existing buildings 2. Renovation costs per MGT study are assumed to be the maintenance repair and renovation cost over the 30 year life of the improvements 3. Accordingly, the MGT study carried a total 30 year renovation cost of $86.9 million for reduced beds and $92.9 million for current beds. 4. "Capital Replacement" (exhibits 9-5 and 9-6) is assumed not to be applied against renovation costs at the campuses 5. Existing space re-used for programs will be fully renovated as needed 6. Residential space will occupy 650 sf/bed; support and program space will occupy 400 sf/bed 7. The new power plant and chiller capacity will be fully used as is. 8. The kitchen, and other service buildings retained will be used as is pending outcome of centralizing or outsourcing this service.

Option A.1 Revised: Reduced Beds

	sf/ bed	No./ beds	total sf	U Bldgs Extg sf	Activity Center	Royster	McFarland	Woodard (e)	Linville	Service Blgds (b.)	Other Bldgs (c.)	TOTAL CONSTUCTION
				218355	39243	102586	24586	62995	22885	111269	88638	
Residential Units	650	361	234650	218355				16295				234650
Program Space	400	361	144400		39243	102586						141829
total	1050		379050	218355	39243	102586	0	16295	0	0	0	376479
Campus Infrastructure										111269		
Mothball/ Unused								46700				46700
Demolition									22885		88638	111523
Sale/ transfer							24586					24586
Construction Cost (d.)	**$/sf**			180	60	100		180/ 45	3.5	as is	3.5	
	Total $			39303900	2354580	10258600	0	5034600	80097.5	0	310233	$ 57,342,011
	Asbestos Removal (g.)			1419307.5	255080	666809	0	105918	148753	0	576147	$ 3,172,013
	Infrastructure Credit (h.)											($5,000,000)
											TOTAL	**$ 55,514,024**

b. Include Boiler Plant, Laundry, Kitchen, Carpenter Shop, Warehouses 1 and 2, garage, Paint, Grounds, Engineering Office & Courthouse
c. Miscellaneous outlying buildings including Residential Hall, Conference Center, Chapel, OT, Carwash, Human resources, and misc smaller bldgs
d. Costs are carried as follows: total renovation ($180/sf); major renovation ($100/sf); minor renovation ($60/sf); demolition excl abatement ($3.50/sf); "mothballing" at $1.50/sf per year for the 30 year life.
e. 46700 sf in Woodward are carried as mothballed at $45/sf maintenance cost over the 30 year life of Woodward use
g. Asbestos removal is budgeted at $6.50/sf
h. Credit for recent infrastructure improvements to chillers & boiler plant.

Cherry Hospital: Option A.2 Revised

Re-use of existing campus with no new construction

Option A.2 Revised: Current Beds

	sf/bed	No./ beds	total sf	U Bldgs Extg sf	Activity Center	Royster	McFarland	Woodard	Linville	Service Blgds (b.)	Other Bldgs (c.)	TOTAL
												0
				218355	39243	102586	24586	62995	22885	111269	123859	705778
Residential Units (e)	650	661	429650	218355		102586	24586	62995				408522
Program Space (e.)	400	661	264400		39243				22885		123859	185987
	1050		694050	218355	39243	102586	24586	62995	22885		123859	594509
Campus Infrastructure										111269		
Mothball/ Unused												
Demolition											123859	
Sale/ transfer												
Construction Cost (d.)	$/sf			180	60	180	180	180	100	as is	100	
	Total $			39303900	2354580	18465480	4425480	11339100	2288500	0	12385900	$ 90,562,940
	Asbestos Removal (g.)			1419307.5	255080	666809	0	409468	148753	0	805083.5	$ 3,704,500
	Infrastructure Credit (h.)											($5,000,000)
											TOTAL	**$ 89,267,440**

b. Include Boiler Plant, Laundry, Kitchen, Carpenter Shop, Warehouses 1 and 2, garage, Paint, Grounds, Engineering Office & Courthouse

c. Miscellaneous outlying buildings including Residential Hall, Conference Center, Chapel, OT, Carwash, Human resources, and misc smaller bldgs

d. Costs are carried as follows: total renovation ($180/sf); major renovation ($100/sf); minor renovation ($60/sf); demolition excl abatement ($3.50/sf); "mothballing" at $1.50/sf per year for the 30 year life.

e. There is insufficient space on campus to provide 1050 sf/ bed for patient residential and program/ support space.

g. Asbestos removal is budgeted at $6.50/sf

h. Credit for recent infrastructure improvements to chillers & boiler plant.

Cherry Hospital: Option B Revised

New construction for residential space; re-use for program space

Assumptions:	
	1. Residential space will be in all new construction
	2. The new construction cost budgeted by MGT is $33 million for reduced beds and $61,320,000 for present bed level
	3. Option B revised carries new construction at $225/sf
	4. Existing space re-used for programs will be gutted and fully renovated as needed
	5. The renovation cost budgeted by MGT study is $21,443,400 for reduced beds and $35,694,000 for present bed level
	6. Option B revised carries renovation at several levels noted below.
	5. The new/ renovation mix will be approximately 2/3 new construction to 1/3 renovation
	6. Residential space will occupy 650 sf/bed; support and program space will occupy 400 sf/bed
	7. The new power plant and chiller capacity will be fully used as is.
	8. The kitchen, and other service buildings retained will be used as is pending outcome of centralizing or outsourcing this service.

Option B.1 Revised: Reduced Beds

	sf/ bed	No./ beds	total sf	New Construc	U Bldgs Extg sf	Activity Center	Royster	McFarland	Woodard	Linville	Service Blgds (b.)	Other Bldgs (c.)	Total Construction
					218355	39243	102586	24586	62995	22885	111269	123859	705778
Residential Units	650	361	234650	234650	0								234650
Program Space	400	361	144400		0	39243	102586						141829
total	1050		379050	234650	0	39243	102586						376479
Campus Infrastructure											111269		111269
Mothball/ Unused													
Demolition					218355				62995	22885		123859	428094
Sale/ transfer								24586					24586
Construction Cost (d.)	$/sf			225.00	3.5	60	180		3.5	3.5	as is	3.5	
	Total $			52796250	764242.5	2354580	18465480	0	220482.5	80097.5	0	433506.5	$ 75,114,639
	Asbestos Removal (g.)				1419308	255080	666809		409468	148753		805083.5	$ 3,704,500
	Infrastructure Credit (h.)												($5,000,000)
												TOTAL	**$ 73,819,139**

b. Includes Boiler Plant, Laundry, Kitchen, Carpenter Shop, Warehouses 1 and 2, Garage, Paint, Grounds & Engineering Offices & Courthouse

c. Miscellaneous outlying buildings including Residential Hall, Conference Center, Chapel, OT, Carwash, Human resources, and misc smaller bldgs

d. New construction $225/sf (excluding major site and site utilities); total renovation ($180/sf); major renovation ($100/sf); minor renovation ($65/sf); demolition ($3.50/sf) exclusive of asbestos, etc; mothballing ($1.50/sf per year for 30 year life or $45/sf);

g. Asbestos removal is budgeted at $6.50/sf

h. Credit for recent infrastructure improvements to chillers & boiler plant.

Cherry Hospital: Option B.1 Revised

New construction for residential space; re-use for program space

Option B.2 Revised: Current Beds

	sf/ bed	No./ beds	total sf	New Construct	U Bldgs Extg sf	Activity Center	Royster	McFarland	Woodard	Linville	Service Blgds (b.)	Other Bldgs (c.)	TOTAL
					218355	39243	102586	24586	62995	22885	111269	123859	705778
Residential Units	650	661	429650	429650									429650
Program Space (e.)	400	661	264400			39243	102586		62995	22885		36691	264400
total	1050		694050			39243			62995	22885			694050
Campus Infrastructure											111269		111269
Mothball/ Unused													
Demolition					218355							123859	342214
Sale/ transfer								24586					24586
Construction Cost (d.)	$/sf			225.00	3.5	60	180		180	180	as is	100/ 3.5	
Total $				96671250	764242.5	2354580	18465480	0	11339100	4119300	0	4102607	$ 137,816,559
Asbestos Removal (g.)					1419308	255080	666809		409468	148753		805083.5	$ 3,704,500
Infrastructure Credit (h.)													($5,000,000)
												TOTAL	**$ 136,521,059**

b. Includes Boiler Plant, Laundry, Kitchen, Carpenter Shop, Warehouses 1 and 2, Garage, Paint, Grounds & Engineering Offices & Courthouse

c. Miscellaneous outlying buildings including Residential Hall, Conference Center, Chapel, OT, Carwash, Human resources, and misc smaller bldgs

d. New construction $225/sf (excluding major site and site utilities); total renovation ($180/sf); major renovation ($100/sf); minor renovation ($65/sf); demolition ($3.50/sf) exclusive of asbestos, etc; mothballing ($1.50/sf per year for 30 year life or $45/sf).

g. Asbestos removal is budgeted at $6.50/sf

h. Credit for recent infrastructure improvements to chillers & boiler plant.

Cherry Hospital: Option C Revised

Re-use of existing buildings with major enabling new construction

Assumptions:	1. U Buildings courtyards will be infilled w/ new construction 2. The existing space will be gutted and fully renovated 3. The renovation/ new mix will be approximately 2/3 renovation to 1/3 new construction 4. In the maintain present No. of beds scheme, Woodard will continue in use also for residential use 5. In the reduced bed scheme, Woodard and Royster will be used for program and support space. 6. Residential space will occupy 650 sf/bed; support and program space will occupy 400 sf/bed 7. The new power plant and chiller capacity will be fully used as is. 8. Moderate funding is provided for the kitchen, pending outcome of centralizing or outsourcing this service.

Option C.1: Reduced Beds

	sf/ bed	No./ beds	total sf	U Bldgs Extg sf	U Bldgs Infill (a.)	Total U Bldgs	Activity Center	Royster	McFarland	Woodard	Linville	Service Bldgs (b.)	Other Bldgs (c.)	TOTAL CONSTRUCTION
				218355	96600	314955	39243	102586	24586	62995	22885	111269	123859	802378
Residential Units	650	361	234650	162659.4	70395	233054.4								233054
Program Space	400	361	144400	55695.62	26205	81900.62	39243				22885			144029
total	1050		379050			314955	39243							354198
Campus Infrastructure												111269		111269
Mothball/ Unused														
Demolition								102586		62995			123859	289440
Sale/ transfer									24586					24586
Construction Cost (d.)	$/sf			180	225		60	3.5		3.5	100	as is	3.5	
	Total $			39303900	21735000	61038900	2354580	359051	0	220482.5	2288500	0	433506.5	$ 66,695,020
	Asbestos Removal (g.)			1419308	0	0	255079.5	666809	0	409468	148752.5	0	805083.5	$ 3,704,500
	Infrastructure Credit (h.)													($5,000,000)
													TOTAL	**$ 65,399,520**

a. Courtyard infill yields 8,050 sf per floor
b. Includes Boiler Plant, Laundry, Kitchen, Carpenter Shop, Warehouses 1 and 2, Garage, Paint, Grounds & Engineering Offices & Courthouse
c. Miscellaneous outlying buildings including Residential Hall, Conference Center, Chapel, OT, Carwash, Human resources, and misc smaller bldgs
d. New construction $225/sf; total renovation ($180/sf); major renovation ($100/sf); minor renovation ($65/sf); demolition ($3.50/sf) excl of asbestos, etc; Mothballing ($1.50/sf per year for 30 year life or $45/sf);
g. Asbestos removal is budgeted at $6.50/sf
h. Credit for recent infrastructure improvements to chillers & boiler plant.

Cherry Hospital: Option C.2 Revised

Re-use of existing buildings with major enabling new construction

Option C.2: Current Beds

	sf/ bed	No./ beds	total sf	U Bldgs Extg sf	U Bldgs Infill (a.)	Total U Bldgs	Activity Center	Royster	McFarland	Woodard	Linville	Service Blgds (b.)	Other Bldgs (c.)	TOTAL
				218355	96600	314955	39243	102586	24586	62995	22885	111269	123859	802378
Residential Units	650	661	429650	218355	96600	314955		102586		12109				429650
Program Space (e.)	400	661	264400				39243			50886	22885		123859	236873
total	1050		694050			314955	39243	102586		62995	22885			
Campus Infrastructure												111269		111269
Mothball/ Unused										12109				12109
Demolition											22885		123859	146744
Sale/ transfer									24586					24586
Construction Cost (d.)	$/sf			180	250		65	180		180/100	100	as is	3.5	
Total $				39303900	24150000	63453900	2550795	18465480	0	7268220	2288500	0	12385900	$ 106,412,795
Asbestos Removal (g.)				1419308	0	0	255080	666809	0	409468	148753	0	805083.5	$ 3,704,500
Infrastructure Credit (h.)														($5,000,000)
													TOTAL	**$ 105,117,295**

a. Courtyard infill yields 8,050 sf per floor
b. Includes Boiler Plant, Laundry, Kitchen, Carpenter Shop, Warehouses 1 and 2, Garage, Paint, Grounds & Engineering Offices & Courthouse
c. Miscellaneous outlying buildings including Residential Hall, Conference Center, Chapel, OT, Carwash, Human resources, and misc smaller bldgs
d. New construction $250/sf; total renovation ($180/sf); major renovation ($100/sf); minor renovation ($65/sf); demolition ($3.50/sf) excl of asbestos, etc; Mothballing ($1.50/sf per year for 30 year life or $45/sf).
e. This option does not allow for 400sf of program space per bed; reduced by availability of space to 305sf/bed
g. Asbestos removal is budgeted at $6.50/sf
h. Credit for recent infrastructure improvements to chillers & boiler plant.

Dix Hospital: Option A Revised

Re-use of existing campus with no new construction

Assumptions:	1. All patient residential, activity and support space will be in existing buildings 2. Renovation costs are assumed to be the maintenance repair and renovation cost over the 30 year life of the improvements 3. The MGT study budget for item 2 for the 30 year life of the improvements is $33.9 million for reduced beds and $76.9 million for current beds 4. "Capital Replacement" (exhibits 9-5 and 9-6) is assumed not to be applied against renovation costs at the campuses 5. Existing space re-used for programs will be fully renovated as needed 6. Residential space will occupy 650 sf/bed; support and program space will occupy 400 sf/bed 7. The existing patient care buildings are mostly of fireproof construction and range in condition. 8. The configuration and layout of the main patient buildings is poorly suited for inpatient mental health units 9. The present boilers are in good condition and can be re-used as is. 10. Chillers and distribution systems are in poor shape and will be entirely replaced for the new/ reno facility 11. Asbestos piping insulation is present throughout the utility distribution systems.

Option A.1: Reduced Beds

	sf/ bed	No./ beds	total sf	McBryde Buildings Extg sf	Hargrove Bldg (e)	Spruill Bldg	Brown Hoey	Wright Lineberger Edgerton	Ashby Cherry Williams	Service Bldgs	Bldgs Used by Others	TOTAL
				406885	30981	46464	40562	73132	73150	242497	362798.8	1,276,469.84
Residential Units	650	247	160550	160550								160550
Program Space	400	247	98800	98800								98800
total	1050		259350	259350								259350
Campus Infrastructure										242497		242497
Mothball/ Unused				147535								147535
Demolition					30981	46464						77445
Sale/ transfer							40562	73132	73150		362798.8	549643
Construction Cost (d.)	$/sf			180/ 45	3.5	3.5	as is	as is	as is	as is		
	Total $			53322075	108433.5	162624	0	0	0	0	0	$ 53,593,133
	Add for asbestos removal (g)			1685775	201376.5	302016	0				0	$ 2,189,168
											TOTAL	**$ 55,782,300**

d. New construction $225/sf; total renovation ($180/sf); major renovation ($100/sf); minor renovation ($65/sf); demolition ($3.50/sf) excl of asbestos, etc;
Mothballing ($1.50/sf per year for 30 year life or $45/sf);
g. Asbestos removal carried at $6.50/sf

Dix Hospital: Option A.2 Revised

Re-use of existing campus with no new construction

Option A.2: Current Beds

	sf/ bed	No./ beds	total sf	McBryde Buildings Extg sf	Hargrove Bldg (e)	Spruill Bldg	Brown Hoey	Wright Lineberger Edgerton	Ashby Cherry Williams	Service Bldgs	Bldgs Used by Others	TOTAL
				406885	30981	46464	40562	73132	73150	242497	362798.8	1,276,469.84
Residential Units	650	429	278850	278850								278850
Program Space	400	429	171600	128035	30981	12584						171600
	1050		450450	406885	30981	12584						450450
Campus Infrastructure										242497		242497
Mothball/ Unused				0		33880						33880
Demolition												
Sale/ transfer							40562	73132	73150		362798.8	549643
Construction Cost (d.)	$/sf			180	180	180/ 45	as is	as is	as is	as is		
	Total $			73239300	5576580	3789720	0	0	0	0	0	$ 82,605,600
	Add for asbestos removal (g)			2644752.5	201376.5	81796	0				0	$ ~~2,927,925~~
											TOTAL	**$ 85,533,525**

d. New construction $225/sf; total renovation ($180/sf); major renovation ($100/sf); minor renovation ($65/sf); demolition ($3.50/sf) excl of asbestos, etc; Mothballing ($1.50/sf per year for 30 year life or $45/sf);

g. Asbestos removal carried at $6.50/sf

Dix Hospital: Option B.1 Revised

New construction for residential space/re-use of existing for program space

Assumptions:	1. Residential space will be all in new construction 2. The new construction cost budgeted by MGT study is $38.4 million for reduced beds and $53.1 million for present bed level 3. Option B revised carries new construction at $225/sf. 4. The existing space used for programs will be gutted and fully renovated 5. The renovation/ new mix will be approximately 2/3 new to 1/3 renovated space 6. The 30 year renovation cost budgeted by the MGT study is $14.2 million for reduced beds and $23.9 million for present bed level 7. Residential space will occupy 650 sf/bed; support and program space will occupy 400 sf/bed 7. The existing patient care buildings are mostly of fireproof construction and range in condition. 8. The configuration and layout of the main patient buildings is poorly suited for patient care but marginally usable for support 9. The present boilers are in good condition and can be re-used as is. 10. Chillers and distribution systems are in poor shape and will be entirely replaced for the new/ reno facility 11. Asbestos piping insulation is present throughout the utility distribution systems.

Option B.1: Reduced Beds

	sf/ bed	No./ beds	total sf	New Construct	McBryde Buildings Extg sf	Hargrove Spruill	Brown Hoey	Wright Lineberger Edgerton	Ashby Cherry Williams	Service Bldgs	Bldgs Used by Others	TOTAL
					406885	77445	40562	73132	73150	242497	362798.8	1,276,469.84
Residential Units	650	247	160550	160550								160550
Program Space	400	247	98800		98800							98800
total	1050		259350		98800							259350
Campus Infrastructure										242497		242497
Mothball/ Unused					308085							308085
Demolition						77445						77445
Sale/ transfer							40562	73132	73150		362798.8	549643
Construction Cost (d.)	$/sf			225	180/ 45	3.5	as is	as is	as is	as is		
Total $				36123750	31647825	271057.5	0	0	0	0	0	$ 68,042,633
Add for asbestos removal (g)				0	642200	503392.5	0				0	$ 1,145,593
											TOTAL	**$ 69,188,225**

d. New construction $225/sf (excluding major site and site utilities); total renovation ($180/sf); major renovation ($100/sf); minor renovation ($65/sf); demolition ($3.50/sf) exclusive of asbestos, etc; mothballing ($1.50/sf per year for 30 year life or $45/sf);
g. Asbestos removal carried at $6.50/sf

Dix Hospital: Option B.2 Revised

New construction for residential space/re-use of existing for program space

Option B.2: Current Beds

	sf/ bed	No./ beds	total sf	New Construct	McBryde Buildings Extg sf	Hargrove Spruill	Brown Hoey	Wright Lineberger Edgerton	Ashby Cherry Williams	Service Bldgs	Bldgs Used by Others	TOTAL
					406885	77445	40562	73132	73150	242497	362798.8	1,276,469.84
Residential Units	650	429	278850	278850								278850
Program Space	400	429	171600		171600							171600
total	1050		450450		171600							450450
Campus Infrastructure										242497		242497
Mothball/ Unused					235285							235285
Demolition						77445						77445
Sale/ transfer							40562	73132	73150		362798.8	549643
Construction Cost (d.)	$/sf			225	180/ 45	3.5	as is	as is	as is	as is		
Total $				62741250	41475825	271057.5	0	0	0	0	0	$ 104,488,133
Add for asbestos removal				0	1115400	503392.5	0				0	$ 1,618,793
											TOTAL	**$ 106,106,925**

d. New construction $225/sf (excluding major site and site utilities); total renovation ($180/sf); major renovation ($100/sf); minor renovation ($65/sf); demolition ($3.50/sf) exclusive of asbestos, etc; mothballing ($1.50/sf per year for 30 year life or $45/sf);

g. Asbestos removal carried at $6.50/sf

Umstead Hospital: Option A Revised

Re-use of existing campus with no new construction

Assumptions:	
	1. All patient residential, activity and support space will be in existing buildings
	2. Renovation costs are assumed to be the maintenanec repair and renovation cost over the 30 year life of the improvements
	3. Accordingly, the MGT study carried a total 30 year renovation cost of $21 million for reduced beds and $28.6 million for current beds.
	4. "Capital Replacement" (exhibits 9-5 and 9-6) is assumed not to be applied against renovation costs at the campuses
	5. Existing space re-used for programs will be fully renovated as needed
	6. Residential space will occupy 650 sf/bed; support and program space will occupy 400 sf/bed
	7. The existing ward buildings are of concrete fireproof construction and in good shape
	8. Structural modules are poor and will be addressed by the infill construction to create a functional footprint
	9. The present boiler plant is in good condition and will be used as is.
	10. Chillers are in poor shape and will be entirely replaced for the new/ reno facility
	11. Asbestos is extensive throughout the existing buildings ceilings, flooring (in some cases) and piping insulation.
	12. Moderate funding is provided for the kitchen, pending outcome of centralizing or outsourcing this service.

Option A.1: Reduced Beds

	sf/ bed	No./ beds	total sf	Ward Bldgs 29-35 Extg sf	Barrett Bldg (e)	Activities Center	Admin Bldg	Ward Bldgs 36-54 Extg sf	Food Service (f)	Service Bldgs (b)	Other Bldgs	TOTAL
				142454	79425	49412	46509	358817	33478	69770	248444	1028309
Residential Units	650	256	166400	86975	79425							166400
Program Space	400	256	102400	55479		49412						104891
total	1050		268800	142454	79425	49412						271291
Campus Infrastructure							46509		33478	69770		149757
Mothball/ Unused												
Demolition								358817			248444	607261
Sale/ transfer												
Construction Cost (d.)	$/sf			180	25	180	as is	3.5	25	as is	3.5	
Total $				25641720	1985625	8894160	0	1255859.5	836950	0	869554	$ 39,483,869
Add for asbestos removal (g)				925951	0	0	0	2332310.5			1614886	$ 4,873,148
											TOTAL	**$ 44,357,016**

a. Courtyard infill yields 7,025 sf per floor; Ward Bldgs are carried at 18,725 per bldg
b. Includes Boiler Plant, Service units between 29-43, Laundry, Warehouses and Utility Buildings
d. New construction $225/sf; total renovation ($180/sf); major renovation ($100/sf); minor renovation ($65/sf); demolition ($3.50/sf) excl of asbestos, etc; Mothballing ($1.50/sf per year for 30 year life or $45/sf).
e. Barrett Building refit for new interior finishes, etc., carried at $25/sf
f. Food Service: carried $25/sf for HVAC upgrade
g. Asbestos removal carried at $6.50/sf

Umstead Hospital: Option A.2 Revised

Re-use of existing campus with no new construction

Option A.2: Current Beds

	sf/ bed	No./ beds	total sf	Ward Bldgs 29-47, 49-50 Extg sf	Barrett Bldg (e)	Activities Center	Admin Bldg	Ward Bldgs 51-54 Extg sf	Food Service (f)	Service Bldgs (b)	Other Bldgs	TOTAL
				411217	79425	49412	46509	61050	33478	69770	275196	1026057
Residential Units	650	513	333450	250842	79425			2252				332519
Program Space	400	513	205200	160375		49412						209787
total	1050		538650	411217	79425	49412						542306
Campus Infrastructure							46509		33478	69770		149757
Mothball/ Unused												
Demolition								61050			275196	336246
Sale/ transfer												
Construction Cost (d.)	$/sf			180	25	60	as is	3.5	25	as is	3.5	
Total $				74019060	1985625	2964720	0	213675	836950	0	963186	$ 80,983,216
Add for asbestos removal (g)				2672911	0	0	0	396825	0	0	1788774	$ 4,858,510
											TOTAL	**$ 85,841,725.50**

a. Courtyard infill yields 7,025 sf per floor; Ward Bldgs are carried at 18,725 per bldg
b. Includes Boiler Plant, Service units between 29-43, Laundry, Warehouses and Utility Buildings
d. New construction $225/sf; total renovation ($180/sf); major renovation ($100/sf); minor renovation ($65/sf); demolition ($3.50/sf) excl of asbestos, etc; Mothballing ($1.50/sf per year for 30 year life or $45/sf).
e. Barrett Building refit for new interior finishes, etc., carried at $25/sf
f. Food Service: carried $25/sf for HVAC upgrade
g. Asbestos removal carried at $6.50/sf

Umstead Hospital: Option B.1 Revised

New construction for residential space/re-use of existing campus for program space

Assumptions:	1. Residential space will be all in new construction 2. The new construction cost budgeted by MGT study is $33 million for reduced beds and $61,560,000 for present bed level 3. Option B revised carries new construction at $225/sf. 4. The existing space used for programs will be gutted and fully renovated 5. The renovation/ new mix will be approximately 2/3 new to 1/3 renovated space 6. The 30 year renovation cost budgeted by the MGT study is $15 million for reduced beds and $27.7 million for present bed level 7. Residential space will occupy 650 sf/bed; support and program space will occupy 400 sf/bed 8. The existing ward buildings are of concrete fireproof construction and in good shape 9. Structural modules are poor and will be addressed by the infill construction to create a functional footprint 10. The present boiler plant is in good condition and will be used as is. 11. Chillers are in poor shape and will be entirely replaced for the new/ reno facility 12. Asbestos is extensive throughout the existing buildings ceilings, flooring (in some cases) and piping insulation. 13. Moderate funding is provided for the kitchen, pending outcome of centralizing or outsourcing this service.

Option B.1: Reduced Beds

	sf/ bed	No./ beds	total sf	New Construct	Barrett Bldg (e)	Ward Bldgs 29-32 Extg sf	Ward Bldgs 33-35 Extg sf	Activities Center	Admin Bldg	Ward Bldgs 36-54 Extg sf	Food Service (f)	Service Bldgs (b)	Other Bldgs	TOTAL
					79425	82670	59946	49412	46509	401860	33478	69770	241421	1064491
Residential Units	650	256	166400	86975	79425									166400
Program Space	400	256	102400				59946	49412						109358
total	1050		268800	86975	79425		59946	49412						275758
Campus Infrastructure									46509		33478	69770		149757
Mothball/ Unused														
Demolition						82670				401860			241421	725951
Sale/ transfer														
Construction Cost (d.)	$/sf			225	25	3.5	180	180	as is	3.5	25	as is	3.5	
Total $				19569375	1985625	289345	10790280	8894160	0	1406510	836950	0	844973.5	$ 44,617,219
Add for asbestos removal (g)						537355	389649	321178		2612090	217607		1569237	5647115.5
													TOTAL	**$ 50,264,334**

a. Courtyard infill yields 7,025 sf per floor; Ward Bldgs are carried at 18,725 per bldg
b. Includes Boiler Plant, Service units between 29-43, Laundry, Warehouses and Utility Buildings
d. New construction $225/sf (excluding major site and site utilities); total renovation ($180/sf); major renovation ($100/sf); minor renovation ($65/sf); demolition ($3.50/sf) exclusive of asbestos, etc; mothballing ($1.50/sf per year for 30 year life or $45/sf).
e. Barrett Building refit for new interior finishes, etc., carried at $25/sf
f. Food Service: carried $25/sf for HVAC upgrade
g. Carried at $6.50/sf

Umstead Hospital: Option B.2 Revised

New construction for residential space/re-use of existing campus for program space

Option B.2: Current Beds

	sf/ bed	No./ beds	total sf	New Construct	Barrett Bldg (e)	Ward Bldgs 29-32, 37-40 Extg sf	Ward Bldgs 33-36, 44-47 Extg sf	Activities Center	Admin Bldg	Ward Bldgs 49-54 Extg sf	Food Service (f)	Service Bldgs (b)	Other Bldgs	TOTAL
					79425	165340	165340	49412	46509	98888	33478	69770	320147	1028309
Residential Units	650	513	333450	254025	79425									333450
Program Space	400	513	205200				165340	49412						214752
total	1050		538650	254025	79425		165340	49412						548202
Campus Infrastructure									46509		33478	69770		149757
Mothball/ Unused														
Demolition						165340				98888			320147	584375
Sale/ transfer														
Construction Cost (d.)	$/sf			225	25	3.5	180	180	as is	3.5	25	as is	3.5	
Total $				57155625	1985625	578690	29761200	8894160	0	346108	836950	0	1120515	$ 100,678,873
Add for asbestos removal (g)						1074710	1074710	321178		642772	217607		2080956	$ 5,411,933
													TOTAL	**$ 106,090,805**

a. Courtyard infill yields 7,025 sf per floor; Ward Bldgs are carried at 18,725 per bldg
b. Includes Boiler Plant, Service units between 29-43, Laundry, Warehouses and Utility Buildings
d. New construction $225/sf (excluding major site and site utilities); total renovation ($180/sf); major renovation ($100/sf); minor renovation ($65/sf); demolition ($3.50/sf) exclusive of asbestos, etc; mothballing ($1.50/sf per year for 30 year life or $45/sf).
e. Barrett Building refit for new interior finishes, etc., carried at $25/sf
f. Food Service: carried $25/sf for HVAC upgrade
g. Carried at $6.50/sf

Umstead Hospital: Option C.1 Revised

Re-use of existing buildings with major new enabling construction

Assumptions:	1. Ward building courtyards will be infilled w/ new construction 2. The existing space will be gutted and fully renovated 3. The renovation/ new mix will be approximately 58% renovation to 42% new construction 4. Residential space will occupy 650 sf/bed; support and program space will occupy 400 sf/bed 5. The existing ward buildings are of concrete fireproof construction and in good shape 6. Structural modules are poor and will be addressed by the infill construction to create a functional footprint 7. The present boiler plant is in good condition and will be used as is. 8. Chillers are in poor shape and will be entirely replaced for the new/ reno facility 9. Asbestos is extensive throughout the existing buildings ceilings, flooring (in some cases) and piping insulation. 10. Moderate funding is provided for the kitchen, pending outcome of centralizing or outsourcing this service.

Option C.1: Reduced Beds

	sf/ bed	No./ beds	total sf	Ward Bldgs 29-34 Extg sf	Ward Bldgs 29-34 Infill (a.)	Ward Bldgs 29-34 Total	Barrett Bldg (e)	Activities Center	Admin Bldg	Ward Bldgs 35-54 Extg sf	Food Service (f)	Service Bldgs (b)	Other Bldgs	TOTAL
				122104	84276	206380	79425	49412	46509	379167	33478	69770	241421	1105562
Residential Units	650	256	166400	54947	37924	92871	79425							172296
Program Space	400	256	102400	61052	42138	103190								103190
total	1050		268800	115999	80062	196061	79425							275486
Campus Infrastructure									46509		33478	69770		149757
Mothball/ Unused				6105	4214	10319								
Demolition								49412		379167			241421	620588
Sale/ transfer														
Construction Cost (d.)	$/sf			180	225		25	3.5	as is	3.5	25	as is	3.5	
Total $				20879784	18013995	38893779	1985625	172942	0	1327085	836950	0	844974	$ 44,061,354
Add for asbestos removal (g)				753992	0		0	0	0	2464586	0	0	1569237	$ 4,787,814
													TOTAL	**$ 48,849,168**

a. Courtyard infill yields 7,025 sf per floor; Ward Bldgs are carried at 18,725 per bldg
b. Includes Boiler Plant, Service units between 29-43, Laundry, Warehouses and Utility Buildings
d. New construction $225/sf; total renovation ($180/sf); major renovation ($100/sf); minor renovation ($65/sf); demolition ($3.50/sf) excl of asbestos, etc; Mothballing ($1.50/sf per year for 30 year life or $45/sf).
e. Barrett Building refit for new interior finishes, etc., carried at $25/sf
f. Food Service: carried $25/sf for HVAC upgrade
g. Carried 6.50/sf for asbestos removal

Umstead Hospital: Option C.2 Revised

Re-use of existing buildings with major new enabling construction

Option C.2: Current Beds

	sf/ bed	No./ beds	total sf	Ward Bldgs 29-40 Extg sf	Ward Bldgs 29-40 Infill (a.)	Ward Bldgs 29-40 Total	Barrett Bldg (e)	Activities Center	Admin Bldg	Ward Bldgs 41-54 Extg sf	Food Service (f)	Service Bldgs (b)	Other Bldgs	TOTAL
				244208	168552	412760	79425	49412	46509	257063	33478	69770	241421	1189838
Residential Units	650	513	333450	146525	101131	247656	79425							327081
Program Space	400	513	205200	97683	67421	165104		49412						214516
total	1050		538650	244208	168552	412760	79425	49412						541597
Campus Infrastructure									46509		33478	69770		149757
Mothball/ Unused														
Demolition										257063			241421	498484
Sale/ transfer														
Construction Cost (d.)	$/sf			180	225		25	60	as is	3.5	25	as is	3.5	
Total $				43957440	37924200	81881640	1985625	2964720	0	899720.5	836950	0	844973.5	$ 89,413,629
Add for asbestos removal (g)				1587352	0		0	0	0	1670910	0	0	1569237	$ 4,827,498
													TOTAL	**$ 94,241,127**

a. Courtyard infill yields 7,025 sf per floor; Ward Bldgs are carried at 18,725 per bldg
b. Includes Boiler Plant, Service units between 29-43, Laundry, Warehouses and Utility Buildings
d. New construction $225/sf; total renovation ($180/sf); major renovation ($100/sf); minor renovation ($65/sf); demolition ($3.50/sf) excl of asbestos, etc; Mothballing ($1.50/sf per year for 30 year life or $45/sf).
e. Barrett Building refit for new interior finishes, etc., carried at $25/sf
f. Food Service: carried $25/sf for HVAC upgrade
g. Carried 6.50/sf for asbestos removal