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# SECTION I

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## INTRODUCTION

*“Colorado is poised to become the premier learning university in the nation ...”*

*John C. Buechner, President, University of Colorado  
Regarding the Total Learning Environment*

The University of Colorado Health Sciences Center and the University of Colorado Hospital Authority have engaged in a joint planning master planning process to produce a comprehensive statement about the future of the two important institutions. This plan is unique because it creates a long-term context and vision for the eventual relocation of all of the education, research, service, and patient care programs from the current campus at 9<sup>th</sup> Avenue and Colorado Boulevard to 217 acres at the site of the Fitzsimons Army Garrison in Aurora. The plan describes a strategy to relocate most of the core programs of the two institutions within twelve years. In addition, specific program and facility initiatives that are anticipated to develop with in the next five years at both sites are outlined.

The challenge presented in creating a master plan that depicts the development of programs by two institutions at two sites, concurrent with the physical transition from one campus to another, is unprecedented at the University of Colorado. Capturing and describing the opportunities and challenges inherent in creating the Total Learning Environment of the future for health sciences has occupied hundreds of faculty, students, staff, administrators, elected officials, community representatives, alumni, friends, and others. This plan is the culmination of the combined efforts of these dedicated people. However, the plan represents a beginning, not an end. The plan provides a framework within which to grasp the possibilities and potential of a new campus. It provides a common language and vision to proceed with the implementation of goals and to continue planning to address unforeseen challenges and opportunities.

### **Background**

The University of Colorado Health Sciences Center (UCHSC) and University Hospital (UH) have an extraordinary opportunity to build the state of the art academic health sciences center over the next 20 years. The campus is only just realizing the possibilities presented by a four-fold increase in land upon which a new campus can be placed to house and support responsive and integrated education, research, and clinical care programs. This potential is being made

## SECTION II

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# PROGRAM PLAN

*“The University can, and must, be a guiding light to the people of Colorado and the world in shaping a vibrant, ethical community.”*

*Total Learning Environment Focus Group, 1997*

The planning process utilized for the development of this master plan has included the following stages: 1) the formation of future institutional vision statements; 2) the identification of current expansion and projected program development needs; 3) the determination of current and long-term space and facility requirements necessary to accommodate evolving program needs; 4) the development of a feasible, short-term (14-year) campus transition scenario necessary to guide the successful relocation and expansion of current programs and the opportunistic development of new facilities and infrastructure at the Fitzsimons site; 5) the development of a comprehensive financial plan to accommodate current and new program requirements, the physical development and operation of the Fitzsimons site, and the continued operation and maintenance of the existing campus site; and 6) a review of possible long-term redevelopment options for the existing campus site.

Presented in this section is a discussion of program – education, research, clinical care and service. The contents of this section on program include: an overview of the current institutional environment; a review of related market conditions and program demand; and a summary of future program requirements based primarily upon the master plan vision statements and information obtained from the master plan program survey.

### A. MISSION

The University of Colorado Health Sciences Center (UCHSC) is a public higher education institution and the only academic health center in the State of Colorado and the Rocky Mountain Region. It is one of four campuses of the University of Colorado (CU) governed by the University of Colorado Board of Regents.

The UCHSC main campus is currently located in the residential heart of Denver and encompasses the Schools of Medicine, Nursing, Dentistry, and Pharmacy, the Graduate School, Colorado Psychiatric Hospital, University of Colorado Hospital Authority (UH), and various related affiliated institutions. Several on health sciences institutions supporting the UCHSC include the Barbara Davis Center for Childhood Diabetes, the C. Henry Kempe National Center for the

Prevention and Treatment of Child Abuse and Neglect, the John F. Kennedy Child Development Center, the University Physicians, Inc. (UPI), the Webb-Waring Institute, and the Eleanor Roosevelt Institute for Cancer Research.

With the three-part mission of education, research, and service, both clinic and academic, the campus serves as a hub of abroad network for health care delivery. The mission of the University of Colorado Health Sciences Center reflects the main purposes of the institution: 1) the education of health professionals; 2) the delivery of both health care and community service; and 3) the advancement of knowledge through research in the health sciences. These activities contribute to the overall mission of the campus – to improve human health. The University of Colorado Health Sciences Center has achieved a national and international reputation for excellence in teaching, service, and research and is truly a unique regional and state resource.

The current mission statement for the campus was originally drafted in the late 1970s. Since that time, the statement has been regularly updated by the various chancellors through consultative processes and through their individual drafting efforts. The campus' mission statement follows.

#### **The UCHSC Mission Statement**

The mission statement of the University of Colorado Health Sciences Center (UCHSC) reflects the main purposes of the institution: (1) the education of health professionals; (2) the delivery of both health care and community service; and (3) the advancement of knowledge through research in the health sciences. The mission statement for the campus is as follows:

UCHSC offers programs and role models for the undergraduate, graduate and postgraduate education and training of professional health practitioners. The programs reflect a balanced integration of the basic and clinical sciences, individual and community health problems, curative and preventive health practices, and individual and team efforts. The UCHSC develops and maintains educational and training opportunities for continuing education of practicing health professionals in the state through educational programs.

UCHSC directly provides health care to patients at University of Colorado Hospital Authority, Colorado Psychiatric Hospital, the Children's Diagnostic Center and the Dental Clinic, as well as at several campus affiliates. University of Colorado Hospital Authority has a responsibility to provide health care to many Colorado residents who are financially unable to secure such hospital care elsewhere. The health care services are comprehensive, ranging from first contact (primary) care to highly specialized (tertiary and quaternary) care. The health care services also serve as a foundation for teaching and research activities.

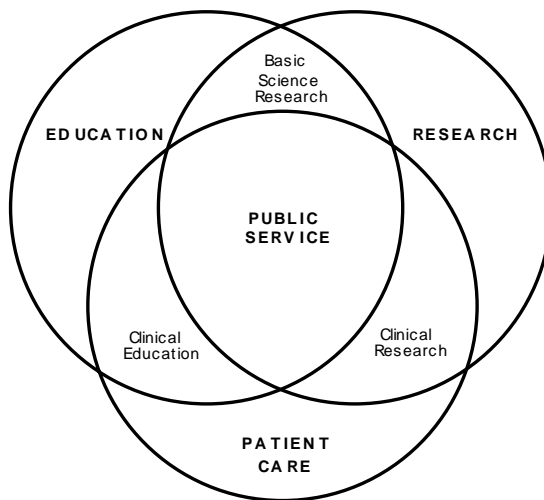


UCHSC advances health knowledge through basic and applied research, functioning as the major health-related research base in the state. UCHSC maintains high standards regarding human subjects throughout its research activities and ensures that any protocols used are intended to benefit both the individual and mankind.

UCHSC is an integral part of the University of Colorado's multi-campus educational system. The center is also a major technical and professional resource for other institutions in the Rocky Mountain Region dealing with health issues. The UCHSC communicates with many constituencies, including the administration, faculty, and staff at other campuses and schools, alumni, professional and civic groups, foundations, and governmental representatives and agencies, and the public.

UCHSC supports its educational, health care, research and external affairs programs through support services aimed at achieving coordinated development, efficient and effective resource management, timely and appropriate informational exchanges, and programmatic accountability. The center also supports its programs by maintaining a safe, secure, and pleasant environment for its patients and personnel, while upholding all aspects of diversity as a necessary condition to achieving the institution's stated objectives and mission.

### Interrelationship among UCHSC'S Missions



### **Legislative Mission**

The legislative mission for the UCHSC is mandated by the Constitution of Colorado. The Colorado Revised Statutes (C.R.S. 23-20-101) states that the UCHSC campus' role is to "be a specialized professional institution offering baccalaureate and graduate programs in health-related disciplines." This mission statement was created during the early history of the institution and although reviewed by the state legislature and the Board of Regents, has not changed since that time.

## **B. CURRENT ENVIRONMENT**

The University of Colorado Health Sciences Center is a critically important institution in Colorado with the primary mission of educating accomplished scientists and health practitioners, including physicians, nurses, dentists and pharmacists to serve in the world of health care. Each year, UCHSC faculty educate 3,100 students, interns, residents, and graduate fellows, conduct approximately \$155 million worth of sponsored research and training, and treat thousands of patients.

Presented below is an overview of current UCHSC programs.

### **Education**

The University of Colorado Health Sciences Center (UCHSC), one of the four campuses of the University of Colorado, is the only comprehensive academic health center in the state of Colorado and the Rocky Mountain region. The UCHSC includes five professional schools: Medicine, Dentistry, Nursing, Pharmacy, the Graduate School. The Colorado Psychiatric Hospital and University of Colorado Hospital Authority (University Hospital) are also major institutional program units of the UCHSC. The primary academic goal of the UCHSC is to provide high quality educational programs which prepare students for careers as health professionals, scientists and educators.

The Health Sciences Center's primary mission is to "improve human health" through the education of health professions; the delivery of both health care and community services; and the advancement of knowledge through research in the health sciences. An international reputation for excellence in teaching, research and service has been achieved by the UCHSC in fulfilling this mission.

The Health Sciences center currently offers professional educational programs leading to doctoral degrees in Medicine, Dentistry, Nursing and Pharmacy, as well as comprehensive clinical training programs for graduate housestaff and fellows; and undergraduate and graduate programs in Nursing, Physical Therapy, and

Pharmacy. Allied Health programs exist in the fields of Dental Hygiene and the Child health Associate program. Graduate programs also exist in the Basic Sciences, Preventive Medicine and the Genetic Associate program. These programs reflect the integration of the basic and clinical sciences, individual and community health problems, and curative and preventive health practices. The Health Sciences Center also provides opportunities for continuing education throughout the state.

#### Graduate School

The Graduate School at the UCHSC is part of the University-wide Graduate School and is responsible for the administration of graduate programs leading to the M.S. and the Ph.D. degrees at the Health Sciences Center.

The Graduate School provides learning in more than a dozen graduate basic science, clinical, and nursing disciplines. The aim of the Graduate School at the UCHSC is to challenge the frontiers of human health and disease. With its distinctive personal mentor-student emphasis, the Graduate School provides programs that develop investigators with broad based knowledge in the biomedical sciences.

The Graduate School mission is to further the purposes of the UCHSC by:

- Assisting departments and faculty in developing, supporting, and administering Ph.D. and master's degree programs in the health sciences;
- Fostering interdisciplinary and interinstitutional programs and collaboration;
- Formulating and maintaining uniform standards for scientific excellence in all graduate-level courses and research experiences offered for credit; and,
- Promoting a supportive graduate student community.

On the UCHSC campus, the Graduate School has grown steadily in the number of its programs, students, and faculty. In the fall of 1996 there were 743 graduate students enrolled in 23 programs leading to the Master of Science and Doctor of Philosophy degrees. The number of UCHSC faculty with graduate appointments now exceeds 430.

### **Master of Science (M.S.) Programs Offered Through the Graduate School**

<b>School</b>	<b>Program</b>
School of Medicine	Biometrics Child Health Associate/Physician Assistant Genetic Counseling Medical Physics Physical Therapy Public Health
School of Nursing	Nursing

### **Doctor of Philosophy (Ph.D.) Programs Offered Through the Graduate School**

<b>School</b>	<b>Program</b>
School of Medicine	Biochemistry Biometrics Cell and Developmental Biology Clinical Sciences Epidemiology Experimental Pathology Human Medical Genetics Immunology Medical Scientist Training Program Microbiology Molecular Biology Neuroscience Physiology Pharmacology
School of Nursing	Nursing
School of Pharmacy	Pharmaceutical Sciences Toxicology

#### School of Dentistry

The School of Dentistry is the only dental school in Colorado and the entire Rocky Mountain Region. The past two decades have witnessed significant development

and sophistication in all three areas of the school's programmatic mission: teaching, scholarship and research, and service (patient care and community activities). The School's teaching excellence program has become a national model for faculty development. The School is nationally recognized as a leader in research in oral cancer, dental pain control, salivary gland disease, and neurobiology. The School of Dentistry operates several dental clinics within the dental school and participates in a variety of clinical programs in other clinics throughout the state. Enrollment in 1997-98 totaled 184 and included 145 professional dental students and 39 dental hygiene students.

The mission of the University of Colorado School of Dentistry is to participate as a respected and responsive member of the UCHSC and the total CU academic community through:

- Education: (1) educating competent, fully qualified general dental practitioners to provide current, comprehensive dental services; (2) educating competent, fully qualified dental hygienists to provide current, comprehensive dental hygiene services; and (3) developing and providing quality postdoctoral dental educational programs.
- Service: (1) providing current primary dental care services to assist in meeting the public's oral health care needs; (2) implementing statewide programs for student provision of direct clinical care services to Colorado's under-served populations; and (3) providing continuing education and professional activities for the mutual benefit of the public and the dental profession.
- Research: (1) actively initiating and conducting scholarly activities and research; (2) encouraging and supporting research opportunities for students; and (3) continue encouraging and supporting efforts to develop centers of excellence in oral sciences research.

The School of Dentistry at the UCHSC offers the following programs and degrees:

<b>Program</b>	<b>Degree</b>
<b>Doctor of Dental Surgery</b>	<b>D.D.S.</b>

The Doctor of Dental Surgery (D.D.S.) program is a high quality innovative educational experience designed to ensure that its graduates possess the knowledge, skills and values to begin the practice of general dentistry. The four academic-year program, consisting of year around course work and approximately 220 earned credit hours, includes didactic, preclinical laboratory and clinical components to its curriculum. The D.D.S. program was fully reaccredited in 1994

by the Commission on Dental Accreditation (CDA), a commission associated with the American Dental Association.

### **Dental Hygiene**

### **B.S. and Certificate in Dental Hygiene**

The Dental Hygiene (D.H.) Program within the School of Dentistry is a baccalaureate program. The program is known as a “two plus two” program in that students first attend two years (60 semester credit hours) of school at any accredited university, college, or community college, prior to applying for entrance into the program. The DH program is accredited simultaneously with the D.D.S. program by the Commission on Dental Accreditation (CDA) and received full accreditation in 1994.

### **General Practice Residency**

### **Certificate of Completion**

The General Practice Residency (GPR) program is designed to provide post-doctoral educational experiences during a one-year or two-year residency program.

### **Continuing Dental Education**

The School of Dentistry has a very active Dental CE department which serves as a state, regional and national resource to thousands of dentists, dental hygienists, and dental assistants. In the years since 1992, 154 courses have been taught to 10,284 participants.

### **School of Medicine**

The UCHSC School of Medicine is the only medical school in Colorado and the largest, most comprehensive of the seven medical schools in the Rocky Mountain Region.

The School of Medicine provides professional medical educational programs to medical students, allied health students, graduate students, and housestaff. It also provides practicing health professionals and the public with community and Continuing Medical Education. The school offers several degrees: Doctor of Medicine (M.D.), Master of Science (Physical Therapy), Bachelor and Master of Science (Child Health Associate/Physician Assistant) and Doctor of Philosophy in biochemistry, biophysics, and genetics; cellular and structural biology; microbiology and immunology; pathology; pharmacology; and physiology. The school also offers the Medical Scientist Training Program leading to a combined M.D./Ph.D. degree granted in conjunction with the Graduate School and several interdepartmental graduate programs in neuroscience, molecular biology, and immunology.

The mission statement of the University of Colorado School of Medicine is to provide Colorado, the nation and the world with programs of excellence in:

- Education through the provision of educational programs to medical students, allied health students, graduate students and housestaff, practicing health professionals and the public at large;
- Research through the development of new knowledge in the basic and clinical sciences, as well as in health policy and health care education;
- Clinical care through state-of-the-art clinical programs which reflect the unique educational environment of the University, as well as the needs of the patients it serves; and,
- Community service through sharing the school's expertise and knowledge to enhance the broader community, including affiliated institutions, other health care professionals, alumni and other colleagues, and citizens of the state.

The School of Medicine at the UCHSC offers the following programs and degrees:

**Program**

**Degree**

**Doctor of Medicine**

**M.D.**

The School of Medicine's Doctor of Medicine (M.D.) program is designed to provide the scientific and clinical background to prepare graduates for the practice of medicine. The four-year curriculum provides a thorough grounding in basic and clinical sciences, exposure to patients in clinical and hospital settings, and integration of teaching in the basic and clinical sciences across the four years of medical school. The M.D. program has been continuously accredited since 1936 by the Liaison Committee on Medical Education.

**Physical Therapy**

**M.S.**

The Master of Science (M.S.) in physical therapy (PT) program is offered in conjunction with the Graduate School. The PT program is designed to train health professionals whose primary purpose is the promotion of optimal human health and function through the application of scientific principles to prevent, assess, correct or alleviate acute or prolonged movement dysfunction. PT students at the UCHSC are trained to evaluate persons who are disabled as a result of pain, disease, injury or developmental delay and to plan and administer appropriate therapeutic programs. The M.S. in physical therapy program at the UCHSC has provided 50 years of quality education and service to Colorado and the Rocky Mountain Region, maintaining continuous accreditation since 1947. An eight-year





**Clinical Sciences**

**Ph.D.**

Graduate work to provide physician students with the background necessary to ensure a meaningful progression through the didactic and research training of Clinical Investigation and Health Services Research.

**Epidemiology**

**Ph.D.**

A course of study dealing with the incidence, distribution, and control of disease in populations.

**Experimental Pathology**

**Ph.D.**

A program designed to bridge the fields of cellular and molecular biology, biochemistry, immunology, and pathology.

**Genetic Counseling**

**M.S.**

A two-year course of study designed to prepare students to work as knowledgeable, competent, caring, and creative genetic counselors.

**Human Medical Genetics**

**Ph.D.**

The program in Human Medical Genetics is an interdisciplinary program which provides research training in the rapidly developing area of human genetics, especially as it regards medical aspects of the discipline.

**Immunology**

**Ph.D.**

A course of study on the immune system and the cell-mediated and humoral aspects of immunity and immune responses.

**Medical Physics**

**M.S.**

A course of study provided by the Department of Radiology that combines classroom instruction with laboratory work and practical experience in a variety of clinical settings and includes training in all areas of diagnostic radiology.

**Microbiology**

**Ph.D.**

A course of study oriented toward basic research in molecular microbiology and the molecular pathogenesis and immunology of infectious disease.

**Molecular Biology**

**Ph.D.**

An interdepartmental course of study that is a student-centered program with faculty that share an interest in conducting research on basic principles of molecular biology.

**Neuroscience**

**Ph.D.**

A training program providing multidisciplinary training in neurobiology, from neuronal gene regulation to the development, structure, and function of the nervous system.

**Pharmacology**

**Ph.D.**

A course of study that seeks to understand basic biochemical, cellular and physiological mechanisms by analyzing the perturbation of these mechanisms by drugs.

**Physiology**

**Ph.D.**

A multidisciplinary course of study in cellular and molecular physiology with an emphasis on cellular, molecular, and developmental neuroscience.

**Public Health**

**M.S.P.H.**

A program design to educate students in the core content and methodological areas of public health, prepare them for practical application of public health skills and knowledge of public health issues and problems, and enrich graduate medical education programs and continuing education for public health professionals.

**Medical Scientist Training Program**

**Combined M.D./Ph.D.**

The Medical Scientist Training Program (M.D. /Ph.D.) offers highly qualified students the opportunity to become physician scientists with dual M.D. and Ph.D. degrees. The curriculum is designed to combine contemporary medical education with a rigorous training program in basic biomedical science. The curriculum provides students with the opportunity to couple medical studies with in-depth advanced research in a selected field.

**Continuing Medical Education**

The Office of Continuing Medical Education (CME) serves the School of Medicine as a resource for planning and conducting educational activities for practicing physicians and allied health care personnel in Colorado, the Rocky Mountain Region and elsewhere in the U. S. and abroad. The commitment is supported by a determination to provide CME activities of the highest quality in accordance with the Essentials for CME of the Accreditation Council for Continuing Medical Education.

The scope of the CME effort includes the needs of both primary care physicians and clinical subspecialists to review basic science principles and clinical applications, including aspects of medical ethics, economics, and health care reform. The methods range from individual lecturers and courses, consisting of lectures and small group discussions, to the production of audiotapes. The latter provide more flexibility in reaching rural practitioners who are unable to attend courses frequently.

Participants are physicians throughout Colorado and the Rocky Mountain Region, including generalists, specialists, subspecialists, and medical researchers, as well as physicians from other regions and other health professionals, including physician assistants and nurses.

## **School of Nursing**

The School of Nursing was established in 1898 in connection with the School of Medicine and University Hospital on the Boulder campus. In 1920, the School offered one of the nation's earliest bachelor of sciences degrees. In 1924, the School of Nursing and the School of Medicine moved to the Denver campus. In 1949, the School of Nursing became an autonomous professional school. In 1965, the School of Nursing offered the first nurse practitioner program in the nation. Also, in keeping with its reputation for innovation, the School of Nursing added a Doctor of Nursing (N.D.) degree program that is one of only three in the country.

Today, in addition to the B.S. degree in nursing, other degrees offered include the Nursing M.S. and Ph.D., and the Nursing Doctorate (N.D.). Enrollments during 1997-98 in the School of Nursing totaled 683 and included 211 undergraduates, 353 graduate students and 119 students enrolled in the Nursing Doctorate program.

The School of Nursing's mission is focused on professional nursing--the art and science of human caring. It is a discipline committed to the search for new knowledge and understanding of human responses in health and illness. It is also a discipline that seeks caring modalities and environments that make possible both health and healing. The School of Nursing's mission and goals are focused on professional nursing within these frameworks.

The University of Colorado School of Nursing seeks to improve health care, especially for residents of Colorado and the Rocky Mountain Region, by providing leadership in educating professional nurses, conducting research, delivering health care, and participation in community service. In particular, the mission of the School of Nursing is:

- To develop and offer educational programs that prepare nurses to provide exemplary professional nursing care and to contribute to the development of nursing knowledge.
- To engage in diverse research activities which contribute to knowledge and understanding of the science, art, and practice of nursing in the complex and changing health care system.
- To provide nursing care through direct services and indirectly through affiliated programs and consultations with other health providers.
- To provide community service to the State and larger community by developing and extending nursing education, research, and practice programs.

-To provide consultation and leadership in addressing health care issues at a local, state, and national and international levels.

The School of Nursing at the UCHSC offers the following programs and degrees:

**Program**

**Degree**

**Nursing**

**B.S.**

The Bachelor of Science program is one of six generic baccalaureate nursing programs in the state. It is a two-year upper division major designed to prepare students for entry into the nursing profession in generalist practice. The B.S. curriculum focuses on the discipline of nursing and is supported by a strong liberal arts and sciences foundation.

**Nursing**

**M.S.**

The Master of Science (M.S.) Program, one of four nursing master's programs in the state, educates nurses for advanced practice in self-defined or program administration, nurse-midwifery, psychiatric-mental health nursing, and primary health care programs for adults and defined areas of specialty (i.e., adult health, community health nursing, nursing children, women, families, and families/communities/individuals). The M.S. program is structured to provide the foundation for career paths of potential leaders in advanced nursing practice and the foundation for doctoral study in nursing. The master's curriculum builds on the knowledge and competencies of baccalaureate education in nursing and provides for the attainment of advanced knowledge and practice of nursing consistent with the school's mission.

**Doctor of Nursing**

**N.D.**

The Doctor of Nursing (N.D.) program, the only one in the Western region and one of three in the United States, offers an advanced generalist, first professional nursing degree. The N.D. program is a four-year, post-baccalaureate professional degree program. The program involves three years of rigorous academic course work plus one year of professional clinical residency.

**Nursing**

**Ph.D.**

The Ph.D. program in nursing, the only one in the state, is designed to prepare nurse scholars who are highly motivated toward advancing the art, science, and practice of the nursing discipline, and to investigate theories, policies, and clinical procedures that preserve human dignity, promote quality of life, and foster social well-being. The curriculum focuses on the use of a broad range of methods of inquiry appropriate for describing nursing phenomena and the conduct of nursing theory development and nursing research.

### **Continuing Education**

Throughout its history, the School of Nursing has served the educational needs of practicing nurses in Colorado and has been a national leader in continuing education. Continuing nursing education, offered both on and off campus, statewide and nationally, provides a bridge between the School of Nursing and the registered professional nurse who has a basic need to maintain competency and commitment in a rapidly changing field.

### **School of Pharmacy**

The School of Pharmacy is a comprehensive institution of higher education committed to excellence in teaching and learning. The purpose of the school's professional education programs is to train competent pharmacy practitioners.

The School of Pharmacy occupies the unique position of being the only pharmacy school in the state. In this capacity, the school's general mission is to educate and provide a sufficient number of competent pharmacy practitioners to meet the needs of the State of Colorado, help to produce enough pharmacists for society at large, and to provide graduate education in pharmaceutical sciences, toxicology, pharmacy administration and clinical pharmacy to help meet the nation's and society's needs for educators, researchers and advanced clinical practitioners. To achieve these goals, the school offers professional educational programs in pharmacy and graduate degree programs in pharmacy, pharmaceutical sciences and molecular toxicology and environmental health sciences. Each of these programs is unique within the University system and provides educational and experiential training in disciplines specific to pharmacy practice and pharmaceutical research. In achieving these overall objectives, the faculty of the School of Pharmacy actively participate in interdisciplinary, collaborative research, as well as in practice environments where multidisciplinary teams of health care professionals contribute to the care of patients.

The mission statement for the School of Pharmacy is stated below.

The University of Colorado School of Pharmacy is a comprehensive institution of higher education committed to excellence in teaching, research and public/professional service in areas unique to the practice of pharmacy and to the pharmaceutical sciences. The school's professional educational programs have as their principal purpose the training of pharmacy practitioners who are compassionate, ethical and caring; scientifically knowledgeable and technically competent; skilled at communication and teamwork; motivated to pursue lifelong learning; and dedicated to fulfilling the public trust by assuring the safe, effective and efficient use of prescription and non-prescription drug products.

The school's faculty endorse the concept that pharmaceutical care, defined as "the responsible provision of drug therapy for the purpose of achieving definite

outcomes that improve a patient's quality of life," constitutes the essence of the pharmacy profession and, as such, must provide the foundation for every aspect of the school's professional curriculum. Faculty members are committed to teaching excellence and to continuous monitoring of the professional curriculum to ensure its faithfulness and relevance to the tenets of pharmaceutical care. Pursuant to this commitment, faculty members welcome the scrutiny provided by student and peer evaluations and by outcomes measurements that assess overall teaching quality and lead the way to improvements in the school's instructional programs.

The faculty also are dedicated to the discovery and dissemination of new knowledge. Encouraging faculty members to engage in creative activities that have a positive impact on the well-being of society, providing these faculty members with the resources necessary to develop into accomplished scholars and supporting graduate, post-graduate and post-professional research training programs are major priorities of the School of Pharmacy. Finally, and most importantly, the faculty recognize their responsibility to promote diversity and equality of opportunity throughout the School of Pharmacy and to advance the profession of pharmacy through public advocacy and through participation in the affairs of local, national and international pharmacy organizations.

The School of Pharmacy at the UCHSC offers the following programs and degrees:

**Program**

**Degree**

**Pharmacy**

**B.S.**

The baccalaureate degree program offered by the School of Pharmacy consists of a two-year pre-pharmacy component and a three-year professional pharmacy component. The pre-pharmacy component may be taken at any accredited college or university. The pharmacy component is taught in its entirety by School of Pharmacy faculty and preceptors at the UCHSC campus and at various experiential sites. The objectives of the baccalaureate pharmacy curriculum are to instill in students a comprehensive body of knowledge, attitudes and clinical and professional skills that will enable them to deliver rational, safe and cost-effective drug therapy to all members of society; to communicate effectively with the general public, patients and other health care practitioners; and to succeed in a pharmacy career in a changing health care environment through lifelong learning and adapting to change.

### **Doctor of Pharmacy**

### **Pharm.D.**

The School of Pharmacy offers a post-baccalaureate professional Doctor of Pharmacy (Pharm.D.) program for graduates of accredited schools and colleges of pharmacy. The curriculum for the program consists of didactic coursework and clinical clerkships.

### **Doctor of Philosophy**

### **Ph.D.**

The school, in conjunction with the Graduate School, offers two Doctor of Philosophy (Ph.D.) degree programs -- one in pharmaceutical sciences, and the other in toxicology. The Ph.D. in toxicology is a research-based program concerned with understanding the adverse effects of chemical and other dangerous substances on humans and other living organisms. The Ph.D. in pharmaceutical sciences is also a research based program concerned with the development of new drugs and the improved treatment of disease. Research areas currently emphasized include: 1) medicinal chemistry, 2) pharmacology, 3) pharmaceutics , and 4) toxicology.

### **Continuing Education**

Continuing education is an integral part of the School of Pharmacy's mission. Continuing educational opportunities are provided to enhance the practice skills of Colorado pharmacists and to lead to better quality of care and patient outcomes for the health care consumer. The School of Pharmacy has taken a leadership role in providing quality continuing education activities for pharmacists practicing in Colorado. The External Programs Office of the School of Pharmacy has accredited more than 100 individual programs during the past two years. These programs have been offered throughout the state and have included single and multi-topic seminars, individual presentations for professional society meetings and correspondence courses.

### **Research**

The research mission of the University of Colorado Health Sciences Center is to develop new knowledge which will be applied to the prevention and treatment of human disease and to the improvement of human health. To better serve the people of Colorado and the public good, research discoveries are the scientific basis for improved patient care.

The University of Colorado Health Sciences Center research effort is based on a strong faculty which values and advocates for research.

In the past 50 years, the UCHSC has emerged as a nationally and internationally renowned center for health-related research. Some of the major breakthroughs which have occurred at the UCHSC include:

- first to identify the "battered child" syndrome

- development of the first classification and numbering system of human chromosomes, which became the standard for the world
- first fetal cell implant for Parkinson's disease in the nation
- first immunology research to identify synergism between B and T-lymphocytes
- world's first 3-D images of the human body derived from anatomical sections
- first liver transplant in the world
- first successful series of open-heart operations under hypothermia, which revolutionized open heart surgery around the world
- first description of toxic shock syndrome
- world's first instance in humans of what is now called cloning
- pioneering research leading to the development of influenza vaccines and the eradication of smallpox
- first human thyroid autograft, using tissue from one's own body to repair damaged or diseased tissue
- first discovery of the magnetic component of human brain response in schizophrenic patients
- first to define adult respiratory distress syndrome (ARDS)
- development of Denver Developmental Standardized Test, establishing a national model to assess childhood development
- discovery that lymphocytes are preprogrammed to respond to antigens: the cornerstone of immunology
- pioneering work in the use of ultrasound in obstetrics
- developed preferred surgical procedure for thoracic outlet syndrome
- first arterial homograft (use of human arterial tissue in heart surgery)
- first in nation to use ultrasound technology on a patient
- first in nation to perform Kasai surgery to correct biliary atresia, preventing liver failure in children
- first to use steroids in immunosuppression as a way to prevent rejection of transplants
- discovery of granulopoietin, which stimulates production of infection-fighting white blood cells
- first genetic counseling team
- first identification of the genetic factor in conversion of normal cells to cancer cells
- first specialized pediatric unit in region to care for kidney patients as young as newborns
- classification of gestational periods in newborns to assess neonatal development
- discovery of new skin disease (Huff's disease)
- development of the Colorado-Bhovona speech prosthesis for surgical restoration of speech following a laryngectomy
- first to prove vitamin E deficiency as a cause of neurologic symptoms in children with chronic cholestatic liver disease
- development of non-invasive tests to measure gallbladder function and bile acid metabolism



- world pioneer in use of high resolution electron microscopy to study dynamics of caries formation
- pioneered computerized model for tooth alignment in ethnic populations
- pioneered model of systems and analysis for dental health care in the elderly population
- first demonstration of killing cancer cells by genetic manipulation of toxin genes
- first to identify a growth factor for normal white blood cells
- first multimodality specialized melanoma clinic
- first fetal cell implant of Type I insulin-dependent diabetes in the nation

Faculty research strength and expertise are requisite to strong academic programs. Today's students will be competent professionals only if their teachers are expanding the knowledge base of the health care system. UCHSC plays a crucial role in fostering basic and clinical research to create new knowledge as well as provide training opportunities for the next generation of Colorado's health care providers, teachers and scientists. The UCHSC currently ranks in the top 25 among academic research institutions in the country in terms of extramural funding. Sponsored project activity at the UCHSC continues to grow. The Health Sciences Center received more than \$154 million in sponsored research grants and awards for the 1996-97 year.

UCHSC also plays an integral part in a vast regional and national network of health-related research activities through such centers, institutes, and affiliates as the University of Colorado Cancer Center, the Webb-Waring Institute, the Barbara Davis Center for Childhood Diabetes, the C. Henry Kempe National Center for the Prevention and Treatment of Child Abuse and Neglect, the John F. Kennedy Center for Child Development, the Center for Health Services Research, the Colorado Prevention Center, and the National Jewish Medical Center

New and expanded research efforts include human genetics, neurosciences, molecular genetics, immunobiology, molecular toxicology and environmental health, hepatobiliary research, pulmonary, perinatal and chemical abuse research, a comprehensive range of oral sciences research, and nursing and caring science research. In addition, liaisons are being established with private businesses to encourage the rapid introduction of new technologies and therapeutic products into the market.

#### School of Medicine

The School of Medicine is the major health research base in Colorado, currently attracting millions of dollars (\$125 million) in research and training grants annually to advance knowledge of biomedical sciences through basic and applied research. Each School of Medicine department conducts research to expand

knowledge about the intricacies of the human body. Some of this research is interdisciplinary in that it is a cooperative effort with other departments or with affiliated institutions on campus.

As earlier described, the School of Medicine's physicians and scientists have pioneered breakthrough medical advances in cardiology, oncology, surgery, genetics, immunology, microbiology, and other medical fields.

Major research programs at the school include those in basic sciences, molecular biology, neuroscience, and genetics. Clinical research areas include cancer, heart disease, AIDS, diabetes, and pulmonary diseases. The school has pioneered in transplantation and recognition of child abuse and neglect as an entity, as well as research in alternative forms of health professional education. Adult and Pediatric Clinical Research Centers have been continuously funded by the National Institutes of Health for more than three decades, and research programs in Native American mental health and alcohol and substance abuse have developed national and international reputations.

The School of Medicine receives significant research funds through grants and contracts. The trend in the amount of awards received by the school during the past ten years has been very positive. In 1996, the school ranked 13th out of 125 medical schools in terms of magnitude of change in total NIH-awarded research funding. A list of key grants and contracts awarded to the School of Medicine for the fiscal year 1996-97 is provided below.

<b>Title</b>	<b>Sponsor</b>	<b>Total \$</b>
Clinical Research Center – Adult	NIH	3,736,496
Epidemiology and Utilization: American Indians	NIMH	2,705,213
SPORE in Lung Cancer - 04 Year	NIH	2,302,810
SPORE in Lung Cancer - 05 Year	NIH	2,253,129
Clinical Research Center	NIH	1,740,390
Genetic Approaches to Neuropharmacology	NIAAA	1,687,012
Addiction Research and Treatment	CDHS	1,685,884
SCOR - Lung Diseases, Infants and Children	NIH	1,617,681
Clinical and Technical Evaluation of Full-field Digital	Army	1,600,000

### Mammography

Adaptations to Hypoxia	NIH	1,504,519
Colorado AIDS Clinical Trial Unit	NIH	1,457,063
PLCO Screening Program	NIH	1,430,492
SCOR in Acute Lung Injury	NIH	1,106,864
Genetic and Neurobiology Study of Schizophrenia	NIMH	1,063,712
Colorado Rural Immunization Services Project	CDC	1,058,512
American Indian/Alaska Native Research	NIMH	1,049,261
Regulation, Release and Action of Vasopressin	NIH	1,015,390
Aminergic Function in Aging and Alzheimer Disease	NIH	960,228

### School of Dentistry

The School of Dentistry is committed to the advancement of knowledge through research in the health sciences. Research is an integral component of the school's programs. The School of Dentistry has regularly received between \$700,000 and \$1,000,000 annually in external funding for research in a wide range of topics. During the 1996-97 year, the School of Dentistry received approximately \$812,000 in sponsored research grants and awards.

These funds for research have come from federal, state and private sources. Studies in molecular biology, salivary gland research, neurobiology, oral cancer, periodontics and various other clinical disciplines are indicative of the types of scholarship and research conducted in the School of Dentistry.

The construction of a dedicated clinical research facility in 1995 adjacent to the new School of Dentistry faculty practice has further enabled faculty to participate in clinical research projects. The planned creation of a postdoctoral program in orthodontics, coupled with the planned Rocky Mountain Center for Oral and Maxillofacial Rehabilitation, will provide additional avenues for clinical investigations and research opportunities.

Specific research grants received by the school have supported the following fields of research:

- clinical cancer education
- papilloma virus in smokeless tobacco and the development of oral carcinogens
- oral tissue response and release of sanguinarine
- dental utilization patterns in older adults
- primary culture of salivary gland cells
- regulation of submandibular acinar cell secretion

In addition, several small instrument grants from the National Institutes of Health (NIH) have been obtained.

#### School of Nursing

The School of Nursing is committed to the advancement of knowledge through research in the health sciences. The school is successful in seeking extramural funding. During the 1996-97 year, the School of Nursing received approximately \$2.8 million in sponsored research grants and awards.

Research in the School of Nursing is directed toward improving the health of individuals, groups, and communities. This research focuses on the development of new nursing knowledge and on the improvement of nursing practice. Nursing research is oriented toward basic and applied scientific inquiry related to areas including: (a) experiences with and responses to various health and illness conditions, (b) the effects of nursing management on health and illness outcomes, (c) attributes of provider-patient (client) care relationships that lead to positive health and illness outcomes, and (d) health care systems that optimize the delivery of health care services.

The School of Nursing has an active research program with projects funded internally (e.g., Intramural Research Awards, Dean's Research Awards, University Hospital) and externally (e.g., National Institutes of Health, foundations, local care institutions).

The internal structure of the school's research program includes the Center for Nursing Research (CNR) and the Research Council of the faculty. In 1984, the CNR was organized to develop, implement, and monitor research and evaluation activities in teaching, research, administration, and practice. It is a key part of the infrastructure for nursing research and scholarship activities at CU. The CNR provides support through consultation, statistical and technological assistance including literature searches and Internet access, training in research methods and software use, and assistance with data management and analysis. In addition, the CNR provides research services to the health care community,

particularly clinical agencies and other health care organizations that require clinical evaluations but do not have the resources or expertise to conduct studies themselves. The School of Nursing is committed to providing the support necessary to assist faculty in developing research projects and in conducting studies once they are funded. The Research Council provides such support. Through the Intramural Research Program of the school's Research Council, faculty have received funding for small scale studies, travel to give presentations, and for research development, literature searches, copying, and audiovisual development.

The school has long been recognized for its research and scholarly productivity. Faculty research primarily has focused on major clinical problems such as pain assessment and control, research on the health care transitions of the elderly, and infant growth failure and nursing care. Faculty research endeavors have achieved national and international recognition, and faculty have been sought after for participation in scientific review committees and consultations at the national and regional level (e.g., National Institutes of Health, Agency for Health Care Policy and Research, and American Cancer Society) that support and conduct research. Faculty have also participated on and chaired national groups developing clinical practice guidelines. They have also participated in reviews of the state of the science on pain management, community-based nursing strategies and complementary healing methods.

Key research affiliations include University Hospital, The Children's Hospital, the VA Medical Center, and other hospital and community-based clinical agencies. Joint appointments of faculty with such agencies facilitates the identification of important research questions to be pursued, enables clinical agencies to obtain needed research consultation and access to the latest research findings, and provides faculty with clinical expertise for their studies. The School of Nursing has ties with other schools of nursing throughout the state, supports joint activities such as research seminars, and provides research assistance to their faculty as requested.

#### School of Pharmacy

The current research activities are diverse in nature, reflecting the interests of faculty members in numerous disciplines including pharmacology, toxicology, medicinal chemistry, biochemistry, cancer biology, drug formulation, stability and delivery; pharmacokinetics, new drug development, pharmacy administration, pharmacoeconomics, and the improved delivery of pharmaceutical care. The three principal areas of programmatic emphasis are pharmaceutical biotechnology, molecular toxicology and environmental health and pharmacoeconomics. These activities are consistent with the stated goals and objectives of the school and support its mission of education, research, patient care and service.

The School of Pharmacy has a strong tradition of research in the pharmaceutical sciences and consistently ranks in the top ten schools of pharmacy nationally for total NIH funding and NIH funding per faculty member.

Extramural-funding for grants and contracts during the last five fiscal years (1991-92 through 1996-97) totaled \$18,497,800 of which \$2,715,557 represented indirect costs.

Future plans for research programs at the School of Pharmacy will seek to maintain current strengths in individual research programs while fully developing the three major research and graduate educational programs in the school, i.e., the collaborative program in pharmaceutical biotechnology, the program in molecular toxicology and environmental health and the program in pharmacoeconomics them to pursue careers as clinician researchers.

### **Clinical Care and Service**

The delivery of services is another essential purpose of the UCHSC. The UCHSC provides both clinical and community service. The UCHSC provides clinical service through affiliation with University Hospital, Colorado Psychiatric Hospital, the School of Dentistry Clinics, and other institutions both within the Denver area and throughout the State of Colorado. Several UCHSC patient care programs are linked regionally with larger health care delivery systems such as the regional high-risk perinatal care providers. The UCHSC also provides community service through the volunteer efforts of the faculty, staff, and students. Faculty at the UCHSC give community service time to provide health education and information to Colorado citizens, patient care to many people without means, and other volunteer services.

#### **Colorado Psychiatric Hospital (CPH)**

The Colorado Psychiatric Hospital was established by the Colorado General Assembly in 1923 with the statutorily defined mission "for the care and treatment of Colorado residents who are afflicted with a mental disease which can be corrected by observation, treatment and hospital care." CPH is staffed by 35 faculty from the School of Medicine's Department of Psychiatry and 140 other employees who work closely with University Hospital to provide adult and child outpatient services as well as intensive and alternative inpatient care. CPH, as a unit of the University of Colorado Health Sciences Center, provides the psychiatric service for University Hospital. All clinical programs of CPH serve as the teaching laboratory for housestaff and trainees; psychiatry, psychology, and social work; and for students; medical, nursing, occupational therapy, and speech pathology.

CPH's current programs include, besides instruction, inpatient services, emergency psychiatric service, adult outpatient services, and child outpatient services. Additionally, the following research groups are also included within CPH: National Center for American Indian and Alaska Native Mental Health Research; Center for Neurosciences and Schizophrenia; Program on Early Developmental Studies; Developmental Psychobiology Research Group (DPRG); MacArthur Research Network on Early Childhood Transitions; Magnetoencephalography Laboratory; the Primate Laboratory; Addiction, Research and Treatment Services (ARTS); Postdoctoral Research Training Program; and Programs for Public Psychiatry.

#### University Hospital Authority (UH)

University Hospital (UH) is the primary site for the provision of clinical education to the students of the Health Sciences Center, the clinical research for the UCHSC faculty and the provisions of health care to the citizens of Colorado. The University Hospital was established in 1921 by the Colorado General Assembly. UH is staffed by 500 physicians who are faculty in the School of Medicine and housestaff. The Colorado General Assembly declared into law that "the needs of the citizens of the State of Colorado and the University of Colorado Health Sciences schools will best be served if the Colorado University Hospital is operated by a quasi-governmental and corporate entity charged with the mission of operating a teaching hospital for the benefit of the Health Sciences schools and providing for the medically indigent." The hospital was reorganized as a not-for-profit entity by the Colorado legislature in 1991, with the enactment of Senate Bill 91-225, to create the University of Colorado Hospital Authority (UHA)

University Hospital is a regional, acute care teaching hospital which offers a full spectrum of primary, secondary, and tertiary adult services, supported by medical staff/faculty representing all major medical and surgical subspecialties. UH provides a comprehensive array of diagnostic and therapeutic services on both an inpatient and outpatient basis.

As the principal teaching hospital for the University of Colorado Health Sciences Center, University Hospital shares the Center's commitment to excellence in the education of health professionals, delivery of comprehensive health services, the acquisition of new knowledge through research, and service to the University, the community, state and region. The mission of the hospital is to support these goals by providing high quality patient care programs and comprehensive, up-to-date clinical facilities in an effective, forward-looking, financially sound manner. The hospital seeks to achieve the following primary objectives:

- To provide the highest quality of health care ranging from primary care to the most highly specialized, complex tertiary care and diagnosis.

- To ensure that an environment exists in which the faculty and students in all health-related disciplines have the opportunity to acquire and maintain the professional values, knowledge and skills that will enable them to contribute effectively to the advancement of health care practice and health science.
- To provide an environment conducive to, and supportive of, basic and clinical research aimed at increasing knowledge and developing new and improved ways of prevention, diagnosis, treatment and rehabilitation.
- In cooperation with the state and within available resources, the Hospital is committed to providing health care to the medically indigent citizens of Colorado.

University Hospital, with 393 licensed beds is rated among the top 25 hospitals in the nation. During fiscal year 1995-96, the tertiary care facility had more than 15,600 inpatient and 254,000 ambulatory visits. Approximately 90 specialty clinics associated with University Hospital provide services to Colorado and the surrounding region such as: birth defects, cleft palate, diabetes, head and neck



tumor, high risk/dystocia, home dialysis, nutrition, pain, PKU, and hematology/



#### University Physicians, Inc.

The University of Colorado Medical Services Foundation (UCMSF) dba University Physicians, Inc. (UPI) is a Colorado nonprofit corporation organized to perform billing, collection and disbursement for the professional services rendered as authorized in Section 23-21-106(2), Colorado Revised Statutes 1973.

Membership in the corporation is open to individuals who, at the time of applying, hold appointments as Executive Faculty members of the University of Colorado School of Medicine and who are employed either by the University or pursuant to a University of Colorado School of Medicine contract with an affiliated institution.

The Board of Regents established the UCMSF as a nonprofit corporation with the following purposes:

- To provide the vital support necessary to assist the UCHSC's School of Medicine in accomplishing certain of its missions and functions, including by way of example and not by way of limitation its education, research and service goals,
- To attract and retain high quality faculty to teach, conduct research and provide patient care through the provision of reasonable and competitive levels of compensation.
- To provide efficient administrative and financial support for the School of Medicine academic programs.

The fees collected by UPI are used to remunerate and support the professional clinical, research, and educational activities of the members of the School of Medicine faculty. A ten percent Academic Enrichment Fund tax is applied by the Dean of the School to support the academic mission. The Board of Regents annually review and approve UPI's Financial Plan and Operating Agreement with the University.

#### School of Dentistry

The educational and accreditation requirements for dental and dental hygiene programs demand extensive clinical instruction and patient care experience. The School of Dentistry, therefore, operates dental clinics within the dental school facility and participates in a variety of clinical programs in other clinics throughout the state. Although the primary reason for operating these clinics is to provide students with the necessary clinical instruction and patient care experience, the

school's clinics and clinical programs provide an extensive amount of dental care services to the citizens of the State of Colorado.

The Dental Faculty Practice, a new multi-specialty group practice, provides outpatient care and is affiliated with and situated within the academic environment of the School of Dentistry. The Dental Faculty Practice is a new program that was previously situated outside of the School of Dentistry. Through the Dental Faculty Practice, the faculty of the School of Dentistry provide a wide range of dental care and consultative service to patients and health care professionals within the Rocky Mountain Region. Agreements between the School of Dentistry and University Hospital enables the Dental Faculty Practice to provide educational opportunities for students, faculty and the local dental community.

The Advanced Clinical Training and Services (ACTS) Program is a state-wide system for service-learning in dental education. It is a cooperative effort between the School of Dentistry, community-based providers and underserved Colorado residents. Through fieldwork in controlled environments, students gain experience in treating diverse groups of individuals whose access to dental care may be limited by economic, physical, geographic or medical constraints.

#### School of Medicine

The community service mission of the School of Medicine includes local, statewide, regional, national, and international activities that are in collaboration with governmental health and human service agencies, professional associations, and non-profit organizations.

The School of Medicine is involved in patient care outreach education, research and other service at a variety of levels. This commitment extends to the citizens and communities of Colorado, as well as to professional health care providers. The School of Medicine effectively delivers a range of health care services through sharing the school's expertise and knowledge to the community, to affiliated institutions, to other health care professionals, to alumni and to other colleagues and citizens of the state.

#### School of Nursing

The School of Nursing effectively participates in community service by delivering health care and by extending nursing education, research and practice programs.

Since its approval in 1993, the School of Nursing faculty practice program has become an integrated and vital manifestation of the School of Nursing faculty's commitment to excellence in health care services and to caring for underserved populations. The faculty practice program, CU Health Care Partners: Specialists

in Health and Healing, provides health services to Colorado citizens at clinics for primary care pediatrics, nurse-midwifery and women's health care, rural elderly, school-based care, migrant health, pain management, incarcerated youth, seniors, and families.

The School of Nursing provides community service through educational opportunities in underserved areas through its Extended Studies/CE Program in interdisciplinary educational programs that deliver health care to underserved populations and through non-degree training programs. Examples of the non-degree training programs include:

- Care of Children with Disabilities and Special Needs
- Advances in Maternal and Child Health for Public Health Nurses
- Development and National Distribution of Nine Videotape Training Packages for Preparation of Personnel Serving Children with Disabilities
- Leadership Option Grant, educating Pediatric Nurse Practitioners to provide leadership in the area of children with special needs
- Cancer Prevention and Screening Program for Rural Nurses
- Helene Fuld 21st Century Learning Laboratory

Other ways the school serves underserved populations is through programs and projects, such as:

- Interdisciplinary Rural Teams Training Project (IRT) - A project designed to improve access and coordination of health care services in rural areas of Colorado by enhancing the recruitment and retention of health care providers in these areas. The project is co-sponsored by UCHSC and Colorado's Area Health Education Centers (AHECs).
- National Health Service Corps Fellowship Program - A program designed to enhance the recruitment and retention of health professional students to provide care in rural and underserved areas of Colorado.
- Community Analysis Projects - Since 1980, the students and faculty in the M.S. program option in community health nursing have conducted community analysis/needs assessment for more than 25 rural and urban Colorado communities. The results of the assessments are used by the communities for community development projects and health care planning.

The School of Nursing manifests its commitment to community service through a number of non-academic training grants focused on children with special needs and nurses practicing in underserved areas.

- Center for Human Caring. The School of Nursing opened the nation's first Center for Human Caring in 1986 to develop and promote knowledge of human caring and healing in health and illness. This center provides academic activities in nursing and health sciences, pilots and researches new educational and clinical practice models of caring excellence, hosts resident scholars, and sponsors national and international interdisciplinary programs.
- First Start: Care of Infants, Toddlers and Preschoolers. A program that links higher education with the State of Colorado community college system. The purpose of the program is to prepare community college faculty for course delivery that provides for the inclusion of children with special health care needs into the existing educational system.
- National Resource Center for Health and Safety in Child Care. This center was established in 1995 through funding from the U.S. Department of Health and Human Services, Maternal and Child Health Bureau. The center seeks to enhance the quality of child care by supporting state and local health departments, child care regulatory agencies, child care providers, and parents in their efforts to promote health and safety in child care.
- Office of School Health. The Office of School Health (OSH) at the UCHSC has been a leader in the field of school health for more than 30 years. The Office gathers data regarding school health practices across the country. It has established frameworks for school health services, developed a basic school health library, and established the first school nurse practitioner training program in the nation. Currently, the OSH provides educators, school administrators, health care providers, and community groups with the technical information, advanced training, and resource assistance to develop or enhance health services in school settings. The OSH offers programs and services on the state, regional, national and international level including School Health Rescues Services, Project Assistance, Center City - USA, Project Health PACT, and the School Nurse Achievement Program (SNAP).

#### School of Pharmacy

Clinical pharmacy and patient care services are provided by faculty members of the Department of Pharmacy Practice in conjunction with other health care providers. The purpose of these clinical programs is to provide the faculty and training sites necessary to deliver experiential training, patient care, and research

programs in pharmacy practice. Practice sites include University Hospital and clinics located on the UCHSC campus, affiliated institutions including Denver Veterans Administration Medical Center, The Children's Hospital, Denver Health Medical Center, the National Jewish Medical and Research Center, the Fort Logan Mental Health Center, and The Apothecary at the Wardenberg Student Health Center on the CU-Boulder campus. Clinical faculty, residents and students work as members of multidisciplinary teams to provide pharmaceutical care services to patients in areas such as primary care, critical care, cardiology, geriatrics, oncology, neurology, nutrition support and drug information.

As clinical pharmacy practitioners, these individuals are responsible for providing drug therapy to patients with the goal of achieving defined outcomes that improve the patients' quality of life. Generally, the major patient care responsibilities in the inpatient practice areas of these institutions include participation in multidisciplinary patient care rounds; monitoring patient drug therapy; reviewing medical records; conducting formal and informal supportive care and dosing consults; detecting, reporting and managing adverse drug reactions; providing drug information; and coordinating the provision of pharmaceutical care services in conjunction with other pharmacy practitioners.

At University Hospital, faculty pharmacy practitioners coordinate their patient care efforts with hospital pharmacy staff members who have been assigned to each practice area. The director of pharmacy services at University Hospital has implemented a new system in which many of the traditional distributive functions of pharmacy services have been "recentralized" to the main pharmacy. This reorganization has allowed practitioners on the decentralized satellites to focus more effort on patient care activities.

The pharmacy satellites at University Hospital are staffed with experienced clinical practitioners, many with advanced degrees and/or residency training, who are involved directly and on an ongoing basis in the pharmaceutical care of patients. These practitioners provide pharmacokinetic monitoring and consulting, participate in multidisciplinary rounds, conduct medication profile reviews and review patient histories and offer individualized patient counseling. University Hospital, along with the School of Pharmacy, also offers several pharmacy practice residencies each year. These residencies are designed to develop the skills of post-Pharm.D. graduates in contemporary pharmacy practice.

The nutrition support service is a consult service managed by a nutrition support team consisting of surgeons, a dietitian, two clinical pharmacy faculty practitioners and a nurse. Patients are reviewed daily by a pharmacy practitioner who monitors nutrition status and makes recommendations for changes in parenteral nutrition delivery. The nutrition support service has been modestly successful in billing third parties for pharmacy consultative services.

Oncology clinical pharmacy services are provided to both inpatients and outpatients through the CU Cancer Center. Practice sites are located in the medical oncology and bone marrow transplant units at University Hospital and in the oncology outpatient clinics at East Pavilion. Practitioners coordinate the preparation of chemotherapy; manage chemotherapy-related drug toxicities such as nausea and vomiting, myelosuppression, mucositis, hypersensitivity reactions and drug extravasations; individualize dosing regimens; perform pain management consults; and coordinate the use of all oncology investigational drugs within the institution.

The School of Pharmacy provides service to the community through various mechanisms. Under the guidance of faculty members, students in the School of Pharmacy are encouraged to participate in community service programs.

Drug information services are provided by School of Pharmacy clinical faculty, residents and students at the Drug Information Center in Denison Memorial Library. The center provides a central and unbiased source of current information about drugs and drug therapy to health care providers at the UCHSC and to preceptors and health care providers throughout the State of Colorado. The Drug Information Center also provides extensive, objective support for the University Hospital Pharmacy and Therapeutics Committee through review and analysis of the medical and drug literature.

The school is also an approved provider of American Council on Pharmaceutical Education (ACPE) courses and grants. ACPE continuing education credits are available to pharmacists in attendance.

## **Support**

The first part of this overview on current institutional support resources focuses on those resources that directly support the educational programs of the UCHSC. This section highlights units within the Office of Academic Affairs and the Student Financial Aid Office.

### **Office of Academic Affairs**

The Office of Academic Affairs (OAA) provides support services and assistance to the academic programs on the UCHSC campus, the students enrolled in these programs and the faculty. The following units are part of the Office of Academic Affairs: Academic Affairs Administration, Educational Support Services, Denison Memorial Library, Student Administrative Services and Admissions, Office of Education, and the Colorado AHEC System. In addition, the Geriatric Education Center, part of the interdisciplinary Campus Center on Aging, maintains a relationship with the administration through the Office of Academic Affairs.



### Academic Affairs Administration

The Office of Academic Affairs (OAA) administration serves to administer and coordinate the centrally provided academic and student-related services. The office serves as a liaison on academic and student issues with the president's office, the Board of Regents, CCHE and other outside accrediting agencies. The office is responsible for assuring that the services provided by its units are responsive to the needs of the academic programs and their faculty, staff and students. The office also is responsible for a variety of processes and reports required by the Board of Regents, CCHE and other outside agencies. The office staff serve in leadership roles on a number of UCHSC committees and provide assistance to the schools and their faculty, staff and students.

### Educational Support Services

Educational Support Services (ESS) is the centralized support unit in the Office of Academic Affairs that provides technical and logistical support to the UCHSC programs. ESS provides specialized services and staff support to the campus and UCHSC affiliates. Special emphasis is placed on finding creative solutions to challenges presented by the complex content of UCHSC academic courses. Centralization of such services minimizes unnecessary resource duplication and maximizes the benefits derived from available resources.

The ESS is organized into seven operational units to deliver services:

- *Engineering/Technical Services --maintains and operates the TV operations, master recording and editing system, and a fiberoptic link, tying the four campuses of the University into a network.*
- *Media Production --provides a variety of consultative and production services for video, slide/tape, script development, and audio projects.*
- *Classroom Support --maintains the classrooms and lecture halls.*
- *Classroom Scheduling Activity --schedules the classrooms, lecture halls, auditorium, and conference rooms on the central scheduling pool.*
- *Test/Evaluation Processing Center--provides all test processing services for all degree granting programs.*
- *Visual Images Program (VIP) --provides a full range of photography, graphic services, and medical illustration and meets all presentation and visual arts requirements of the campus.*
- *Teaching Laboratories --supports basic science laboratory courses.*

#### Denison Memorial Library

Denison Memorial Library is the largest biomedical library in Colorado, providing information and services primarily to students, faculty, and staff of the UCHSC. The library provides print and electronic resources, education on information retrieval and management, and access to worldwide information networks. The primary mission of the Denison Library is to assist the UCHSC in accomplishing its mission and goals in education, research, patient care and community service. Denison Library enhances access to the biomedical literature, provides instructional opportunities for individuals to acquire skills in information retrieval and management, acquires a specialized collection of resources, and obtains remote materials in a rapid and cost-effective manner.

#### Student Administrative Services

Student Services provides services to UCHSC in the following programmatic areas: registration, records, admissions, commencement, housing and day care referral, intramural sports, student lounges, student health service and insurance, student government, learning assistance and the on-line student information system. The Student Administrative Services Office is organized into functional units that support the mission of the office and the campus.

**Student Admissions and Records.** The Office of Admissions and Records performs all student registration functions. The office also prepares numerous required reports, microfilms, records, enforces University-wide academic credit and admissions policies, and provides grade distribution and analysis reports. The office also writes and publishes a course book listing all UCHSC courses and University rules in one document, and produces admissions publications which provide admissions information in regard to all UCHSC schools and programs under one cover

**Student Assistance Office.** The Student Assistance Office provides specific services which support and complement the UCHSC students' academic learning. The office provides a housing referral service and produces appropriate publications describing these services. The office also provides information in regard to UCHSC area child care centers, homes, summer camps, and sick child care. The office provides for supportive or referral counseling. Informal and supportive counseling is available to the UCHSC student population through this office. The office also coordinates student intramural sports.

**Office of Education.** The Office of Education provides services and support to the UCHSC faculty and has established the following goals for the unit: 1) to stimulate changes in health professions education programming, in consideration of enhancing the teaching-learning process and in alignment with evolving societal needs, practice patterns, and scientific/technological developments; 2) to provide continuing professional development education for faculty in support of their roles

as “educators”; 3) to consult and/or collaborate with faculty and/or educational units on educationally-related issues and/or activities to include, but not limited to: instructional planning, development, management, and evaluation; instructional materials design, implementation, and evaluation; teaching strategies; student assessment methods; curriculum development, evaluation, and revision; and educational research and scholarship; 4) to maintain collaborative relationships with other units within the Office of Academic Affairs serving to support health professions education; and 5) to establish and maintain collaborative relationships with other units within the University of Colorado System and other institutions/organizations serving complementary purposes.

The Colorado AHEC System. The UCHSC and Colorado communities created the Area Health Education Center (AHEC) System to improve the geographic distribution of health manpower and health services throughout Colorado, by regionalizing and decentralizing of the educational activities of the UCHSC. The AHEC system consists of two principal components: the UCHSC and five Area Health Education Centers. The AHECs and their headquarters communities are: Centennial AHEC – Greeley; Central Colorado AHEC – Denver; San Luis Valley AHEC – Alamosa; Southeastern Colorado AHEC – Pueblo; and Western Colorado AHEC - Grand Junction (Clifton).

The AHEC system strives to improve the education of health professionals by expanding their experiences throughout the state. The system also seeks to impact the supply, distribution, quality, utilization and efficiency of health providers in rural and underserved areas. The AHECs are integrated into a network covering all of Colorado’s 63 counties. The UCHSC is responsible for the overall performance of the AHEC system, its component AHECs and the accomplishment of the statewide objectives. The basic programmatic ingredients of Colorado AHECs are health professions student education and continuing education and consultation services for practicing health professionals. Each of these components is directed toward responding to regional needs with a major emphasis on primary care. The AHEC program has engendered a well-defined commitment by the communities to work with local, regional and statewide health service and health educational institutions.

#### Student Financial Aid Office

The Student Financial Aid Office is housed in the administrative and finance organization of the campus. It is the responsibility of the Student Financial Aid Office to meet the demonstrated financial need of all qualified financial aid applicants at the institution and to administer financial aid in an ethical manner in compliance with all Federal, state, and institutional rules, regulations, and policies. Financial aid resources available to UCHSC students have increased substantially in recent years. In the 1988-89 academic year, students received \$8,210,950 in financial assistance. In the 1996-97 academic year, students received

\$26,985,796 in financial assistance.

#### Administrative Support Resources

Administrative support programs at the UCHSC are primarily housed in the Central Services and Administration Unit on campus and provide centralized support services for the schools, programs and certain clinical functions. A description of the units in Central Services and Administration is provided below:

#### Chancellor

The chancellor is the chief academic and administrative officer for the campus. The chancellor reports directly to the president and has overall responsibility for all campus matters. The units within the Office of the Chancellor include the following:

##### **Office of the Associate Director of Public Affairs**

This office coordinates public and governmental affairs for the UCHSC and legislative relations with the director of public affairs for the University of Colorado System. The associate director serves as the lead legislative liaison for the UCHSC and University Hospital and is responsible for building effective relationships with members of the Colorado General Assembly, legislative staff, other legislative liaisons, executive branch officials, health care providers and their respective associations, policy makers and community leaders.

##### **CU Foundation Office at UCHSC**

*(CUF-HSC)* -- The foundation is responsible for the management of fund-raising programs for the campus in coordination with the CU Foundation central office in Boulder and other respective CU campuses.

*Office of Alumni Relations* -- The Office of Alumni Relations is an integral part of the CUF-HSC office. Its mission is to build relationships with UCHSC alumni for the purposes of awareness, advocacy, advisement and private support

##### **The Office of Public Relations**

The Office of Public Relations is the central communications office for the UCHSC. Main areas of management responsibility include: news media relations, internal communications (hospital as well as campus), community education and community relations, publications, statewide outreach, promotion of hospital services and paid hospital advertising, and Internet communications.

##### **UCHSC Office of University Counsel**

This office provides legal services to UCHSC. It is part of the Office of University Counsel within system administration. At the UCHSC, this office provides advice and representation to the University on all legal matters relating to interpretation of policy and procedures, contract review, health

law, higher education law, administrative matters, faculty, personnel matters, risk management, and malpractice issues.

#### Executive Vice Chancellor

The office was created to provide a senior officer to serve in the place of the chancellor as required, be a “chief of staff” as the chief campus planning officer, and carry the portfolio of liaison to affiliated clinical entities, diversity programs, TeleHealth/TeleMedicine programs, Information Systems, and BioMedical Technology Transfer Office. The office of the executive vice chancellor is supported by the following organizational entities:

#### **TeleHealth/TeleEducation Program**

Developed to provide the highest quality medical consultations, education and research opportunities to communities and health care providers throughout the state. The campus seeks to provide access to primary care, education, and research to rural, underserved populations through educational outreach utilizing technology in established networks such as the Colorado Area Health Education Centers (AHECs). Additionally, UCHSC currently offers distance learning, training programs, and extended studies via the AHECs in nursing programs; community educational training programs; community educational programs; library resources services; dentistry advanced clinical training programs; graduate course work in nursing, pharmaceutical sciences, physical therapy and public health; geriatric health care programs; and other continuing medical education. The UCHSC/University Hospital is currently linked electronically to the four CU campuses, the Family Medicine Residency Program at St. Mary's Hospital in Grand Junction, the Southwest Health Systems, Inc., in Cortez, the Mount San Rafael Hospital in Trinidad, the Veterans Administration Medical Center satellite clinic in Colorado Springs, the Four Corners Hematology Oncology Practice in Durango, and to the statewide network for delivery of programming to many rural communities.

#### **Bio/Medical Technology Transfer Office (BMTTO)**

The BMTTO was established to support, guide and assist UCHSC researchers in technology transfer education and faculty development, to protect intellectual property, to facilitate technology transfer, to encourage research, and to promote corporate-sponsored collaborative research and development agreements with external enterprises. The BMTTO is responsible for the oversight, management and protection of all intellectual property originating from the UCHSC campus. The office also works in collaboration with the University Technology Corporation (UTC), a separate 501(c)3 organization that has contracted with the CU system to manage the technology transfer functions for CU.

#### **The Office of Diversity**

The Office of Diversity was created in the fall of 1996, combining the resources of the Equal Opportunity Programs and the Center for Multicultural Enrichment. The office has strategic planning and monitoring responsibilities to ensure that diversity is woven into the infrastructure of the UCHSC. The office is divided into two components: affirmative action/equal opportunity and student services.

*The Affirmative Action/Equal Opportunity Section* -- ensures that the recruitment and selection processes for faculty and exempt professionals (unclassified staff) are consistent with Regent policies as well as Federal and state laws and regulations. This section is also responsible for the implementation of and reporting on the Sexual Harassment Policy and oversight for the campus implementation of the Americans with Disabilities Act.

*The Student Services Section* -- ensures that underrepresented minority students are considered for admission and are retained by the health professions programs of the UCHSC.

### **UCHSC Information Systems (IS)**

Information Systems is responsible for providing information systems and communications products and services. The Information Systems department has been in the process of transition for the last several years. The service centers in Information Systems for 1996-97 were as follows:

*Help Desk:* This unit provides first-line support for voice and data services such as telephone, voice mail, and computer applications.

*Network Services:* This unit provides the technical support for the UCHSC network backbone.

*Campus Information Systems:* This unit provides applied computing support for the data warehouse, the World Wide Web, and the campus central service departments.

*Telecommunications:* This unit supports voice services including basic phone service; moves, adds and changes to voice and data service; long distance; and pagers.

*Computer Support Services:* This unit provides computer hardware and software support, file server management, and network administrator support.

*Administration:* This unit is the central service accounting and administrative support services for all Information Systems operations.

The Information Systems department has been in the process of transition for the last several years. A new Information Technology Council (ITC) was appointed in June 1996. The campus strategic plan for information technology was recently completed by the ITC. A copy of this plan is provided in Appendix F.

#### Vice Chancellor for Administration and Finance

The vice chancellor for administration and finance is responsible for the activities of the associate vice chancellor for finance and budget, the assistant vice chancellors for business services and facilities and the director of planning. The vice chancellor has direct responsibility for the administrative and facility infrastructure of the UCHSC.

#### Associate Vice Chancellor for Finance and Budget

The associate vice chancellor is responsible for directing and coordinating the management of the budget office, finance office and the office of grants and contracts which constitute the campus financial services.

#### **Finance Office**

The Finance Office is responsible for the day-to-day financial operations of the UCHSC. Among the major responsibilities are monthly and annual financial reporting, reconciliation of data between the University's accounting system and that of the State of Colorado, preparation of the indirect cost proposal, maintenance of space utilization records, preaudit of procurement documents, control of financial data flowing into the University's financial reporting system, payroll reconciliation, maintenance of capital asset records, data entry for the University financial system, payment of UCHSC bills, control of travel tickets, award and issuance of scholarships and loans to students and cashiering and collection of student tuitions and fees. In addition, the department performs special fiscal analyses and studies as necessary.

#### **The Office of Grants and Contracts**

The Office of Grants and Contracts is responsible for directing and coordinating the administration of sponsored programs within the UCHSC. Specifically, the Office assists members of the UCHSC faculty and staff in the application for and receipt of grant and contract support, and maintains a library of sources of extramural support. The office administers grant and contract funds in accordance with sponsoring agency and University regulations and policies and recommends policy changes related to extramurally supported programs.

#### **Budget Office**

The Budget Office is responsible for the state-appropriated budget of the campus and prepares the annual budget request and the annual operating budget, prepares answers to legislative questions, performs institutional research, develops outcomes data, and supports the campus allocation process and prepares materials for the system office and the Board of Regents.

#### Assistant Vice Chancellor for Business Services

The assistant vice chancellor for business services provides management and leadership to the business services departments which include the Human Resources Department, the Purchasing Department, the Police Department, risk management, and materials management.

#### **The Human Resources Department**

The Human Resources Department is comprised of five divisions: human resources administration, employee benefits, employment/classification, payroll records, and training and employee relations. The department is responsible for administering a comprehensive human resources program for the UCHSC. The department is organized into the following six divisions:

Human Resources Administration - Human resources administration is responsible for the oversight and direction of the remaining five divisions within the department. In addition, Human Resources administration has responsibility for administering the recruitment and hiring process for faculty and unclassified administrators.

Employee Benefits Division - The employee benefits division ensures that all benefits-eligible employees are aware of and understand the benefits available to them. Active participation in University benefit policy development is the responsibility of this office.

Employment/Classification - This division of the Human Resources Department has responsibilities in the areas of job evaluations, employment, performance planning and review, layoff procedures, student workers and the overall management of compliance with the Colorado State Personnel System as it pertains to the identified areas.

Payroll/Records - the Payroll/Records Division of the Human Resources Department is responsible for accurately paying and maintaining records for the almost 6,000 active employees of UCHSC. In addition to payroll and record keeping, the unit has the following assignments: calculation and processing of court-ordered child support payments; government levies of back taxes; garnishments and bankruptcy payments; telephone and written verification of employment; expense transfers (journal entries) to transfer charges from one account to another; calculation and collection of over-



payments; enforcement of University of Colorado policies; and enforcement of Federal government regulations.

Training and Employee Relations Division -- The Training and Employee Relations Division provides training opportunities to the faculty, unclassified, and classified staff of the institution as it relates to general managerial, supervisory, administrative activities, and matters of policy. Attendance at the programs is either mandatory, e.g., new employee orientation, or voluntary, e.g., performance planning and appraisal.

#### The Risk Management Department

The Risk Management Department provides expertise in the management of exposures and losses associated with the UCHSC property/casualty, liability, and workers' compensation program. The mission of this department is to protect UCHSC assets (people, property, programs) from the adverse effects of accidental losses through administration of an effective risk management program.

#### The Purchasing Department

The Purchasing Department exists to procure equipment, goods, supplies, and services from external vendors, as requested from campus constituents, following established policies and in conformance with Colorado revised statutes.

#### Material and Auxiliary Services Management

This department is responsible for stocking and supplying high volume office and laboratory supplies to UCHSC departments and serving as the primary contact for problems related to shipping and receiving. This department is also responsible for the administration of other assigned auxiliary service units including the Mail Center, the Bookstore, Printing Services, records retention and the vending program.

#### The Police Department

The Police Department at the UCHSC provides the police, security, and community services assistance for the UCHSC and University Hospital campus. The Department is dedicated to serve the campus, its constituents, and its guests in a professional and courteous manner while ensuring their safety and security.

#### Assistant Vice Chancellor for Facilities

The Office of the Assistant Vice Chancellor for Facilities works to ensure that the campus physical facilities are planned, designed, constructed, operated,

maintained and managed in a safe and effective manner to support the campus mission. The department is divided into nine divisions.

**Facilities Services**

This division is responsible for the operations, maintenance and repair of the on-campus building systems and grounds. Also included are the campus asset management program, power plant operations, grounds maintenance and housekeeping services.

**Project /Design/Construction Management**

This division is responsible for the design and construction of all remodels, renovations and additions to UCHSC facilities through the utilization of external designers and contractors. These include capital construction, infrastructure, utility and controlled maintenance projects.

**Offsite Facilities**

This division is responsible for the operations, maintenance and repair of the buildings and grounds at all UCHSC offsite facilities. This division is also responsible for leasing all new space and contracts with a real estate firm to assist with finding properties to lease.

**Administrative and Financial Services**

This division is responsible for the finance, budgeting and administrative functions of the department.

**Health and Safety**

This division is responsible for the health and safety of the campus community. Major programs include radiation safety, hazardous materials and waste control, industrial hygiene, fire safety and general safety.

**Internal Construction Services**

This unit is responsible for remodels and renovations to UCHSC facilities.

**Parking and Transportation Services**

This unit is responsible for the parking operations at the UCHSC as well as the motor pool and campus shuttle services. There are approximately 3,800 parking spaces on campus.

**Project Planning**

This division is responsible for the planning phases, including CCHE program planning for UCHSC projects.

**Fitzsimons Operations**

This division is responsible for future facilities management at the Fitzsimons site.

## Technology

In June 1996, the Chancellor appointed an Information Technology Council (ITC) to create a strategic plan for the campus and recommend policies, procedures, and standards in computing and telecommunications. The ITC is comprised of a dean, faculty from each school, students, and other senior academic and administrative managers. In addition, three key affiliates are represented in order to maximize opportunities to implement joint standards. These affiliates include University Hospital, The Children's Hospital, and University Physicians, Inc. The ITC provides the institutional structure for planning, oversight, and evaluation of technology programs and policies. The role of the ITC in establishing management priorities for the Information Systems Department is especially important. The ITC annually establishes the rate structure and budget for the Department based on institutional goals. The ITC commissions cost studies and other technical and management reviews to support their decisions on these matters.

One year after its creation in 1996, the ITC prepared a self-assessment in nine key areas: academic computing, research computing, clinical computing, scholarly systems, health informatics, administrative applications, TeleHealth/TeleEducation, strategic business systems, and infrastructure/architecture. The assessment was completed as a precursor to the development of the vision statement and this plan, and as a mechanism to take stock of the issues regarding information technology within the UCHSC. The following is a summary of the findings in each of these areas regarding progress and challenges at UCHSC.

### Academic Computing

In support of the Total Learning Environment, all schools are reviewing and updating portions of their curriculum. Efforts are underway in distance/distributed education, informatics, development of Internet sites, and enhancement of student computing. UCHSC Schools are considering the implementation of student competency requirements, faculty development programs are increasing, and several models for the incorporation of technology into new learning approaches are being implemented and evaluated. New learning spaces, including Smart Classrooms, are being created by remodeling existing spaces. Migration towards digitized files is providing vast new educational resources for faculty and students.

### Research Computing

UCHSC investigators who rely upon scientific computing have generally developed stand-alone programs that are loosely integrated with other programmatic components and the campus IT infrastructure. Efforts over the last two years have resulted in minimal centralization of technical support. Biomedical

researchers believe that mathematical modeling of problems in human biology will require new research “cores” that expand access to high speed computing and experts in fields not currently located on the campus, such as mathematicians, computer scientists, engineers, and others who will rely upon a sophisticated computing environment.

#### Clinical Computing

The University Hospital Office of Clinical Affairs provides academic support to clinical programs on the use of clinical data for improving programs and providing data for research. The program in Health Outcomes Analyses is concerned with directly linking patient outcomes to the methods of providing clinical care. This work provides a foundation for the development of evidenced-based research, which in turn is applied to clinical practice and new education components. These efforts involve emerging disciplines and require greater integration of and access to data than is currently available at UCHSC/UH. The success of these efforts will ultimately depend on a fully integrated electronic patient record, which is still in the development stages at the institution. Relationships and common goals across the broader clinical enterprise (UCHSC and its key hospital affiliates) are supporting the move to common standards, thus establishing the goal of eventual integration. However, legacy systems, security, and similar issues create substantial challenges.

#### Scholarly Systems

The range of electronic scholarly resources available to UCHSC faculty and students has expanded to include: the Denison Library's online catalog of local holdings and linkages to remote resources; bibliographic data bases; full-text books and journals; sound and image files; numeric and other data banks; specialized knowledge data bases; patient/consumer health information tools; digitized versions of print or audiovisual materials; and instructional computing programs. The campus needs to continue moving in the direction of making all tools available across the network and in adopting information standards that facilitate accomplishment of this goal. Resource constraints, lack of required IT competencies for faculty and students, unstable and unpredictable pricing of electronic products, and lack of national standards all create problems in moving forward at a faster pace.

#### Health Informatics

Health informatics is becoming an area of increasingly higher priority at UCHSC. The discipline and issues of health informatics have been the focus of efforts by selected faculty members for many years. Informatics faculty contribute new areas of research and are increasingly becoming critical team members of basic and applied research groups. Informatics faculty in all of the UCHSC schools are involved in the establishment of faculty development programs, student competency issues, and IT infrastructure planning. The rate at which informatics components are integrated into the curricula across the schools is accelerating

rapidly. However, many of these efforts have not been coordinated, resulting in varying degrees of duplication and minimal interdisciplinary collaboration.

#### Administrative Applications

The University of Colorado has embarked upon an ambitious program to replace its antiquated and inefficient financial and payroll systems with state-of-the-art integrated financial and human resource systems. The School of Dentistry and the Colorado Psychiatric Hospitals are completing initiatives to replace their patient service systems. Underlying the success of the current and future administrative systems are requirements for a robust, dependable, secure, and cost-effective network. The move of many administrative support units to the Fitzsimons campus in 1998 will create greater demands for paperless systems, decentralized decision-making, and modernization of business practices, all of which will depend on greater applications of technology.

#### TeleHealth/TeleEducation

The UCHSC recognizes that TeleHealth and TeleEducation programs have the potential to support the delivery of health care in a more efficient manner and help generate revenue for clinical programs. Several successful programs are in place, including a TeleHealth contract for services between the Department of Corrections, UCHSC and selected affiliates. The institution continues to struggle to find a model for contractual agreement that not only results in savings and improved health care, but that also generates revenue adequate to cover all direct and indirect expenses. This is a national dilemma and will require regulatory, legal, and other solutions before these programs can expand to meet their original promise. UCHSC is committed to maintaining a core of TeleHealth services and will expand services where new partnerships are mutually beneficial.

#### Strategic Business Systems

The UCHSC and its key affiliated hospitals are engaged in the development of market strategies that will increase the competitiveness of the entire clinical enterprise. University Hospital has made significant investment in new infrastructure and applications to support these strategies, including: scheduling systems, managed care systems, clinical repository and master patient index systems, and a world-class network infrastructure engineered in partnership with 3Com. Changing alliances, the need for standards and security, and a lack of comprehensive or linked applications create challenges for the development of strategic business systems.

#### Infrastructure and Architecture

The UCHSC Information Systems Department has made major strides in planning and implementation, resulting in major improvements in the campus infrastructure. Standards have been established before the end of the current fiscal year for the existing campus and for the new Fitzsimons campus in 12 areas: wire and cable, cable management and closet wiring, telecommunications, network electronics,

network protocols, network security, microcomputers and workstations, file servers and application servers, desktop application software, application development tools, groupware suites, and help desk services. These standards were developed in cooperation with University Hospital in order to provide consistency, reliability, and a seamless appearance to faculty, students, and staff who are the customers of both institutions. The backbone of the campus network is being replaced and upgraded in 1998-1999, new customer service goals have been established, and the campus is moving toward a model of centralized file servers. Other initiatives are being made consistent with the University's Total Cost of Ownership Initiative.

## **C. MARKET ANALYSIS**

The University of Colorado Health Sciences Center and University Hospital engaged Chi Systems, a division of Superior Consultant Company, Inc., on January 30, 1998, to perform a market analysis encompassing the Health Sciences Center's three enterprises: research, education, and clinical services. As part of the clinical services analysis, Chi Systems was asked to examine in greater depth two of the programs slated to be relocated to the Fitzsimons campus: the Cancer Center and Rocky Mountain Lions Eye Institute. The market analysis used data from a variety of sources including the Health Sciences Center, University Hospital, and the Colorado Health and Hospital Association, and Chi Systems' experiences working with academic medical centers across the country. In addition, extensive literature and Internet searches were conducted to assure that the most current information was used for the analysis.

The complete market analysis may be found in Appendix E. An executive summary of the findings related to each of the three enterprises follows.

### **Education**

Common to all of the schools that comprise the University of Colorado Health Sciences Center is their movement toward curriculum integration and their commitment to create a total learning environment at Fitzsimons. While each of the schools has unique professional issues, their common interests and concerns are growing, as evidenced by the market analysis findings. Shared issues include:

- The need to be able to assess patient outcomes quantitatively
- The increasing use of interprofessional teams to address complex patient needs
- The demand for patient-centered care
- The increased use of computers in all aspects of their work
- The need to be able to supervise and work with people who have complementary but fewer skills

Key findings for each of the schools follow.

#### School of Dentistry (Doctor of Dental Surgery)

The dental profession is experiencing rapid change as a result of the following:

- Increased emphasis on outcomes assessment
- Greater numbers of medically complicated patients
- Increased use of computer technology in both teaching and patient care
- Greater emphasis on patient-centered care
- Increased diversity among students, faculty, and staff
- More care provided by teams of interdisciplinary professionals
- Stronger ties with physicians
- Increased use of hygienists
- Need for cost-efficient practice management
- Demand for post-doctoral education
- Migration toward specialty practices (e.g., oral-maxillo-facial, geriatrics, orthodontics)

Because of space limitations, the School of Dentistry has forecast a stable class size over the next ten years. This assumption would be revisited if additional space became available. Currently, supply exceeds demand for dentists, although this may change in the future as the population ages and grows. In the United States, there are 58 dentists per 100,000 population. In Colorado, this number is 67, although the ratio is higher in Metro Denver where 66% of the state's dentists serve 54% of the state's population. In the US as in Colorado, approximately 80% of all dentists are in general practice.

Nationally, dental school enrollments have varied widely over the past 20 years. In 1980, nearly 23,000 students were enrolled. By 1995, this number had dropped to 16,600. Since 1985, six private dental schools have closed, and in 1991-92, the nation's 55 dental schools reported a combined loss of \$60 million. Losses and closures are attributable to decreases in state funding and to the fact that cross-subsidization opportunities from research and clinical fees is limited. Should these trends continue, a national shortage of dentists could occur between 2005 and 2010.

The School of Dentistry at the UCHSC offers the only DDS degree in Colorado and attracts more than 20 applicants for every available position. Ample opportunities exist to offer programs at the master's level to meet forecast demand. The following table displays five years of enrollment trend data.

SCHOOL OF DENTISTRY (DDS) ENROLLMENT TRENDS: 1992 THROUGH 1996

	1992	1993	1994	1995	1996
Applicants	578	648	758	890	914
Enrollments	37	36	35	36	36
Applicants Per Available Place	15.6	18.0	21.7	24.7	25.4
Headcount	128	139	140	140	140

### School of Dentistry (Dental Hygiene)

The number of schools that train dental hygienists increased from 197 in 1990 to 214 in 1997. Of these, 72 were in university settings and 5 offered a master's degree. Only 21, including the UCHSC, offer baccalaureate programs. Since 1982, 15 university-based dental hygiene programs have closed, as more and more two-year programs have been developed in community college-type settings.

Most of the professional issues affecting dentists also pertain to dental hygienists, suggesting opportunities to bring them together more frequently during the education process.

The table that follows shows enrollment trend data for the dental hygiene program. As demand continues to grow for professionals to support and work with dentists, this program should consider expanding to meet the demand.

#### SCHOOL OF DENTISTRY (DENTAL HYGIENE) ENROLLMENT TRENDS: 1992 THROUGH 1996

	1992	1993	1994	1995	1996
Applicants	40	65	65	62	106
Enrollments	20	20	20	20	20
Applicants Per Available Place	2.0	3.3	3.3	3.1	5.3
Headcount	39	38	41	40	39

### School of Medicine (Medical Doctor and Graduate Medical Education)

Enrollments in the nation's 125 medical schools have been relatively constant since 1989 at less than 67,000 students, with nearly 16,000 graduating each year. Similarly, the enrollments and graduates at the UCHSC have been relatively constant at 534 and 127, respectively. No changes are forecast in the future. The following table is a summary of medical school activity in selected years.

#### SCHOOLS OF MEDICINE: ACTIVITY IN SELECTED YEARS



	1989-90	1993-94	1996-97
National Enrollment	65,081	66,453	66,712
National Graduates	15,336	15,579	15,904
National Schools	127	126	125
UCHSC Enrollment	530	534	534
UCHSC Graduates	128	121	127

Although US enrollments and graduates have remained constant, applications have increased significantly, from slightly more than 29,000 in 1990 to nearly 47,000 in 1996. The increase in Colorado residents applying to medical schools has grown at an even greater rate, increasing from 373 in 1990 to 814 in 1996.

While US medical school enrollments have remained steady for some period of time, the number of physicians has increased as a result of more international medical graduates (IMG) coming to the US for residency training and then remaining to enter medical practice. Had this not occurred, the US would not be experiencing an oversupply of physicians. Nationally, 23% of medical residents graduated from a medical school outside of the US in 1994; in Colorado in that same year, only 6% of medical residents were IMGs. In an effort to discourage residency training programs from contributing to the oversupply of physicians, the Council on Graduate Medical Education (COGME) has recommended:

- that the number of residencies be limited to 110% of US medical school graduates
- that Medicare funding for IMGs be reduced by 75%

COGME has also recommended a 25% increase in Medicare funding for generalist residency positions to try to correct the balance between specialists and primary care physicians. As a result of COGME recommendations, the Health Care Financing Administration (HCFA) limited the number of positions funded by Medicare and reduced indirect medical education (IME) funding. Continued reductions in funding likely will require the UCHSC to downsize its residency programs.

The School of Medicine does not produce enough MD graduates, who remain in Colorado, to meet the state's need although Colorado has a surplus of physicians. Colorado's physician-to-population ratio is 219; the recommended ratio is 165 per 100,000 population. The state's surplus results from the number of physicians who come from other states to practice in Colorado.

School of Medicine (Physical Therapy)

The number of physical therapists (PT) practicing in the US in 1993 was approximately 90,000, or one PT for every 2,800 Americans. In Colorado, the ratio was 1 for every 1,500 residents. Settings in which these professionals work have changed significantly in recent years as evidenced by the fact that in 1983:

- 42% worked in hospitals, declining to 22% by 1996 (although vacancy rates in hospitals continue to be high)
- 6% worked in nursing homes in 1983, increasing to 13% by 1996

As the population ages and as PTs move into such areas as sports medicine, athletic training, and geriatrics, the demand for them may double by 2005, particularly if there is pent-up demand currently as a result of poor insurance coverage. To meet the demand, which is forecast to exceed supply for the next 10 years, healthcare providers are making greater use of physical therapy assistants and aides.

From an educational perspective, the number of programs educating PTs increased 175% between 1970 and 1993. Currently, there are 173 accredited programs; annual graduates totaled 4,600 in 1993. Program changes are underway in many of the schools as some move toward longer entry-level programs that feature either additional didactic or clinical practice time; some are shortening the training period for students with science or health-related backgrounds; yet others are cross training professionals who perform similar types of work.

Until 1994 when Regis University initiated its physical therapy program, the UCHSC offered the only PT degree in Colorado. Regis enrolls 54 students annually. The table below summarizes activity in the PT program in the School of Medicine. Headcount at the UCHSC increased 16% over the six-year period.

SCHOOL OF MEDICINE (PHYSICAL THERAPY) ENROLLMENT TRENDS: 1992 THROUGH 1996

	1992	1993	1994	1995	1996	1997
Applicants	417	461	408	475	468	414
Enrollments	57	60	63	62	62	62
Applicants Per Available Place	7.3	7.7	6.5	7.7	7.5	6.7
Headcount	104	111	118	121	120	121

School of Medicine (Child Health Associate/Physician Assistant)

The Child Health Associate (CHA) program is unique to the UCHSC. Graduates are considered to be physician assistants (PA), joining 35,000 other similar professionals in the US. Physician Assistant training occurs in 96 accredited programs, 53 of which offer a baccalaureate degree or degree option. The only PA program in Colorado, UCHSC receives 10 to 13 applications for every available place. Between 1992 and 1997, headcount increased 45%, from 55 to 80. Future plans call for a headcount of 120 by 2001-2002. Opportunities abound to expand the areas in which students specialize (e.g., gynecology, geriatrics, surgery, occupational medicine).

As with most other health professions, Colorado employs more per 100,000 population than the US as a whole, 11 and 9, respectively. Nationally, the demand for physician assistants is so great that seven job opportunities exist for every graduate. Demand may increase to even greater levels as states pass laws that grant appropriate privileges to physician assistants. Slightly more than one-third of the PAs in the US work in rural areas which lack an adequate number of primary care providers. As with other healthcare professions, PAs are being viewed increasingly as valuable members of the healthcare team, particularly as managed care organizations assigning teams of physicians, physician assistants, and nurse practitioners to provide efficient, cost-effective healthcare.

#### **School of Medicine (Doctor of Philosophy, Basic and Clinical Sciences)**

In 1995, 122 medical schools enrolled approximately 18,600 PhDs and MD-PhDs, about 24% of whom held temporary or permanent visas. Between 1992 and 1997, enrollment in these programs at the UCHSC increased from 129 to 176 students. Of interest is the fact that there is a trend toward awarding interdisciplinary rather than departmental degrees.

Generally, PhDs in the basic sciences are employed as full-time faculty in medical schools or as researchers in the pharmaceutical industry. Most studies, although not all, find that there is no over-supply of PhDs in the basic sciences. The future looks bright for these graduates as a result of forecast growth in NIH funding over the next three to five years. Forecast class size at the UCHSC appears to be appropriate over the next five years.

The UCHSC is offering a new degree, PhD in Clinical Sciences, which trains students in outcomes assessment.

#### **School of Medicine (Master of Public Health)**

While public health is not defined consistently or clearly among the 300+ schools that offer some type of training in this discipline, increasingly the field is attracting established healthcare professionals (physicians, nurses, and so forth) who

understand the importance of incorporating principles of epidemiology and biostatistics in their areas of practice. Practitioners focused on disease prevention efforts have also found value in the MPH curriculum.

The Master of Public Health degree is offered through the Department of Preventive Medicine. The UCHSC's plans call for exploring the feasibility of developing a School of Public Health, doubling the size of the program, and possibly offering a degree in healthcare informatics.

#### School of Nursing (BSN, MSN, PhD, ND)

Nationally, enrollment in baccalaureate nursing programs decreased 6% between 1996, and 1997, the third consecutive decrease, in spite of the belief that the demand for BSN-prepared nurses is going to continue to exceed the demand for associate-degree and diploma nurses. The number of programs offering advance practice nursing (APN) courses is growing although many who earn these degrees are not employed in an APN role. Doctoral program enrollments across the country are down, largely as a result of a lack of faculty involved in research.

Locally, the UCHSC nursing school enrollments declined between 1992 and 1997, as indicated in the following table.

#### SCHOOL OF NURSING ENROLLMENTS: 1992 AND 1997

	1992	1997
BSN	120	68
MSN	97	77
Nursing Doctorate	20	28
PhD	17	11
Total	254	184

The RN-to-BSN Completion option was discontinued in 1993. A number of other Colorado schools offer nursing degrees at the baccalaureate and master's level, although no other programs offer training beyond the master's level. Beth-El, Regis, and University of Northern Colorado continue to offer the RN-to-BSN completion. Six other schools offer BSN programs and four others offer the MSN, with a fifth contemplating such a program. No other schools in Colorado offer the PhD in nursing; only three others in the US offer the Nursing Doctorate degree.

To meet a growing demand for nurses trained in critical care and certain specialty areas, the School of Nursing offers intensive, non-degree, short-term courses. As shortages are forecast to occur in intensive care, post-acute care, home care, and long-term care, the UCHSC may need to increase the number of these course offerings to meet demand. As in other healthcare professions that are in short

supply, providers with fewer skills (in this case, licensed practical nurses and certified nurse aides) are being hired to try to address personnel shortages.

Of particular concern among those who employ registered nurses is the fact that the workforce is aging. The average age of RNs in 1980 was 40; it is now 44. As the demand for nurses continues to grow significantly, particularly in non-hospital settings, schools of nursing must examine their curricula and policies related to class size to regain balance between supply and demand.

While Colorado hospitals report shortages of nurses skilled in particular areas, the state continues to report better ratios of RNs per 1,000 population than the US as a whole, as reflected in the following table. The proportion of Colorado nurses whose training goes beyond two or three years also exceeds that found in the US as a whole.

REGISTERED NURSES IN THE US AND IN COLORADO: 1994 AND 1995

	US		COLORADO	
	1994	1995	1994	1995
Total RNs	2,044,000	2,090,000	30,500	32,000
RNs per 1,000 Population	7.93	7.98	8.59	8.54
Associate Degree and Diploma	1,227,000	1,247,000	13,300	13,400
BSN	643,100	664,400	13,400	14,000
MSN and Doctorate	173,900	184,400	3,900	4,300

School of Pharmacy (PharmD and PhD)

Over the past four years, enrollments at the 79 colleges and schools of pharmacy in the US averaged 33,000 each year, although enrollment increased 42% between 1984 and 1996. Of these graduates, more than one-third were enrolled in PharmD programs with two-thirds in baccalaureate programs. Between 1989 and 1996, PharmD graduates increased by 142%, from 1,061 to 2,567.

Consistent with trends nationwide, the UCHSC School of Pharmacy is phasing out its baccalaureate program in favor of the four-year PharmD as a first professional degree. A track-in option is attracting pharmacists interested in furthering their education and the level of interest should accelerate the transition to the single, four-year, entry-level PharmD program.

Pharmacists are yet another healthcare profession that is growing each year. In 1990, 169,000 pharmacists were employed in the US; by 1996, their ranks numbered 172,000. Per 100,000 population, pharmacists number 65. By 2005, this number is expected to grow to 68. Colorado boasts 3,700 licensed pharmacists, resulting in a ratio that approaches 100 per 100,000 population. Increasingly, pharmacists are found working in hospitals as part of interprofessional teams dedicated to improving healthcare. More and more, pharmacists are leaving commercial pharmacies and moving to positions in hospitals, long-term care facilities, ambulatory care facilities, and home care programs. Growth is also forecast for pharmacists interested in research, disease management, and pharmacoconomics.

The School of Pharmacy also offers two PhD programs. The 22 students enrolled in these programs are likely to be in demand for new employment opportunities in biotechnology industries and gene therapy as well as for faculty positions.

### Allied Health

The number of allied health professionals in the US likely approaches six million, although counts are difficult given lack of agreement as to what constitutes an “allied health professional.” Some estimates suggest that this group accounts for 60% of the nation’s healthcare workers, a sizable group for which no substantive data are available.

Despite the lack of good data, most sources believe that the allied health professions will continue to grow despite various barriers to their ability to practice to their full potential. A number of barriers contribute to this dilemma, including:

- Resistance to change and “turf protection” on the part of health professionals
- Lack of awareness of allied health competencies on the part of employers, other providers, and payers
- Unnecessarily restrictive and inconsistent laws regarding licensure and scope-of-practice regulations
- Eliminating these barriers could have some positive consequences, including:
  - Increasing the availability of services to the community
  - Facilitating the development of innovative delivery systems
  - Improving availability of allied health professionals
  - Encouraging role expansion
  - Decreasing the cost of healthcare

While it is difficult to quantify society’s need for allied health professionals, there is a growing demand for multi-skilled healthcare professionals who can direct a team of healthcare providers with varying skills and training. These multi-skilled providers must also be able to evaluate the impact of clinical decisions on the cost of care as pressure increasingly is brought to bear on professionals to justify the value of diagnostic and therapeutic services.

### **Research**

Health research funds come from a variety of sources, with the majority of dollars awarded by the National Institutes of Health (NIH) and by private industry. The following table shows the dollars funded by each of five major sources in 1989

and eight years later in 1997. Of particular interest is the fact that the percent of funds coming from NIH decreased from 36% to 28% of the total, and funds from industry (82% of which comes from pharmaceutical companies) increased, from 45% to 54% of the total.

NATIONAL FUNDING SOURCES: HEALTH RESEARCH MARKET, 1989 AND 1997  
 (in billions of dollars)

Funding Source	1989		1997	
	\$	% of Total	\$	% of Total
NIH	\$7.5	36%	\$121	28%
All Other Federal	1.7	8%	3.2	8%
State and Local Government	1.5	7%	2.8	7%
Industry	9.4	45%	23.1	54%
Private, Non-Profit	.9	4%	1.4	3%
Total	\$21.0	100%	\$426	100%

In 1989, the University of Colorado Health Sciences Center (UCHSC) ranked 30<sup>th</sup> in NIH funding, receiving .61% of all NIH dollars awarded for research. By 1994, shortly after the Biomedical Research Building (BRB) was completed, the Health Sciences Center's NIH rank had improved to 19<sup>th</sup> place, and its share of dollars to .77%. Two years later, in 1996, the Health Sciences Center's NIH rank had slipped to 22<sup>nd</sup> as a result of increased research space, and related increases in funding, at other academic medical centers.

One of the Health Sciences Center's goals is to be among the top ten medical schools in terms of research funding. The table that follows shows the top ten schools, as determined by the research funds they received from NIH in 1996, how their respective rankings have changed since 1989, and the percentage by which the NIH funds changed over that seven-year period. The Health Sciences Center funding increase was nearly double the average increase (90% compared to 46%), bringing it from 30<sup>th</sup> to 22<sup>nd</sup> place. With a 90% increase, the Health Sciences Center ranked fifth among the top fifty medical schools in terms of NIH funding increases. Schools with greater percentage increases included Jefferson Medical College, Case Western Reserve, Northwestern, and Indiana. The schools which experienced significant increases in either funding or rank were ones which focused their attention on increasing research space, aligning with large pharmaceutical companies, recruiting renowned researchers, securing funding from multiple sources, and developing programs in such areas as genetics and neurosciences.



TRENDS IN NIH FUNDING AMONG THE TOP TEN MEDICAL SCHOOLS

	1996 Rank	1989 Rank	Change	% Increase
Johns Hopkins	1	2	+1	53%
UCSF	2	1	-1	29%
Washington University	3	5	+2	73%
Yale University	4	3	-1	40%
University of Pennsylvania	5	9	+4	82%
University of Washington	6	6	-	47%
Stanford	7	4	-3	26%
Duke	8	8	-	49%
University of Michigan	9	10	+1	50%
Case Western Reserve	10	26	+16	131%
Average				46%
UCHSC	22	30	+8	90%

The Health Sciences Center's market share in each of the five research funding sources is shown in the table below. Increases in market share were experienced in each of the five categories between 1992 and 1994, although growth was not sustained uniformly over the following three years.

UCHSC HEALTH RESEARCH MARKET SHARE BASED ON AWARDS IN SELECTED YEARS

	1989	1992	1994	1997
NIH	.61%	.60%	.77%	.74%
All Other Federal	.49%	.48%	.52%	.55%
State and Local Government	.29%	.40%	.46%	.53%
Industry	.03%	.05%	.08%	.07%
Private, Non-Profit	1.11%	1.34%	1.37%	1.10%
Total	.34%	.34%	.40%	.36%

As the table above indicates, the Health Sciences Center's share of NIH funds in 1997 was .74%. This number represents the average market share across all of the institutes that comprise NIH. As the following table indicates, market share varied considerably by institute, ranging from a high of 1.95% (Alcohol Abuse and Alcoholism) to a low of .12% (Eye Institute).

UCHSC MARKET SHARE BY NIH INSTITUTE: FY 1997

	NIH Institute	% Market Share
HIGHEST	Alcohol Abuse and Alcoholism	1.95
	Diabetes and Digestive and Kidney Diseases	1.89
	Research Resources	1.43
	Nursing Research	1.41
	Mental Health	1.08
	Average	.74
LOWEST	Arthritis and Musculoskeletal and Skin Diseases	.28
	Dental	.14
	Eye Institute	.12

Research dollars funded by NIH exceeded inflation between 1989 and 1997 and are expected to continue to grow at a rate greater than inflation in the near-term. Although NIH is the largest single source of funding for academic medical centers, it has grown the least of the major funding sources.

NIH is currently and will continue to be a significant source of health research funding. The top six areas that NIH is emphasizing in awarding research grants include:

- Cancer
- Diabetes
- Nervous System Disorders
- Cardiovascular Disease
- Infectious Diseases
- Clinical Trials

As the Health Sciences Center forecasts research dollars likely to be awarded over the next five years, several likely scenarios emerge. The table below shows a range of possibilities from a moderate increase to a moderate decrease. Market share in 1997 was .36%; total research funding was \$154 million.

RESEARCH FUNDING FORECAST: 2003

	Market Share	Total Funding	% Change in Funding
Moderate Increase	.38%	\$247 million	60%
No Change	.34%	\$222 Million	44%
Moderate Decrease	.30%	\$196 Million	27%

As the preceding data indicate, the Health Sciences Center has experienced significant growth in research funding over the past eight years and has ample opportunity to continue that trend given the likelihood that NIH and industry will increase research funding. To achieve growth, however, requires that research activity, including participation in clinical trials, be expanded aggressively. Critical to the Health Sciences Center's ability to expand its research presence and, thus, enhance its rank among academic medical centers, is the need to:

- increase research space
- recruit renowned researchers
- develop or expand programs in such areas as genetics, neurosciences, and cancer; pursue funding from private sources (industry)
- shore up the areas which are not securing adequate research funds.

### **CLINICAL CARE**

Healthcare has undergone rapid change as a result of significant changes in reimbursement and care delivery. Some of the more significant changes include:

- Medicare moving away from reimbursing hospitals on a "cost-plus" basis
- Increasing numbers of people switching from traditional indemnity insurance to managed care plans
  - Improvements in anesthesia and surgical technique which moved many procedures from inpatient to lower-cost outpatient settings
- Payment changes, particularly by Medicare, that encouraged hospitals to move patients into such lower-cost settings as transitional care units, skilled nursing care, and home health
- Out-of-pocket expenditures for complementary medicine exceeding those related to "mainstream" medicine

In combination, these events caused hospitals to reexamine how and where they provide care. No longer is the traditional hospital building an appropriate place to house the full continuum of services required by a population that is increasingly comprised of older citizens and increasingly populated by individuals living outside of the core city. To be competitive in this new environment requires that healthcare providers re-think where services are located and how they are delivered. Hospitals affiliated with academic health centers have yet an additional challenge: how to integrate research and education into care delivery at a price that can compete with sophisticated community hospitals.

This story is being played out across the country, but is particularly relevant in metropolitan Denver where the competition is keen, managed care has proliferated virtually every type of public and private payer, and patient

expectations are high. University Hospital is challenged daily to meet diverse and often conflicting demands in its delivery of care to hundreds of thousands of people living in the Rocky Mountain Region.

Somewhat offsetting the decline in the utilization of the healthcare delivery system in Colorado is population growth. In 1997, the metropolitan Denver population was slightly greater than 2.1 million, and is expected to increase 14% to nearly 2.5 million by 2008. Colorado's population, at 3.9 million in 1997, is expected to grow 18% over the next ten years to nearly 4.6 million. As a percent of Colorado's population, people age 65 and over—who use healthcare services at four times the rate of the rest of the population—are expected to comprise 12.5% of the population by 2008, up from the current 10.9%.

The inpatient market in Colorado is big business. In 1996, 392,000 people were patients in Colorado hospitals, generating more than 1.6 million patient days and \$3.8 billion in charges. The number of inpatient days generated per 1,000 population was 434 in 1996, a significant reduction from the 590 experienced in 1991. Experiences in other states (e.g., California) suggest that this number will continue to decline, although the rate of decline will diminish as a result of the aging population and as a result of legislation aimed at “protecting” consumers who believe they have been discharged from hospitals prematurely. In spite of these mitigating factors, Colorado likely will experience use rates of around 375 in the next few years.

Among Colorado hospitals, University Hospital is a market leader in several important areas including cancer, kidney disease, solid organ transplants, and psychiatry. In each of these areas, University Hospital enjoys statewide market share of at least 12%, compared to its average share of 4.5%. Services which experience market shares of less than 4.5% include dermatology, general surgery, heart services, ophthalmology, orthopedics, otolaryngology, pulmonary, rheumatology, urology, and women's and infants' services.

The following table summarizes important characteristics about University Hospital, all Denver hospitals, and all Colorado hospitals for 1995 and 1996. University Hospital's average length of stay is higher than the average for other hospitals in the state, but declined nearly 8% between 1995 and 1996. Average charges, per stay and per day, at University Hospital are higher than the average although the average per day increased only 3% between 1995 and 1996 while the average for all Denver hospitals increased 11% during that same period of time.

HOSPITAL CHARACTERISTICS: 1995 AND 1996

	1995			1996		
	Colorado	Denver	UNIV HOSP	Colorado	Denver	UNIV HOSP
Discharges	388,269	230,127	15,373	393,505	232,023	16,068
Pt Days	1,706,330	1,030,518	78,332	1,672,138	994,397	75,852
ADC	4,675	2,823	215	4,581	2,724	208
ALOS	4.4	4.5	5.1	4.2	4.3	4.7
Total Charges	\$3.55 billion	\$2.27 billion	\$239.9 million	\$3.83 billion	\$2.44 billion	\$240.4 million
Avg Charge/Stay	\$9,141	\$9,858	\$15,607	\$9,743	\$10,507	\$14,960
Avg Charge/Day	\$2,080	\$2,201	\$3,063	\$2,293	\$2,452	\$3,169

ADC = Average Daily Census  
 ALOS = Average Length of Stay

In the recent past, Denver boasted 22 independent hospitals, nearly all of which were not-for-profit. Today, with mergers and closures, three healthcare systems dominate the metropolitan area: Centura Health, Columbia, and Exempla. University Hospital is a member of HealthCare Colorado, a statewide hospital network. Between 1992 and 1996, Centura Health and Columbia both gained market share within metropolitan Denver, while Exempla lost market share. University Hospital gained market share over this 5-year period, increasing from 6.3% in 1992 to 6.9% in 1996.

University Hospital's patients are more dispersed than normally is found in a community hospital. The six-county metro Denver area is home to 78% of the inpatients, while 14% live in other parts of Colorado, and 8% traveled to University Hospital from other states. These numbers vary significantly by product line, with a greater percentage of those seeking quaternary care (e.g., solid organ transplants) traveling from outside the metro area. As one might expect, the outpatient demographics are slightly different, with 86% residing in the six-county metro area, 10% in other parts of Colorado, and only 4% from other states.

As inpatient volumes have decreased, ambulatory care visits have increased. Between 1994 and 1997, the number of visits to University Hospital's primary care clinics doubled. Much of this success is attributable to the hospital's foresight to place these clinics throughout the metropolitan area, close to area residents' homes. As more specialty care is redirected toward primary care providers, fewer visits are occurring in the specialty clinics. During that same four-year period, visits to the hospital's specialty clinics remained constant. To reduce inappropriate use of high-cost emergency services, University Hospital implemented two programs, CU Care and urgent care. Among the three programs, volume has increased although emergency room visits have declined significantly.

Critical to any hospital's success are payer mix, charity care, and bad debt. The chart below shows how University Hospital's payer mix changed between 1993 and 1996 compared to changes experienced by Denver and all Colorado hospitals. University's percent of government payers (Medicare and Medicaid) increased from 46% in 1993 to 48% three years later, suggesting the likelihood that average reimbursement, adjusted for inflation, decreased during that time. The percent of government payers among all Colorado hospitals remained constant at 42% over the period, although Medicare increased as a percent of the total and Medicaid decreased.

PAYER MIX IN COLORADO HOSPITALS: 1993 AND 1996

	1993			1996		
	Medicare	Medicaid	Other	Medicare	Medicaid	Other
University Hospital	21%	25%	54%	22%	26%	52%
All Denver Hospitals	27%	13%	60%	27%	11%	62%
All Colorado Hospitals	30%	14%	56%	32%	12%	56%

University Hospital, when compared to other Denver hospitals, provided more than its fair share of charity care in 1996 and experienced a higher percentage of bad debt, as shown in the following table. Only Denver Health Medical Center fared worse in both categories.

PERCENT OF CHARITY CARE AND BAD DEBT IN DENVER HOSPITALS: 1996

	Charity Care	Bad Debt
Denver Health Medical Center	28%	11.3%
University Hospital	12%	3.5%
All Other Denver Hospitals	< 2.0%	< 3.0%
All Denver Hospitals	4.5%	2.9%

As hospitals become more sophisticated, more expensive, and more competitive, directing precious resources to specific product lines becomes increasingly important. The following is a summary of the key findings related to product line trends that are likely to impact University Hospital's future.

- Inpatient volumes are likely to continue to decrease, although the rate of decrease may diminish, as a result of:
  - Improvements in post-operative recovery

- Shifts from invasive to less or non-invasive procedures
- Movement from inpatient to outpatient surgery
- Lower birth rates
- Shift from acute care to alternative settings (outpatient, physician offices, day programs, post-acute units, assisted living, home care, home telemedicine)
- Earlier detection, greater prevention
- Improvements in such technologies as lasers, diagnostic imaging, robotics, telemedicine, and laparoscopy
- New drug therapies and biological response modifiers
- Physicians will continue to compete with hospitals for patients, with specialists in particular creating niche products in such areas as cancer, dermatology, heart, endocrinology, and orthopedics. For-profit, niche firms are also emerging to compete in several of these areas.
- Increased use of multidisciplinary approaches to diagnosis and treatment
- Increased emphasis on self-care
- Increased emphasis on disease management, particularly in such areas as diabetes, asthma, congestive heart failure, and kidney disease
- Greater intervention by and pressures from payers to steer patients away from costly specialists to lower-cost providers
- Limiting or eliminating payment for procedures that are borderline “medically necessary”
- Events likely to mitigate against the reduction in inpatient services include:
  - Increased demand for quaternary services and “dual-trained” specialists (e.g., neurologists expert in pain management; endocrinologists with in-depth knowledge of cellular, molecular biology, and genetics; medical oncologists with training in geriatric medicine)

- An aging population, which will increase demand for cancer care, dental care, ophthalmological services, orthopedic surgery, and rheumatology, to name a few
- Growth in the number of ethnic minorities who exhibit higher rates of such diseases as diabetes

Other trends likely to affect University Hospital include:

- Nationwide reductions in many medical residency training programs (e.g., anesthesiology, endocrinology, ophthalmology, radiation oncology)
- Greater use of computer technology, particularly to measure financial and operational performance and to track patient outcomes
- Linking physician payment to patient satisfaction
- Reductions in payments to specialists
- Moving Medicaid eligibles into managed care programs
- Medicare eligibles selecting managed care programs

The clinical services market analysis concludes with forecasts as to what the future holds for this enterprise. The following table shows for University Hospital the forecast for inpatient days and beds at two different levels of market share. (The hospital's current statewide market share is 4.54%). Bed need is calculated on the basis of overall occupancy of 74%. A declining use rate—expressed as patient days per 1,000 population—is assumed, based on the 1995 rate of 458. Using a relatively constant market share, University Hospital will experience a slight increase in patient days. If the hospital can achieve a 5% market share, patient days will increase 11% between 1996 and 2008.

UNIVERSITY HOSPITAL PATIENT DAY FORECAST AND BED NEED: 2002 AND 2008

	1996	2002	2008
Patient Days Per 1,000 Population in Colorado	437	378	371
At this market share	4.54%	4.65%	4.65%
UH patient days =	74,697	73,216	76,935
Bed need =	277	270	285
At this market share	4.54%	4.65%	5.00%
UH patient days =	74,697	73,216	82,726
Bed need =	277	270	306



Surgery volumes, both inpatient and outpatient, were also forecast. The forecast assumes that market share remains constant at 2.6%, that the average case consumed 153 minutes, that surgical procedures will continue to shift from inpatient to outpatient settings, and that the aging of the population will result in higher rates for most types of surgery. The following table summarizes the forecast; if volumes forecast for 2008 are achieved, the hospital will need 16 operating rooms.

UNIVERSITY HOSPITAL SURGERY VOLUME FORECAST: 2002 AND 2008

	1996	2002	2008
Inpatient	4,900	5,300	5,500
Outpatient	3,100	9,200	9,900
Total	8,000	14,500	15,400

Ambulatory visit growth is forecast to be 18.5% between 1997 and 2008. Current visits, including primary and specialty clinics, urgent care, and emergency, number nearly 320,000. By 2008, total visits are forecast to approach 380,000.

Achieving all of these forecasts assumes that University Hospital can:

- Increase market share
- Maintain a physician workforce of the right size and configuration
- Continue to offer primary care throughout the metropolitan area
- Increase referrals from outside Metro Denver
- Compete for comparable services with area hospitals on a cost basis

Cancer Center

University Hospital is Colorado's market share leader in inpatient hematology and oncology services. As the population ages, the number of cancer cases per 1,000 population is expected to increase, providing a rich patient base for the cancer center programs. Based on University Hospital's recent cancer center program experience, coupled with population growth and aging, the number of cancer cases should increase 49% between 1995 and 2008. The majority of services offered to these patients—chemotherapy, radiation therapy, physician visits—are provided on an outpatient basis. University Hospital has significant potential to serve patients more efficiently and achieve forecast growth more easily by bringing all of these services together in a single location.

#### Rocky Mountain Lions Eye Institute

The Eye Institute has an excellent opportunity to build a unique program serving a population of nearly 7 million people by 2002. Presently, the ophthalmology practice is quite small, with 1% or less market share in both inpatient and outpatient surgery and a 1.37% market share in clinic visits. Inpatient surgery cases numbered 24 in 1997, outpatient cases totaled 484, and clinic visits were 13,220. Efforts are underway in this highly competitive specialty to increase the number of faculty as quickly as possible to achieve the forecast volumes forecast.

### **D. PROGRAM REQUIREMENTS— CURRENT AND PROJECTED**

#### **The Total Learning Environment (TLE)**

*“Colorado is poised to become the premier learning university in the nation ... The Total Learning Environment (TLE) is a concept that builds upon strong and relevant programs, activities, and philosophies already in place. It seeks to augment and enhance the best of our innovations in teaching, research, management and planning, asking at every juncture 'How do we enhance learning?' and 'How do we help students prepare for the future?’ “*

*John C. Buechner, President, University of Colorado*

The Total Learning Initiative was unveiled by President John Buechner during October 1996. The TLE initiative has four themes: supporting innovations in learning, including both undergraduate and graduate education; being more responsive to students and other constituents; using technology to improve teaching, learning, research, and management; and enhancing the University's human, capital, financial and organizational infrastructure.

An initial information gathering process involving 2,500 - 3,000 people across the state included local business owners, community leaders, CU parents, alumni, donors, and the faculty, staff, administrators and students of CU was completed.

Three major points were mentioned during this process: 1) CU can provide the skills necessary for a qualified workforce including: providing technical training, opportunities for lifelong learning, executive education, and distance learning; raising the standards for K-12; improving undergraduate and teacher education; and producing work-ready and life-ready graduates; 2)CU should be a leader in technology through developing new technologies, technology training, and access to technology; and 3) CU can conduct research or provide information on state issues - through the development of "think tanks" to research specific issues, the dissemination of existing information, and community access to CU's resources.

According to the TLE individual and group discussion, a Total Learning Environment should include everything believed to be good about or for education. All of the groups suggested that a Total Learning Environment include:

- Cutting edge technology - developing new technologies, access to the University through technology, interactive courses, and training in technology for students, faculty, community
- Partnerships with business, industry, and government
- Focus on learning
- Personalized attention and smaller classes
- Being flexible enough to accommodate a variety of learners - nontraditional, traditional, lifelong learners, job retraining, etc.
- Hands-on, experiential learning experiences
- Internships, real-world learning experiences
- Responsiveness
- Graduates with good work skills - communication, interpersonal, teamwork, and ethics.

During fiscal year 1997-98, approximately \$932,000 in TLE program initiatives were funded at the UCHSC. These initiatives included the following programs:

**1. Supporting innovations in learning, including both undergraduate and graduate education**

**Organize And Conduct Interdisciplinary Student Team - \$140,000**

**Training In Rural Areas Throughout Colorado**

This allocation will assist in the recruitment of UCHSC faculty from each of the health professions disciplines to form interdisciplinary faculty teams which will coordinate the development and shared use of remote affiliated training sites, train clinical preceptor teams in these community settings, and recruit students from participating disciplines into interdisciplinary student teams who will be assigned to rural training sites as a cohesive unit. The purpose of this project is to promote a total learning environment on the HSC campus by bringing together students

across disciplines who will engage in shared learning experiences. It will promote and expand faculty interaction in curricula development, research and training efforts with students and community based preceptors. The interdisciplinary experience will focus on core competencies needed by health practitioners for the 21st century: population based care, cultural competence, just-in-time learning, use of electronic databases, systems of care, team skills and interdisciplinary practice.

## **2. Using technology to improve teaching, learning, research, and management**

### **Course Development For Teaching With Technology And Tele-education - \$51,566**

This initiative will provide a resource in the School of Nursing for faculty who need assistance developing two-way interactive video (TWIV) and computer based coursework from course redesign and computer programming specialists, both within the University and from the community. This resource service will exist within the School of Nursing with attention to maintaining the integrity of the curriculum of the School of Nursing. The new resource will include consultation service in media development, distance education programs and computer skills within the framework of adult learning theory and in cooperation with the Health Sciences Center Office of Education.

### **Physical Interaction With Data Through The Use Of Force Feedback Devices - \$170,000**

These funds will help further the development of the Visible Human Project. More specifically, this allocation will provide support to further the development of haptic interaction with the human body to underpin the development of learning through simulation in the next century. This will include extending the tissues so that doctors can interact with, extending the haptic feedback from one handed operations to situations with instruments in both hands and development of remote training by coupling multiple haptic feedback devices in master/slave configurations. Of course, the overall goal is to test the effectiveness and guide future development of these simulations by students and faculty and facilitate their incorporation in the curriculum of the future. The HSC will pursue other resources to develop and meet evaluation goals during the course of this grant. With this effort in the research and development of these techniques and an early adoption in new student labs designed for this new teaching paradigm, the University of Colorado can remain on the forefront of virtual reality education in medicine.

### **Multimedia Instructor Station For Dental Preclinical Simulation Laboratory - \$210,000**

These funds will provide for the creation of a central multimedia instructor station to be placed in the main teaching laboratory of the School of Dentistry. The

development of this multimedia center would allow for a paradigm shift in the learning environment that dental and dental auxiliary students experience in mastering psychomotor skills. Additionally, this particular equipment would make possible the ability to tie the University of Colorado School of Dentistry site into a statewide telemedicine/teledentistry network.

**Distributed Education Program Support - \$203,490**

These funds will increase of the level of support in both an FTE and a technological capacity for the Educational Support Services within the Office of Academic Affairs. Specifically these funds will:

- Provide support for the addition a Classroom support person whose responsibility will be to meet workloads developed by the technological growth in the on-campus educational programs.
- Add an additional staff member in the Engineering and Technical support area to help with the increased number of courses being delivered at a distance.
- Provide support in making the transition of instructional materials from analog to digital.

**Modernizing Computer Assisted Instruction - \$500,000**

These funds will provide assistance in the purchase of hardware, software and audiovisual software. As the new HSC Office of Education successfully encourages the faculty to embrace information technology and as students make growing use of e-mail and Internet access, funding of the library's computer assisted instructional center becomes more critical. These funds will help purchase equipment now and on a continuing basis. This center is the only central microcomputer support facility on the HSC campus and is dedicated to serving the needs of over 2,300 students.

**4. Enhancing the University's human, capital, financial, and organizational infrastructure**

**Master Planning Efforts For Fitzsimons And 9th & Colorado - \$100,000**

These funds will assist in the development of two capital master planning efforts that are currently on-going at Health Sciences Center. First, as required as part of the CCHE approval of lease and renovation of Building 500, the HSC will be developing a master plan for the old Fitzsimons Army Base. The components of this master plan will include a space guideline analysis, an institutional plan and responses to specific questions generated from the CCHE and the Capital Development Committee. Secondly, this master planning effort will provide a redevelopment plan for the current campus located at Ninth and Colorado.

The initial vision, themes, and program concepts of the Total Learning Environment were incorporated into the campus 2020 vision formation program planning process of this master plan now presented.

### The 2020 Vision

As part of the master plan process, seven campus core vision teams with representation from the entire institution were engaged to develop program vision statements for the year 2020. In addition to the overarching vision statement, program areas for which the 2020 vision statements were drafted included: education, research, clinical care, health network and affiliates, finance, information technology and logistics and support. These vision statements guided the development of the master plan. A detailed copy of the vision statements for all core teams is provided in Appendix ( ).

Additionally, as part of the programming effort of the master plan, a program survey and focus interview process was utilized to identify current and future program and related space and facility requirements. A summary of the institutional vision and program requirements developed during the master plan process is presented below.

### **The University of Colorado Health Sciences Center - The Vision**

The University of Colorado Health Sciences Center's (UCHSC) paramount and time-honored mission of education, research, patient care, and community service will continue into the next century. UCHSC is a unique regional public resource because it generates new knowledge and translates these discoveries to superior health education and human health. In all of its endeavors, UCHSC will achieve excellence and outstanding accomplishments, which will place the institution in the top tier of academic health centers.

The UCHSC, in partnership with health network and affiliates, will be responsive to the community's health care needs by educating individuals as members of interdisciplinary professional health care teams, and by preparing tomorrow's leading health scientists. Physical proximity and integral working relationships among and between clinicians and scientists will foster new levels of collaboration and integration. Partnerships among faculty, students, staff, affiliates, and the community will foster the development of new knowledge, and this knowledge will be applied to the prevention and treatment of human disease and to the improvement of human health. The institution also will create partnerships among faculty, students, and consumers in offering the highest quality of health care, and providing access for citizens to the latest scientific findings concerning the promotion of health and the treatment of disease.

The UCHSC will serve as an umbrella organization for superior science in the region. In this capacity, UCHSC will provide the basic and applied health-related research technology and the intellectual capital to enhance the activities of other education, research, and industrial entities in the region. The integration of functions in academic and clinical endeavors, and in the physical facilities of UCHSC, will foster a sense of community for faculty, students, and staff and for patients. Those functions and facilities will create a supportive culture that promotes the highest technological advances as well as human caring throughout the continuum of science and health care. The UCHSC will collaborate with and provide services to a global community through the application of innovative technologies in all of its missions.

Programs at UCHSC will evolve and be influenced by societal demands and the expectations embodied in changing demographics, competition, new financial opportunities and constraints, technology, and the continual application of rapidly expanding new knowledge. UCHSC will be successful because it adapts and maintains flexibility in a changing environment to accomplish its mission.

### Education

In the year 2020, the essential and inseparable functions of the University of Colorado Health Sciences Center (UCHSC) will be:

- education of health sciences students (practitioners and scientists) at the pre-professional, professional, graduate, and post-graduate levels
- continuing education of health care professionals and health sciences investigators
- public and consumer health education
- delivery of health care
- research in the health sciences at basic, transitional, and clinical levels

With unified mission and purpose, the UCHSC will exist to improve the health status of individuals and populations. As an academic health sciences institution, scholarly activities, devoted to this aim, will include:

- the scholarship of discovery (development of new knowledge in research)
- the scholarship of integration (synthesis of new and existing knowledge in dissemination and publication)

- the scholarship of application (application of knowledge in clinical and community service)
- the scholarship of learning (transition of knowledge in professional, scientific and public education)

### **Education Vision for 2020**

The vision for the educational enterprise of the UCHSC includes the following essential elements:

- A. The educational enterprise will be supported by a strong sense of community within the UCHSC, within the University of Colorado system, with affiliates, and with public constituencies
- B. The UCHSC will be responsive to health-related workforce needs in preparing health care professionals and health sciences investigators
- C. Using evolving information technologies and other learning methods, the UCHSC will be progressively stronger in community partnerships for the continuing education of health care professionals and health sciences investigators, and for public and consumer health education
- D. Reflective of the population, the faculty, staff and learners of the UCHSC will possess diverse cultural, learning, and experiential backgrounds and diverse interests, needs, and aspirations
- E. The UCHSC will use evolving educational technologies to enable diverse learners to take advantage of different learning modalities, with faculty serving as content experts, facilitators and mentors in the learning process
- F. The UCHSC will invest in ongoing faculty and staff development as an essential means to provide the best possible educational environments and experiences
- G. The UCHSC will provide interprofessional learning opportunities and offers disciplinary, multidisciplinary, interdisciplinary, and transdisciplinary models of curricula in fulfilling its academic missions of scholarship
- H. Graduates of the UCHSC will be sought after by employers from multiple settings because they demonstrate professional competence in the knowledge, skills, and attitudes intrinsic to their field(s) of study and practice, as well as excellence in:



- working independently and in interprofessional teams;
- mastering new knowledge through information management and life-long learning;
- basing practice decisions on scientific evidence and evaluation research;
- ensuring cost-effective care and using technology appropriately;
- acting within the context of the patient and society;
- making new contributions to the scholarly record;
- participating in the education of the public and of future health care professionals and health sciences investigators
- demonstrating the highest levels of public accountability, cultural cognizance and professional ethics

#### The Rationale for the Vision--Education

The educational enterprise will be supported by a strong sense of community within the UCHSC, within the University of Colorado System, with affiliates, and with public constituencies.

Viability, strength, sustainability and growth in the educational enterprise will occur less in competitive environments, and more in cooperative environments. Building community aids in bridging gaps and fosters connectivity and networking capacities for shared and complementary purposes contributing to the educational enterprise. Building upon the shared strengths, assets and resources of organizational units, agencies and institutions in partnership, the UCHSC will function more efficiently and effectively.

The UCHSC will be responsive to health related workforce needs in preparing health care professionals and health sciences investigators.

The UCHSC must maintain and enhance an ongoing commitment to form and reform educational programs to respond to health workforce needs. Educational programs must be continuously responsive, dynamic, evaluation-conscious and future-oriented. The UCHSC must be prepared to revise or eliminate programs, as well as develop new educational programs for the preparation of health sciences practitioners, educators and investigators.

Using evolving information technologies and other learning methods, the UCHSC will be progressively stronger in community partnerships for the continuing

education of health care professionals and health sciences investigators, and for public and consumer health education.

Using evolving information technologies (such as current notions of telehealth, telelearning and other distributed learning technologies) will continuously improve delivery, access and connectivity.

By the year 2020, the term student will be an out-dated, 20th century concept. The UCHSC concept of learners and learning communities will expand significantly. The HSC will be progressively stronger in community partnerships to serve learning interests and needs in:

- pre-professional career education: provision of learning opportunities in health sciences education for children and young adults for career development of future health scientists and health care professionals
- professional and graduate education: provision of learning opportunities to prepare health care professionals and health sciences investigators
- post-graduate education and continuing professional education: provision of advanced study learning opportunities for health care professionals and health sciences investigators
- consumer and public education: provision of learning opportunities for non-health professionals and the general public for the promotion of health and wellness and the prevention of illness and disease

Reflective of the population, the faculty, staff and learners of the UCHSC will possess diverse cultural, learning, and experiential backgrounds and diverse interests, needs and aspirations.

In 2020, the UCHSC community of diverse faculty, staff and learners will better reflect the general population. In continuous pursuit of a celebrative and rich community, differences and commonalties will be recognized and valued.

The UCHSC will use evolving educational technologies to enable diverse learners to take advantage of different learning modalities, with faculty serving as information experts, facilitators and mentors in the learning process.

In the information age, the concept of learning environments and learning modalities will continuously evolve. The use of educational technologies will better accommodate differences among learners, including real and virtual learning environments, demand and just-in-time learning opportunities, and increased access and time flexibility in distributed learning modalities.

Learner and faculty roles will evolve. Both will become equally proficient as navigators, analyzers and synthesizers in information management. Faculty will serve as information experts, as well as facilitators and mentors in the learning process.

The UCHSC will invest in ongoing faculty and staff development as an essential means to provide the best possible educational environments and experiences.

Given its commitment to life-long learning, the UCHSC will continuously invest in the personal and professional growth and development of faculty and staff. Use of diverse learning strategies and methodologies will serve the developmental needs of the UCHSC community.

The UCHSC will provide interprofessional learning opportunities and offers disciplinary, multidisciplinary, interdisciplinary and transdisciplinary models of curricula in fulfilling its academic missions of scholarship.

All roles and functions of interprofessional teams in health science, health care delivery and health professions education are evolving. Among interprofessional teams, there are:

- shared roles (multiple functions performed by one person and single functions performed by multiple persons)
- specialized roles (different functions performed by different people)
- collaborative roles (different people working together to fulfill functions).

Specialized curricula will prepare individuals and groups for specialized roles and functions (disciplinary curricula), while core curricula will prepare them for shared and collaborative roles and functions (multidisciplinary, interdisciplinary and transdisciplinary curricula).

Preparing practitioners, scientists and educators to function in interprofessional teams will emphasize cost-effective role definition, using shared data, and an atmosphere of mutual trust and respect. These types of roles will pertain to faculty and learners. The scholarship of discovery, integration, application and learning will be pursued and performed independently and in interprofessional teams.

Graduates of the UCHSC will be sought after by employers, from multiple settings, because they demonstrate professional competence in the knowledge, skills, and attitudes intrinsic to their field(s) of study and practice, as well as excellence in:

- working independently and in interprofessional teams

- mastering new knowledge through information management and life-long learning
- basing practice decisions on scientific evidence and evaluation research
- ensuring cost-effective care and using technology appropriately
- acting in partnership within the context of the patient and society
- making new contributions to the scholarly record
- participating in the education of the public and of future health care professionals and health sciences investigators
- demonstrating the highest levels of public accountability, cultural cognizance and professional ethics.

Educational research will focus on the learning process (methods and materials) and the assessment and evaluation of specialized and generic learning outcomes. Discipline-specific proficiencies and generic abilities will drive curricula planning, development, management and evaluation activities.

#### Current and Projected Enrollment

A summary of current (1997-98) and five-year and ten-year projected (2003-04 and 2008-09) annualized enrollments by program area is provided in the following table. As indicated, the current total annualized campus enrollment is 2,395 students. Included in this total amount are 1,118 students currently enrolled in School of Medicine programs, 184 students enrolled in the School of Dentistry, 683 students enrolled in the School of Nursing, and 410 students in School of Pharmacy programs.

A total five-year student enrollment increase of 8% is projected for the year 2003-04. The total campus enrollment is projected to increase by total of 197 students from a total of 2,395 to 2,593. Total school enrollment projections during this five-year period indicate student enrollment increases of approximately 11% (125) for the School of Medicine, 10% (19) for the School of Dentistry, and 9% (63) for the School of Nursing. Due primarily to the transition to the Pharm.D. degree from the B.S. degree, a slight enrolment decrease of 2% (10) is projected for the School of Pharmacy during this five-year period. In addition to growth in the Pharm.D. degree program within the School of Pharmacy, other programs with significant enrollment increases projected during this 5-year period include the Child Health Associate program – M.S. (82%), Public Health – M.S. (57%), the Basic Sciences – M.S.(33%)/Ph.D.(+17%), and Nursing – M.S. (32%).

The total ten-year student enrollment increase of approximately 14% is projected for the year 2008-09. The total campus enrollment is projected to increase by total of 335 students from a current year (1997-98) total of 2,395 to 2,730 students in the year 2008-09. The school enrollment projections during this ten-year period indicate total annualized enrollment increases of approximately 14% (158) for the School of Medicine, 36% (66) for the School of Dentistry and 18% (120) for the School of Nursing. Enrollment for the School of Pharmacy is projected to remain relatively constant at a total of 401 students.

In 1994, the University of Colorado engaged in an enrollment planning process. The Health Sciences Center participated in that effort and developed a 10-year plan which has been recently updated as part of the master plan. The projections represent the best estimates for future enrollments, while recognizing the volatile nature of the health care marketplace. In concert with that plan, the Health Sciences Center has the following enrollment goals.

#### Enrollment Management Goals

- Manage enrollment stability through a combination of quality, accountability and flexibility. To accommodate the predicted enrollment demand, the University must balance accountability demands with the flexibility to manage the institution within fiscal constraints.
- Maintain responsiveness to the health care marketplace, which is affected primarily by changes in the delivery of health care, such as the shift towards managed care and more generalist health care providers.
- Maintain high quality academic programs that prepare students for changes in the delivery of health care developments in market demand, and advances in health policy, ethics and science.
- Apply new technological approaches to service delivery, increasing productivity, improving on/near campus instructional quality, and meeting market demands.

**UNIVERSITY OF COLORADO HEALTH SCIENCES CENTER**  
**Student Headcount Enrollment - 1997-98, 2003-04 and 2008-09 Years**  
**Summary Enrollment Data - Annualized**

	Current 1997-98 Total	5-Tear 2003-04 Total	% <i>Increase</i> 5-Year	10-Year 2008-09 Total	% <i>Increase</i> 10-Year
<b><u>SCHOOL OF MEDICINE</u></b>					
Medical Students	543	543	0%	543	0%
Graduate Students					
Child Health Assoc (MS)	44	80	82%	80	82%
Public Health (MSPH)	53	83	57%	95	79%
Basic Sci (MS-BMSC/BIOM/MPHY)	21	28	33%	31	48%
Basic Sci (PhD)	176	206	17%	216	23%
Phys Therapy (MS)	125	125	0%	125	0%
Genetic Assoc (MS)	17	16	-6%	16	-6%
Special Students (MS)	111	122	10%	130	17%
Total Graduate Students	547	660	21%	693	27%
Undergraduate Students					
Child Health Assoc	28	40	43%	40	43%
TOTAL School of Medicine	1,118	1,243	11%	1,276	14%
<b><u>SCHOOL OF DENTISTRY</u></b>					
Dental Students	145	158	9%	200	38%
Undergraduate Students					
Dental Hygiene	39	45	15%	50	28%
TOTAL School of Dentistry	184	203	10%	250	36%
<b><u>SCHOOL OF NURSING</u></b>					
Nursing Doctorate	119	116	-3%	123	3%
Graduate					
Masters	254	335	32%	368	45%
PhD	67	66	-1%	67	0%
Special Students (MS)	32	45	41%	45	41%
Total Graduate	353	446	26%	480	36%
Undergraduate (BS)	206	179	-13%	195	-5%
Special Students (BS)	5	5	0%	5	0%
TOTAL School of Nursing	683	746	9%	803	18%
<b><u>SCHOOL OF PHARMACY</u></b>					
Pharm D	32	360	1025%	360	1025%
Graduate Students	27	40	48%	41	52%
Undergraduate Students	351	0	-100%	0	-100%
TOTAL School of Pharmacy	410	400	-2%	401	-2%
<b>CAMPUS TOTAL</b>	<b>2,395</b>	<b>2,592</b>	<b>8%</b>	<b>2,730</b>	<b>14%</b>

## **Research**

The research mission of the University of Colorado Health Sciences Center is to develop new knowledge which will be applied to the prevention and treatment of human disease and to the improvement of human health. To better serve the people of Colorado and the public good, research discoveries are the scientific basis for improved patient care.

The University of Colorado Health Sciences Center research effort will be based on a strong faculty supported by an institutional leadership which values and advocates for research. Critically important is the on-going development of research programs and infrastructure.

### Research Vision for 2020

As articulated by the 2020 Research Vision Team, the vision for the research enterprise of the UCHSC includes the following essential elements:

The research enterprise at UCHSC will :

- be larger, stronger, and better
- be highly interdependent, collaborative, and multidisciplinary
- develop and utilize new technologies
- have even stronger federally funded grant support
- have expanding partnerships with industry and biotechnology
- have strong community involvement, support, and endowments

### The Rationale for the Vision--Research

The research enterprise at UCHSC will be larger, stronger, and better. The University of Colorado Health Sciences Center is currently the largest and most successful health related research institution in the State of Colorado. The vision is that the UCHSC research enterprise should continue to grow and become a more nationally prominent research institution.

At a time when there are pressures nationally to reduce the number of medical schools, Colorado has the potential to expand its excellent research base. To succeed in this goal, the UCHSC must plan strategically and have flexible operational processes.

- First, the momentum of growth in research activity that has occurred over the past decade must be maintained and enhanced. Losses of key faculty or key programs are unacceptable. To accomplish this goal, the UCHSC

must expand and enhance its research infrastructure and program development.

- Second, recruits to the faculty must consist of the most outstanding candidates available. Recruitment of superior research faculty in all areas is the foundation for creating the conceptual and technological advances necessary for rapid enhancement in both the basic and applied sciences. Attracting this caliber scientist to the campus will require substantial resources from all mechanisms including the State, the University Hospital and faculty, and philanthropic gifts and endowments.
- Third, the UCHSC campus must continue to nurture all students who will become tomorrow's leading scientists. Learning will be more integrated at the scientific and clinical levels and will utilize more advanced technologies and communication systems. The training of future scientists will require current technologies such as molecular biology and genetics as well as developing tools of computational mathematics and medical informatics.
- Fourth, the UCHSC must provide state-of-the-art and readily accessible research facilities for the faculty and students. Facilities should be built to promote collaboration and integration. Physical proximity is critical for these interactions. Plans which disrupt or destroy interdisciplinary collaboration will interfere with progress and are not acceptable. All research facility planning must have as a top priority enhancement of intellectual interactions, synergism of new and different technologies, and blending of our most precious resource . . . intellectually curious minds. A research campus; now or in 2020, which is separated or divided with islands of excellence will in aggregate only be good, never superior, and therefore not competitive.
- Fifth, the UCHSC must include its affiliated institutions in its plans to strengthen programs and expand research opportunities. These affiliated institutions include but are not limited to the Denver Health and Hospitals, The National Jewish Medical and Research Center, the Veterans' Administration Medical Center, the Barbara Davis Institute for Childhood Diabetes, the Eleanor Roosevelt Cancer Institute, and the Webb Waring Institute.

The research enterprise at UCHSC will be highly interdependent, collaborative, and interdisciplinary. The University of Colorado Health Sciences Center is in an enviable position for broad translational initiatives. In the past 15 years, many interdisciplinary programs have been developed which have achieved national prominence. Questions of human biology and human disease are becoming more complex and require faculty from many disciplines to join together to solve problems. This is called scientific interdependency. Already, the programs in



molecular biology, neurosciences, and cancer research bring together specialists in all fields of biology and medicine. There are currently over 30 centers of excellence on the campus, bringing together groups of scientists and clinicians to focus on specific diseases such as diabetes, alcoholism, schizophrenia, and Parkinsonism, as well as more comprehensive problems like the genetic causes of cancer. Such collaborative efforts must be enhanced because a single investigator will be unable to competently use all approaches needed to move a research domain forward. Scientific interdependency and collaboration will increase substantially. Therefore, research faculty must not be fragmented but instead should be consolidated.

The genetic revolution will discover about 100,000 new proteins in the coming decade. Uncovering the function of this huge number of molecules will be the challenge and opportunity of the next century. An increased emphasis on computational mathematics, informatics, and molecular structure analysis will be needed to understand these molecules. Furthermore, complex mathematical modeling of non-linear phenomena within the cell, the organism, and populations will be necessary. Success in these efforts will tell us the cause of many human diseases. Once the cause of disease is known, the chance of finding a cure is much improved. The process of discovery has turned from a steady trickle in the 80's to a flood in the 90's. The deluge of opportunity will be upon the faculty by the year 2000. If the campus is prepared with adequate resources, the Health Sciences Center can sail gloriously. Unprepared, the UCHSC will drown in noncompetitive mediocrity. Making these interactions more effective in the future will require a flexible administrative structure enhancing relationships between and within schools, departments, divisions and centers. A campus administration dedicated and responsive to the needs of the faculty, staff, and students must be created and maintained. Wise planning must promote--and not disrupt--the interdependent environment that makes discoveries possible.

The research enterprise at UCHSC will develop and utilize new technologies. Fundamental to the process of increasing the prominence of the research mission at UCHSC is the ability to develop, rapidly and flexibly, new technologies. The institution must empower its administrative structure to plan strategically and creatively. Faculty must have rapid and substantial input into these processes. Resources from grants, endowments, gifts, and indirect cost recoveries must be available to ensure timely operationalization. For example, the new techniques of multidimensional mathematical computation and molecular structural analysis must be developed swiftly on the UCHSC campus to enhance its competitive position. To achieve these new technologies, the institution needs to acquire new talented scientists, new facilities with different core capacities, and multidisciplinary teams.

The research enterprise at UCHSC will have even stronger federally funded grant support. The UCHSC has increased its federal grant support 12% per year over the past decade and has risen into the top 20 medical institutions for federal support. This achievement is admirable but not superior. The vision is that this source of support will expand; that UCHSC will utilize its geographic, political, social, and human intellectual resources to make a quantum jump in federally sponsored research programs. To ensure success in this vision, UCHSC must change its administrative structure. First, UCHSC must strengthen and institutionalize its research mission by establishing a Vice-Chancellor for Research Affairs with resources and authority to succeed. Second, UCHSC must evaluate alternative administrative structures similar to University Hospital or University Physicians, Inc. to provide rapid and flexible operationalization of strategic initiatives. Third, UCHSC must adopt an aggressive and proactive mentality to recruit and retain superior scientists.

The research enterprise at UCHSC will have expanding partnerships with industry and biotechnology. A crucial component to our vision of research in the future is substantial interaction with and development of biotechnology and durable relationships with industry. Scientific advances on this campus and elsewhere are increasing at an exponential rate. Translation of these discoveries to the improvement of human health will require sophisticated and substantial resources with capacities and intellectual resources that differ from those in a biomedical research laboratory. Biotechnology transfer is the medium for this activity. UCHSC must have accessible and responsive biotechnology transfer capabilities. For this to occur, UCHSC must commit itself to the development of substantial partnerships with industry and biotechnology. The vision is that Colorado is advantageously positioned to develop these relationships. For UCHSC to succeed, the campus and research enterprise must consider alternative administrative structure for biotechnology transfer that simplifies the process of transferring scientific discoveries on this campus to the private sector. The goal will be to translate scientific discoveries to human biology and the development of substantial resources to be recycled into the process of discovery.

The research enterprise at UCHSC will have strong community involvement, support, and endowments. Translation of basic scientific discoveries into applicable solutions for human disease will necessarily involve community outreach. Education of the public domain about the quality of research at UCHSC must become a priority. To succeed in this educational process, the linkage of science to human health and disease is essential. Great progress in the advocacy of UCHSC to the public has been made in the past 5 years. The vision is that the UCHSC research enterprise will commit itself to translating and linking science to health for the citizens of Colorado and the Rocky Mountain Region. In return, there will be increasing investment of the citizens, political structure, alumni and business communities into the UCHSC research endowment. To achieve this goal, the vision includes increased dedication to intramural, extramural and distant

learning for the broad lay community. In addition, community and alumni advisory boards should become an integral part of campus and program development. The UCHSC campus and the community must synergize to address creative programs in medical ethics and minority/diversity involvement. The vision is that the UCHSC research enterprise plans for an innovative transition from an isolated "island of excellence" to an "umbrella organization of superior science" serving with and for all its alliances and constituencies.

The mission statement for the Health Sciences center states that health knowledge will be advanced through basic and applied research, and that high standards will be maintained regarding the use of animal and human subjects. Research and discovery are what make a major regional academic health science center such as the UCHSC unique. Basic research findings discovered in the laboratory are often translated into clinical trials. These trials lead researchers to new techniques and procedures that can be used directly to the benefit of patients. As earlier indicated, during the past 50 years, the UCHSC has emerged as a center for health-related research. In many fields, the UCHSC has earned a national and international reputation.

Faculty research strength and expertise are requisite to strong academic programs. Today's students will be competent professionals tomorrow only if their teachers are successfully expanding the knowledge base of the health care system. The UCHSC plays a crucial role in fostering basic and clinical research to create new knowledge as well as providing training opportunities for the next generation of Colorado's health care providers, teachers and scientists.

Sponsored project activity at the Health Sciences Center continues to grow. The UCHSC received more than \$154 million in sponsored research grants and awards for the 1996-97 year. Faculty members participate in research on an individual basis, with colleagues, or in a variety of structured organizations that have specific missions and responsibilities. All campus research programs emphasize the involvement of students. This training is an important responsibility of the faculty in conducting research.

As previously presented in the market analysis summary, the Health Sciences Center has experienced significant growth in research funding over the past eight years and has ample opportunity to continue that trend given the likelihood that NIH and industry will increase research funding. To achieve growth, however, requires that research activity, including participation in clinical trials, be expanded aggressively. Critical to the Health Sciences Center's ability to expand its research presence and, thus, enhance its rank among academic medical centers, is the need to: increase research space, develop and expand programs in such areas as genetics, neurosciences, and cancer; and pursue funding from private sources (industry).

## **Clinical Care**

The clinical mission of the University of Colorado Health Sciences Center is: to provide the highest quality health care for the citizens of Colorado and the region; to serve disenfranchised patients as resources permit; to provide a learning environment for the students of the schools of the Health Sciences Center; to provide adequate patient volumes to support the clinical mission; and to serve as the focal point for translation of scientific discovery into clinical practice.

By 2020, the University of Colorado Health Sciences Center Clinical enterprise will be governed by a consolidated team of expert faculty and health care administrators. Primary, secondary, tertiary, and quaternary care in addition to wellness, prevention, and long-term care programs will be established. The Clinical Enterprise will create an environment that fosters a sense of community both for its faculty, students and staff and for its patients, resulting in a caring and nurturing culture that supports the highest technological advances as well as human caring advances throughout the continuum of care.

### Clinical Care Vision for 2020

As articulated by the 2020 Clinical Care Vision Team, the vision for the clinical care enterprise of the UCHSC includes the following essential elements:

The clinical care enterprise at UCHSC will:

- develop a robust patient base to insure the success of the education and clinical research missions of the Health Sciences Center
- be a unique regional / national resource for translation of scientific discovery into clinical practice
- encompass a full range of primary, secondary, tertiary, quaternary, preventive, long-term and assisted care required for the populations it serves
- be committed to providing care to the medically indigent to the extent resources allow
- be a competitive force in the marketplace
- be provided by an interdependent multi-professional team
- be patient and family centered
- provide the highest quality of care to insure that it remains one of the top tier academic medical centers in the United States.

### **The Rationale for the Vision—Clinical Care**

Full-time faculty will be the practicing providers of care. The clinical enterprise will improve its clinical services continually to insure that we remain a strong and

competitive Health Sciences Center. The clinical enterprise will thoughtfully and carefully distribute resources in order to be successful in the competitive environment. The Clinical enterprise will strive to balance the need for specialists and generalists to insure a balance that enables the UCHSC to remain in the top tier of the medical centers providing the most sophisticated care. The clinical enterprise will take a leadership role in defining guidelines for practice and measuring outcomes. Decisions will be evidence based. The clinical enterprise will allow flexibility for professionals to move between clinical and academic roles while assuring that the clinical mission and its success is sustained.

The clinical enterprise will be a unique focal point for actualizing concepts and scientific discoveries aimed at better understanding disease, improving patient care and enhancing prevention of illness. Most full-time faculty clinicians will concentrate their activities in the clinical, clinical research and education spheres. The enhanced excellence that clinicians and researchers can achieve because of their areas of concentration, coupled with a goal of integration, and their physical proximity will facilitate transfer of newly acquired information and concepts and subsequent actualization of these ideas by clinical investigation. This amalgamation of discovery and application is the characteristic which defines an academic medical center and clinical enterprise, distinguishes the UCHSC from a community based "teaching" hospital, and attracts patients with diseases whose cures have yet to be found.

Clinical Care. The clinical enterprise will provide a full range of service to the populations served. This will include prevention, wellness, maintenance of health, primary care, secondary care, tertiary and quaternary care, subacute care, assisted living care, long-term care, and home care. The tertiary and quaternary care component will be focused at the Health Sciences Center campus. Other components of care may be provided in more than one distinct site. Provision of all levels of care will be influenced by the patients' preferences and needs. The integrated professional team will deliver care and organize care with the patient as the central focus. There will be different models of practice such as hospitalists for inpatient acute care, ambulatory care practitioners, assisted living practitioners, home care practitioners. The populations served by the Health Sciences Center clinical enterprise will consist of defined populations, patients in a network of providers with whom the UCHSC partners for specialty care, patients referred through networks, the disenfranchised population, and the veterans and military populations. There will be a greater number of older, more frail and chronically ill patients. Patients in this clinical enterprise will be attracted from Colorado and from regional, national, and international groups. Patients may be more affluent and technologically savvy. People will access the clinical enterprise system on a personal level and on an electronic level. The integrated professional team members may go to the patients. These teams will be operating on a horizontal level and will take full ownership of the plan of care.

Community Service. The clinical enterprise will support the clinical needs of the providers of the State of Colorado by sharing their clinical expertise via tele-education, telehealth and telemedicine. The HSC will continue to provide care to the medically indigent as resources allow.

Financial Solvency and Stability. The clinical enterprise will be cost effective and efficient while providing high quality, personal and highly technical care. The clinical enterprise will evaluate functional areas and redistribute resources in order to compete successfully in the marketplace. Sources of patients will come from governmental supported populations, business purchasers, unions, and individual indemnity payers. The UCHSC will develop its own HMO or become part of an integrated care delivery system. The clinical enterprise will consider merging and/or developing partnerships with other providers and be partners in other networks. Members of the clinical enterprise will take a proactive role in bringing patients into the system. This may include developing and managing transport systems and developing mobile healthcare teams. There may be true financial mergers and not partnerships in the future. The UCHSC must generate a strong capital base in order to have state-of-the-art facilities and the therapeutic equipment needed to be a provider of tertiary and quaternary care. The clinical enterprise will be flexible and decide on a case by case basis its make/buy decisions relative to the services that it provides. The UCHSC will pursue regional, national, and international patient bases.

Integrated Professional Team. Care will be provided by an integrated professional team consisting of physicians, nurses, nurse practitioners, physician assistants, pharmacists, dentists, nutritionists, social workers, physical therapists, etc. These team members will cooperate to optimize communication and patient needs. There will be hospitalists, ambulatory care practitioners, and case managers. Primary care practitioners will provide a significant counseling role for patients and families. The organization of the clinical enterprise will consist of these teams centered around patient needs. The team leader will not necessarily be a physician. Patients and families will have greater say in their care. The clinical enterprise will support the training of various professional groups in order to provide care in differing environments.

Patient-Centered Care. The clinical enterprise will structure the delivery system based more on the needs of the patient than the provider. The goal will be service that is caring, comfortable, accessible, flexible, and calm. To accommodate these goals, the clinical enterprise will have a completely integrated and confidential electronic medical record with integrated billing and a clinical database. There will be electronic order entry and retrieval and immediate access to information. The patient will come on line with the providers, enjoying the benefits of electronic patient education, electronic communication with the provider and telemedicine and telehealth that can be brought into the home. The care delivery system throughout the continuum of care will be a seamless system to the consumer. The

electronic medical record will allow the ability to track incidence of disease and make predictions and provide data for ongoing clinical research and projects of disease risk as well as financial risk. The HSC will have the ability to interact electronically with other medical centers and within our network. Patients will not lose their autonomy upon admission to the system. Accessibility for patients includes a safe neighborhood community with efficient public transportation. The UCHSC will have a culture that fosters trust among the members of the clinical enterprise and Health Sciences Center and trust between the members of the Health Sciences Center and the community we serve. The clinical enterprise will support the development of a community environment that supports the delivery of healthcare in a warm, open, calm environment that does not have an institutional image. The clinical enterprise sees its staff and faculty as its most valued assets.

#### The Center for Advanced Medicine

Since the early 1990's there has been an ever increasing demand for space by University Hospital (UH) to deliver ambulatory care. With the shift of care from the inpatient to the out patient setting, and the growth in clinical programs at the Health Sciences Center the number of out patient visits has grown from just under 200,000 in 1990 to over 300,000 today. To meet this demand the University Hospital has done several things. This includes acquiring the old Rocky Mountain Osteopathic Hospital (University East Pavilion), renovation of existing clinic space on the first and second floors of the west wing of UH, relocating several ambulatory care functions closer to the inpatient units, and expanding and moving clinics off of the 9<sup>th</sup> Ave. and Colorado Blvd. site. The latter include sports medicine, general internal medicine, and primary care clinics in Boulder, Aurora, Fitzsimons, and Littleton.

Although all of these efforts have helped in meeting the demand for clinical space, and some have improved patient access, they have also created problems. The East Pavilion is very inefficient because it is an inpatient facility used for out patient care. The UH clinic space has never been adequate even after renovation, and patients fight the access and parking problems associated with the campus. Ambulatory care is spread out in several locations without regard to the issues of proximity and carries all of the inherent cost of duplication. Most importantly, is the fact that in all these settings, ambulatory care continues to be subordinated to the inpatient mind set. What the growth has done is create more of the same "old" kind of ambulatory care. UH is still fundamentally delivering ambulatory care today as it did in the 1980s.

Many academic health sciences centers have faced these same issues over the last several years with a variety of solution and success. Recently, some have taken a major step forward in the concept of providing ambulatory care. This new approach has created an ambulatory complex that is distinct and separate physically, organizationally, and functionally from the inpatient hospital. All

aspects of these new centers are focused on the satisfied patient experience. This includes a distinct building designed specifically for ambulatory care, easy access and parking, all services needed to support the care provided, and bringing together all specialties so that the patient has true "one stop shopping". In the academic setting these centers have usually concentrated the specialty care, and some primary care in one building and left the bulk of the primary care geographically dispersed.

Such centers allow the university hospitals to capitalize on their strongest market advantages, that is their specialty care. The very nature of these highly efficient venues of care makes for superb teaching. With most of these efforts, there has been very strong growth in market share and clinical activity.

One of the best examples of this new concept is the Center for Advanced Medicine at the University of Chicago. This unique facility houses all of the specialty care of the hospital and faculty and is operated distinctly separate from the inpatient facility.

Until recently the prospect of creating such a concept and facility at UH was almost impossible. This because of the constraints of the current site. With the acquisition of the Fitzsimons campus such a concept is not only possible but probable.

A Center for Advanced Medicine at the University of Colorado Hospital is a bold move to create a true market leading ambulatory care facility and concept. It will become the anchor tenant at the new Fitzsimons campus, and will allow the University to grow our programs and volumes in such a way as to secure our future.

## **Support**

In order for the logistics and support services to contribute successfully to the broad mission of the academic health center, a set of core values should serve as the guiding principles for organization and delivery of services. Those core values identified by the 2020 Logistics and Support Vision Team include:

- Service programs and physical facilities are critical to a "sense of community" that encourages creativity, cooperation, and productivity
- Responsiveness to the needs of all constituents
- Flexibility in operations to meet the needs of the variety of programs



- Adaptability to adjust to the changing environment, including health care changes, demographics, and technology
- Capitalizing on the most valuable resource--human resources--and creating an environment that encourages innovation, creativity, and risk taking
- Holding employees accountable for their actions and success of their programs
- Delegating responsibility and authority to the lowest level possible without compromising protection of assets and effective program management
- Embracing change as a constant, and preparing our employees and the organization(s) to effectively deal with change
- Expecting financial responsibility, which is critical to the success of the academic health center.

### **Support and Logistics Vision for 2020**

Logistics and Support Services provide the infrastructure that enables the achievement of excellence in patient care, teaching, research, and community service. The services must be accountable, effective, and efficient in order to provide the best possible services to internal and external customers. Innovation and flexibility will be key considerations in developing and implementing services for the future.

### **The Rationale for the Vision—Support and Logistics**

The most valuable resources available to the institutions are informed employees, students, patients, and community supporters; the institutions must focus on creating an environment that benefits from the talents of its human resources.

- A service-oriented culture will be maintained for all aspects of the logistics and support services. This entails a regular review of services and a willingness to take advantage of new technology and management approaches. A system of services must be provided to meet varying levels of customer needs with uniformly high standards of excellence.
- The skills and talents of employees providing support and logistic services will need to evolve with changes in technology and innovations in the marketplace. As entrepreneurs enter the marketplace with new products and services, the center's support units will be challenged to match and compete with the private sector in terms of products offered, quality, service, and price.

- Greater emphasis will need to be placed on training the workforce that supports the core missions of the enterprise. The skills and knowledge needed to provide support to the community served will expand as changes in the academic environment manifest in day to day operations.
- All services will be provided in a manner that maximizes revenue and avoids unnecessary costs.
- All services share in the responsibility to protect the physical and intellectual assets of the institutions.
- Changes in health care will continue to accelerate. The institutions must meet the challenge of providing service excellence while supporting community identity, stability, and culture during times of rapid change through constant attention to change management and program re-engineering.
- The academic health center must be receptive to identifying and establishing new programs to meet the changing needs of its constituents. Some examples of service programs that may be needed in the future are:
  - Housing for students, visitors, and patients/families.
  - Conference facilities with support services and amenities.
  - Day care for students and employees.
  - Transportation services for students, employees, and patients and families.
- Efficiencies should be achieved through options such as consolidation of services and outsourcing whenever they will result in improved customer service and are economically beneficial. These solutions should cross institutional boundaries whenever possible.
- As clinical, research, and educational programs assume a more entrepreneurial character, the State of Colorado and the academic health center must ensure flexible approaches to its administrative policies, rules and regulations; as the federal government continues to delegate more programs to the state, the academic health center should assume a leadership role in ensuring that external agencies support its objectives.

## **Technology**

The UCHSC is committed to using advanced, integrated technologies as the primary enabling mechanism for multi-level integration of its programs. This integration will involve all programs on the campus, will create bridges to key partners in various locations, will foster trans-disciplinary teams of health care professionals, and will transform the ways in which learning and work occur.

### **Information Technology Vision for 2020**

In the year 2020, technology functions as the most important enabling tool for most aspects of education, research, clinical care and campus administration. The expanding use of new technology restructures how people work and learn. Students function in a self-directed manner with faculty as facilitators rather than traditional lecturers. Clinicians seamlessly generate and use data, interacting with enormous clinical data repositories with integrated decision support. The development of large clinical databases, and new technologies for filtering, sorting, and data mining facilitate the integration of patient care, teaching, and clinical and epidemiological resources. These resources also allow rapid adjustment of business practices. Basic science researchers distribute and retrieve results quickly. Clinical researchers depend on large databases, universal taxonomy, and they interact immediately with data they generate.

All information resources are integrated and within the reach of individuals who need them. "Smart agents," representing the next development in artificial intelligence, will integrate technological functions by performing continuous searches and analyzing, evaluating, synthesizing and presenting data. Learning, collaboration, communication, completion of job duties and other tasks occur when and where convenient for the individuals involved. This is accomplished by functional systems that are highly intuitive. Students, faculty, staff, and administrators come to the institution with more readiness to continually adapt to new technology. However, intense competition for the most adept individuals remains a strategic challenge for the institution.

Technology supports all types of collaboration, learning, and patient care among groups of people who are physically remote from each other via sophisticated and interactive video, robotics, wireless systems, and through systems that are more "intelligent." The institution's ability to acquire and apply new technology directly impacts the competitive success of its programs, and may impact the survivability of the institution. Investments in technology compete with physical (capital) and human resource investments in the allocation of institutional resources. A continuously updated strategic plan that anticipates significant and targeted investment in technology is critical.

Technology standards have evolved to overcome basic aspects of interconnectivity, security, and confidentiality, but the continual emergence of new technologies requires on-going standards development. The ability to maintain connectivity, data transfer, and access to campus systems by individuals and small organizations is as important as connectivity with large affiliated entities. An effective and broad reaching strategic planning process is on-going and is supported by institutional leadership that has a vision and unified commitment to the role of technology in the academic health center of 2020. This planning process focuses on the application of emerging technologies as solutions to meeting the needs of the campus programs.

### **The Rationale for the Vision—Information Technology**

- The successful implementation of new technologies will depend on the ability to solve problems associated with the “human factor.” In other words, integrating technology in a manner that individuals will learn how to use and apply new tools will be critical.
- Individual skills relating to the wise use, interaction, and “filtering” of information available through technology will be required at more sophisticated levels than ever before. This will be accomplished through informatics curricula, research, and programs. Informatics will serve as the bridge between technology and professional activities.
- The rate at which new technology is implemented will continue to depend upon dynamics related to individual abilities to adopt and adapt to new technology. For example, early adopters will continue to lead the implementation curve, however, the time it takes for the rest of the UCHSC population to adjust may occur within a shorter timeframe than currently experienced within the institution. The unknown impact on the “adoption curve” of increasing and accelerating change in technologies will present major challenges to the institution.
- The evolution of technology and its implementation in both the broader world and at the UCHSC will result in greater decentralization of information and decision-making within the institution.
- Decision support systems will be a primary tool used by health care practitioners and patients alike.
- Faculty inventions will increasingly be technology-based, which will require unique infrastructure support and development.

- The economics of electronic information will be vastly different than today in ways we cannot foresee.
- “Smart Agents” will be the primary vehicle for UCHSC users to have information identified, organized, evaluated, and presented in an integrated manner.
- HSC faculty will have three roles as they interact with increasingly sophisticated and expanding knowledge data bases. As educators they are aggregators and re-sellers of information; as researchers they are developers of information; and as clinicians they are consumers/users of information.
- The way in which faculty work will focus increasingly on their ability to use technology resources. New economic models for education, research, and patient care will emerge from this dynamic.
- UCHSC will serve as a hub to provide information technology services to its clinical and educational enterprise, which may be global.
- The role of academic health centers will be to determine the extent to which available technology is applied to health care. Issues of ethics and rules built into decision support systems will be important. The goal will be to balance the possibilities of available technology with ethics and good business practices.
- “Actuarial health care” will be a reality. Technological advances and reforms in payment structures will foster an increased reliance on actuarially based decisions for the provision of health care. Electronic data bases will also support improved quality of care through better documentation.
- The University will be both an importer and an exporter of technology-based courses and programs.
- Distributed health care and health education will be the norm in 2020. This will be enabled by the penetration of interactive systems in the home. By 2020, the UCHSC will have developed and implemented a cost-effective strategy to leverage this new global infrastructure to fulfill its missions.
- Students will no longer learn through traditional methods. Technology-based education programs will be tailored to learning styles, needs, and the convenience of the individual. Educational technology will result in radical changes in the roles and responsibilities of faculty and students.

### Program Development Summary

As part of the market and program analysis of this master plan, specific program expansion and development requirements were identified. Specific program requirements for the next 5-year (1998 – 2003) period include:

Education. During the past 5-year period, enrollment at the Health Sciences Center has remained stable with an average number of students of approximately 2,400-2,500.

A total institutional student enrollment increase of 8% is projected for the period of 1998 – 2003. The current annualized student enrollment of 2,395 is projected to increase to 2,592. Included in this increase is an 11% projected increase for programs in the School of Medicine, a 10% increase for the School of Dentistry, and a 9% increase for the School of Nursing. The 5-year enrollment projection for the School of Pharmacy indicates a slight decrease of 2% from 410 to 400.

The campus projects stable headcount enrollment in the near future for several of the educational programs at the Health Sciences Center, including Medical, Physical Therapy, Nursing Doctorate.

Programs projecting significant growth during the next 5-year period include: Child Health Associate – M.S. (82%)/Undergraduate (43%), Public Health M.S. (57%); Basic Sciences – M.S. (33%) / Ph.D. (17%), Dental Hygiene (15%), Nursing – M.S. (32%) and Pharmacy Doctorate.

#### **Child Health Associate Program**

The program will increase incrementally in class size beginning in 1997-98 and continue until doubling the class size by the year 2001-02.

#### **Ph.D. Programs**

The first class of students matriculated into the new Human Medical Genetics track in Biophysics and Genetics Degree program in the fall of 1997.

The first class of students matriculated in fall 1997 into the new Ph.D. in the Clinical Sciences degree program.

A pilot unified Ph.D. program has been implemented by Graduate School faculty. This program will admit an incoming class of 6-8 students, who will enter the school in fall 1998 as special students and select a degree program in their second year. The number of students for this program will not augment the total current enrollment projections for basic science Ph.D. programs. Rather, the program's intent is to replace a percentage

of students matriculating directly into Ph.D. programs with students who engage in a year of studies before choosing their degree program.

### **Physical Therapy**

The program is analyzing options for the addition of an advanced Physical Therapy degree program with the expectation of making a recommendation and proposal to the campus and University with the goal of submitting a concept paper to CCHE within a year.

### **Masters in Public Health**

The MSPH program goal is for moderate growth under the tuition differential plan and to double its enrollment by the year 2004-05.

### **Doctor of Dental Surgery**

Based upon new space availability at the Fitzsimons site, the current class size is projected to increase by 9% during the next 5-year period.

### **School of Nursing**

The enrollment plan for the School of Nursing is being reviewed. Flexible options and an innovative curriculum should result in slight increases in the graduate programs

The enrollment in the baccalaureate and the Doctor of Nursing (ND) programs will stabilize at current levels. This is in response to the current market demand for Registered Nurses as well as reallocation to the graduate level programming.

#### *Nursing Masters*

The School of Nursing is to review the number of specialty track options available in the master's program. Meanwhile, the enrollment in this program is lower than projected, which is a national trend in nursing education. Master's enrollments fluctuate significantly in the school's outreach program as the number of off-campus sites change over time in response to local needs. The school anticipates enrollment increases, particularly in out-of-state students.

#### *Nursing Ph.D.*

The school of Nursing is to decrease the student faculty ratio and total enrollment in the Ph.D. program. The summer option for admission into the program will end after summer 1997, however use of intensive models will allow the program to slowly grow. The Ph.D. program was part of the overall Graduate School review of Ph.D. programs.

### **School of Pharmacy**

The goal is for the school of Pharmacy to transition from its current three degree professional programs: 1) a three-year baccalaureate program; 2) a two year post-baccalaureate Pharm.D. Program; and 3) a track-in option to the post-baccalaureate program; to a single four year entry level Pharm.D. program. The transition plan received approval from the Board of Regents in November 1997 and approval by the Colorado Commission on Higher Education is anticipated in February 1998.

#### *Pharmacy Baccalaureate*

The original plan called for reductions of approximately 15% annually in the baccalaureate degree program. That plan is being implemented.

#### *Pharm.D. Track-In Option*

The original plan called for implementation of the Pharm.D. track-in option in 1997, with an enrollment of approximately 30 students. The plan was implemented at an accelerated pace in response to heavy market demand. Sixty students were admitted to the program and began classes in fall 1997.

#### *Pharm.D. Post-Baccalaureate*

The current, post-baccalaureate, Pharm.D. Degree Program will be phased out as stated above. A post-baccalaureate Pharm.D. program is offered in a non-traditional format that allows practicing pharmacists to remain fully employed while fulfilling the degree's requirements.

### Research

Current research program expansion is envisioned for all program and center areas. Significant growth areas noted during the market and program analysis include molecular biology, genetics, neurosciences and cancer. The research enterprise will continue to evolve toward highly interdependent, collaborative and interdisciplinary approaches. Other areas for expansion during the projected period of 1998-2003 include clinical trials expansion related to University Hospital facility development and expanding partnerships with industry and biotechnology.

### Clinical Care

The UCHSC clinical enterprise will continue to provide a full range of service to the populations served. This will include prevention, wellness, maintenance of health, primary care, secondary care, tertiary and quaternary care, subacute care, assisted living, long-term care, and home care. The tertiary and quaternary care component will be focused at the Health Sciences Center campus. Other components of care may be provided in more than one distinct site.



As earlier described, The Center for Advanced Medicine at the University of Colorado Hospital will make a bold move to create a true market leading ambulatory care facility and concept. It will become the anchor tenant at the new Fitzsimons campus, and will allow the University Hospital to successfully expand programs and volumes.

#### The Future Environment at Fitzsimons

Due to physical site constraints, UCHSC programs cannot sufficiently expand nor new programs of critical importance to the mission of the institution be developed at the present campus location. The opportunity to acquire and develop a new campus has become available at the site of the former Fitzsimons Army Medical Center in Aurora, Colorado, six miles from the present UCHSC campus. This site represents many advantages for future growth, both immediate and in the years to come. The plan for reuse of Fitzsimons affords a satellite campus initially and the opportunity for a complete relocation of all of the HSC during a long-term period, given adequate approvals and funding.

Competent UCHSC faculty have built successful health professional educational programs for Colorado citizens, provided health care for both private patients and the medically indigent, and made significant research discoveries benefiting all of mankind. The current facilities house almost 11,000 people, employ more than 7,700 staff and faculty, and generate \$671,000,000. However, the highly successful academic health center located at 9<sup>th</sup> Ave. and Colorado Blvd. in Denver has outgrown its existing space and has begun to bulge into neighboring areas.

Based on the recognition of limited growth potential within these constraints and acknowledgment of the concerns of the neighbors and the City of Denver, during the last several years, the HSC leadership has sought a satellite campus site. Program surveys of faculty and staff revealed long-term growth needs that would double the current 2.4-million square feet of facility space to approximately 5 million square feet.

The Fitzsimons site is viewed by many as well suited to the future of the HSC for the following reasons:

1. The HSC acreage increases from 46 to 217 acres, more than enough to accommodate the expressed program space needs of faculty and staff. It also makes possible both a second, or satellite, campus in the near future and the possibility for complete relocation in the distant future.
2. The acreage is available by public conveyance to the State of Colorado and the CU Regents at no cost. Market value of the 217 acres and existing facilities has been judged to be in the range of \$100,000,000.

3. Site location - the site is immediately adjacent to I-225, very close to I-70 and the Denver International Airport, Fitzsimons is approximately six miles from the present HSC campus.
4. The location of the adjacent 150-acre research park.
5. The availability of Building 500, the Army Hospital, with slightly less than 500,000 square feet for occupancy two years prior to actual conveyance, which provides the HSC with needed space to relocate personnel on the present campus and to consolidate some administrative services and to allow for expansion of some programs at the 9<sup>th</sup> Avenue campus.

What has emerged from the program planning is a consensus that the institution needs to expand from its present site, but that certain integrated functions must remain on site until they can be moved en masse, when and if that is fiscally and practically feasible in the future.

This master plan accomplishes both of these purposes. The plan provides a vision for the development of an immediate satellite campus and holds out the opportunity and expectation for entire relocation. The contingencies are that funding can be accomplished during the long-term period and that regental, Colorado Commission on Higher Education (CCHE) and legislative approvals be granted.

An overview of the scenario option for campus transition is presented in the following section.

## **Related Materials**

possible by the transfer of 217 acres that comprise over half of the Fitzsimons Army Medical Center in Aurora, Colorado to the University of Colorado. This location, just six miles east of the existing campus, enables phased transition of programs with minimal disruption. The relocation to Fitzsimons is creating great excitement locally and nationally, because it combines the opportunity to develop both a model for military base closure and a new model for health professions' education, scholarly work, and community service. This unique and challenging project began to emerge almost four years ago, after several years of investigating alternative solutions to accommodating the UCHSC and UH success and projected growth.

In the early 1990s, it had become clear that the 46 acres on which the UCHSC and UH campus is sited would no longer support the existing programs or anticipated growth in education, research, patient care, and administrative programs. The Chancellor initiated discussions with the Denver Mayor's Office, the Denver Planning Office, and those neighborhood associations that represent residents who live in areas contiguous to the campus. These discussions centered around the physical space needs of the UCHSC and UH and the options for expansion through a series of property acquisitions. The discussions also included options for the development of University-owned, undeveloped property west of Colorado Boulevard.

After several years of failed negotiations, the political and resident groups determined that the quality of life in the areas contiguous to the UCHSC and UH would suffer from any expansion, thus effectively land-locking the existing campus. A search began for other long-term solutions to accommodate program growth and enhancement. These options included redevelopment opportunities in the lower downtown Denver area, the old Stapleton Airport property, open parcels of land in contiguous counties, and the Lowry Air Force Base, which was being closed. Each of these options involved great expense to purchase land and each was ultimately determined to be financially unfeasible for the University. In 1994, however, the federal government announced plans to close the Fitzsimons Army Garrison. Subsequently, the UCHSC was approached by the City of Aurora to initiate discussions regarding the relocation of the UCHSC and UH campus to the Fitzsimons site.

The discussions with the City of Aurora proved fruitful, since any land conveyance to the University of Colorado would be without a direct cost for the property. In 1995, a proposed reuse request for a public benefit conveyance of 186 acres to the University was submitted to the Fitzsimons Redevelopment Authority. The application for a public benefit transfer was approved by the US Department of Education in September, 1997. The UCHSC proposal was complemented by an economic development conveyance request by the City of Aurora, through its Fitzsimons Redevelopment Authority, for the remaining 147 acres at the site. Of

this acreage, 31 acres are to be transferred to the UCHSC at a later date and the remainder of this conveyance will be used to develop a bioscience research park.

The UCHSC's request for the Fitzsimons property is supported by the University President's Office, the Board of Regents, the Colorado General Assembly, and the Colorado Congressional Delegation. The 217 acres, valued at over \$100 million, and approximately \$10 million of equipment and furnishings will transfer without cost to the UCHSC.

The current UCHSC and UH programs are housed in facilities that have a combined total of 2.4 million gross square feet. A faculty survey of program needs and plans indicate that over the next decade, an almost 100 percent increase in space will be needed. These projections are supported by the growth of the campus over the last ten years. Campus expenditures, including the total campus economy of UH, UCHSC, and University Physicians, Inc. have grown 300% in the last decade to \$700 million. Research and training income from sponsored program support has grown from \$50 million to \$155 million during this period. New research space is urgently needed to house current and expanding programs. Administrative space shortages are forcing UCHSC and UH support programs off of the campus to remote sites. Space for education programs and activities is inadequate to support changes in curricula and teaching, and space for amenities and quality of life programs is almost non-existent. The space and facility shortages at the current campus have impacted the competitive position and the quality of all of the campus' programs. The Fitzsimons site provides UCHSC and UH opportunity to plan for future growth and to accomplish immediate relocation for selected programs.

### **Opportunity**

The acquisition of 217 acres at the Fitzsimons site presents opportunities beyond those associated with relieving the stress of expansion at the 9th Avenue campus. Aside from a handful of buildings on the Fitzsimons site, most of the structures are inadequate, unsafe, inaccessible, inefficient, and poorly maintained. The need to clear the Fitzsimons site of these structures creates a "blank slate" upon which to build the academic health center of the future. No other institution in the country currently has this opportunity.

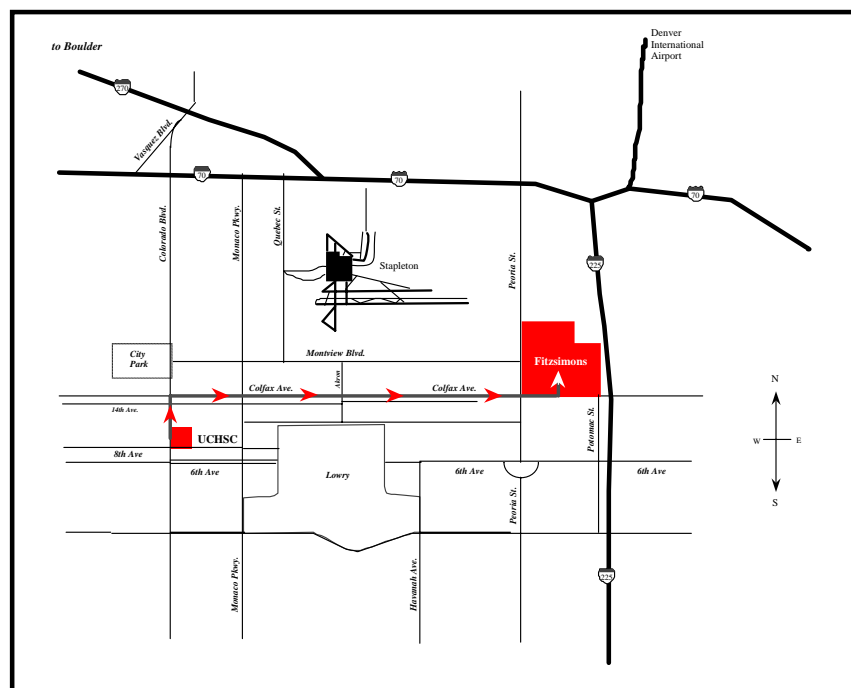
The vision of the new campus includes spaces that will enable new ways in which faculty, students, and staff will conduct their duties in the 21st century. In the new Total Learning Environment at Fitzsimons, education space will be more integrated with clinical and research space and will reflect the way in which teaching and learning are changing to learner-centered approaches. Research space will integrate clinical and basic science research to encourage a more effective flow of new discoveries to their application for the benefit of the patient and the community at large. Clinical space will reflect the reorganization of health

care as a result of new treatments and approaches to diseases, the new demographics of patient populations, the emphasis on wellness and preventive care, the increase in the types of clinical sites, the need for facilities to support clinical trials, and other anticipated changes.

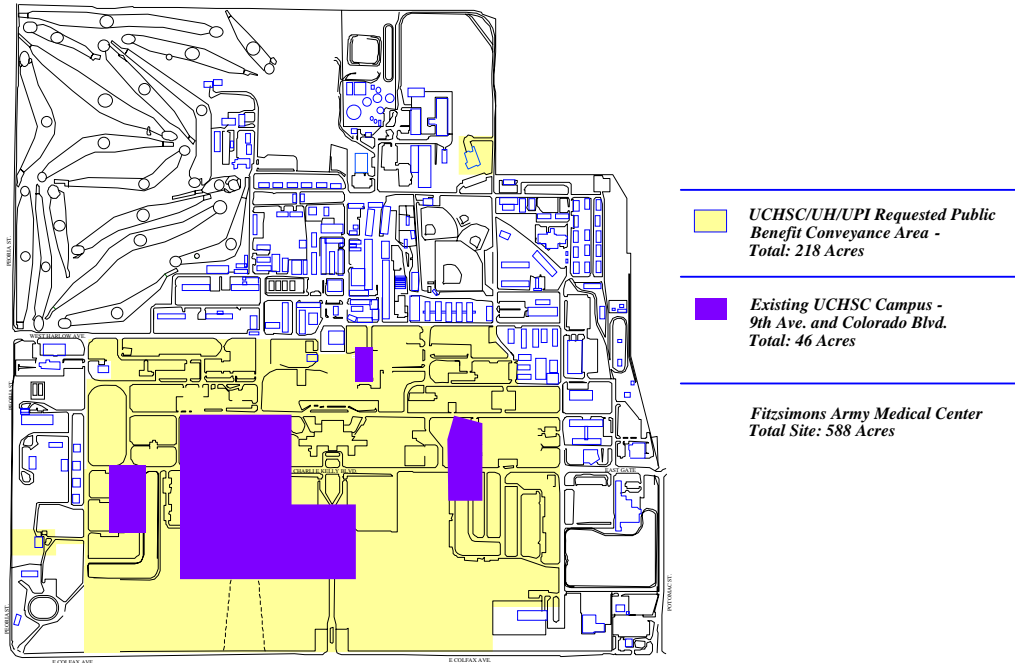
The current physical barriers that exist between the health sciences schools can be overcome in new facilities that promote interdisciplinary work and health care teams. The new campus can incorporate infrastructure and space that promote the integration of new technology in all aspects of clinical, education, research, and administrative work. Amenities and support services will be configured to promote a high quality of life, effective communications, applications of advanced technologies, and a sense of community. Proximity to the new bioscience research park and regional industry provides access and opportunities for public/private partnership and entrepreneurial development.

This unique opportunity and the compelling vision of the academic health center of the future has made this project a model at the national level for base closures across the country. The Fitzsimons endeavor is not simply an economic development effort on the part of a local community, but one that will also benefit the entire nation.

### *Fitzsimons Site Location*



## Fitzsimons Reuse Plan Comparison of Existing Campus Area to Proposed Area

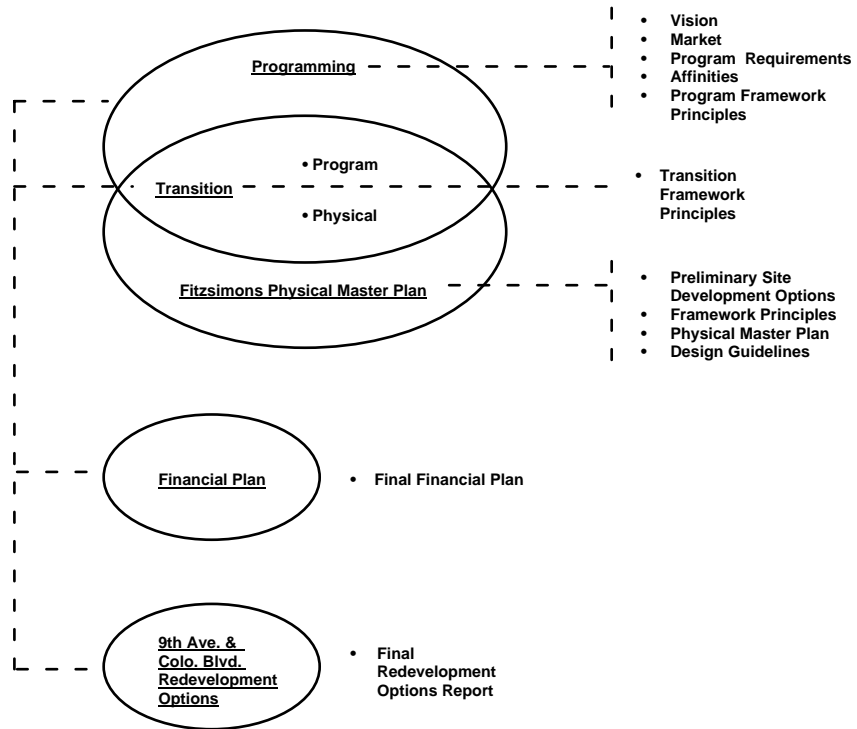


### Planning Challenge

In order to position the UCHSC and UH to take full advantage of the Fitzsimons initiative, the institutions embarked upon a highly participatory, year-long joint master plan process to:

- Define the vision of the academic health center of the future.
- Define the projected program requirements for the education, research, clinical, and support programs.
- Develop a transition plan to migrate from the 9<sup>th</sup> Avenue campus to Fitzsimons.
- Develop a physical master plan that embodies the vision for the new Fitzsimons campus.
- Develop a financial plan that supports and enables the successful relocation to Fitzsimons.
- Develop options for the redevelopment of the 9<sup>th</sup> Avenue campus.

**Master Plan Development  
 Summary of Key Work Plan Milestones**

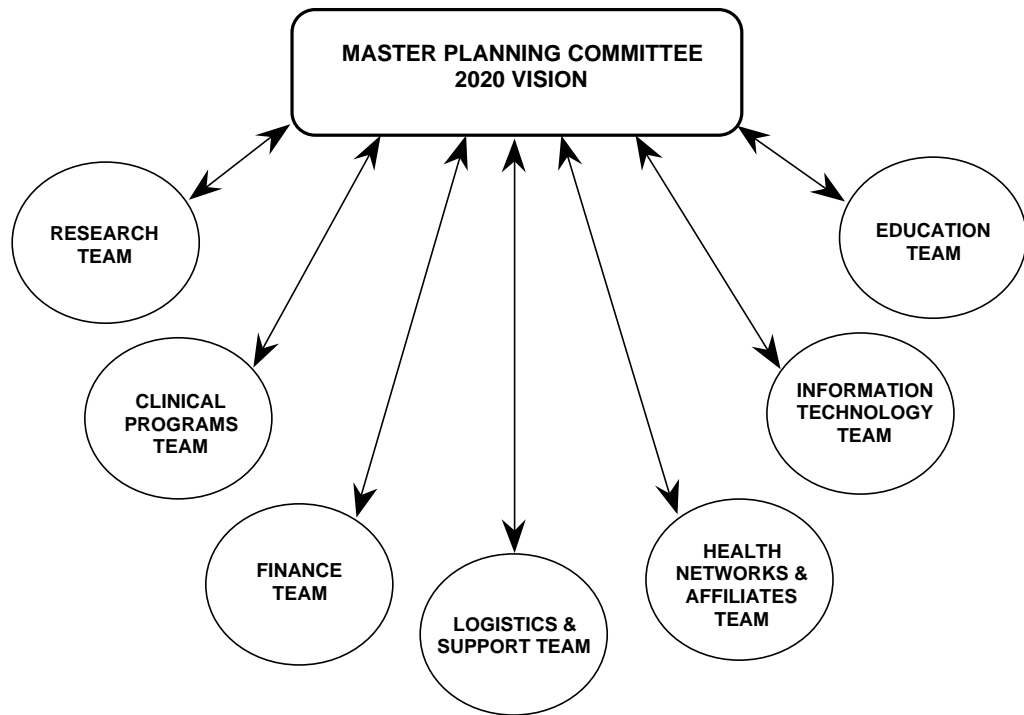


**Vision**

In June 1997, the Chancellor appointed a 2020 Committee to develop a vision for the campus--UCHSC and UH--in the year 2020. This Committee was co-chaired by a Regent of the University and a member of the University Hospital Board of Directors. The Committee appointed 7 Vision Teams to create statements regarding education, research, clinical care, health network and affiliates, information technology, finance, and logistics and support systems. More than 150 UCHSC and UH faculty and staff were appointed to these seven teams.

The 2020 Committee used the seven team vision statements as the basis for drafting an overarching vision statement for the campus, which appears below:





### **UCHSC Overarching Vision Statement**

The University of Colorado Health Sciences Center's (UCHSC) paramount and time-honored mission of education, research, patient care, and community service will continue into the next century. UCHSC is a unique regional public resource because it generates new knowledge and translates these discoveries to superior health education and human health. In all of its endeavors, UCHSC will achieve excellence and outstanding accomplishments, which will place the institution in the top tier of academic health centers.

The UCHSC, in partnership with health network and affiliates, will be responsive to the community's health care needs by educating individuals as members of interdisciplinary professional health care teams, and by preparing tomorrow's leading health scientists. Physical proximity and integral working relationships among and between clinicians and scientists will foster new levels of collaboration and integration. Partnerships among faculty, students, staff, affiliates, and the community will foster the development of new knowledge, and this knowledge will be applied to the prevention and treatment of human disease and to the improvement of human health. The institution also will create partnerships among faculty, students, and consumers in offering the highest quality of health care, and providing access for citizens to the latest scientific findings concerning the promotion of health and the treatment of disease.

The UCHSC will serve as an umbrella organization for superior science in the region. In this capacity, UCHSC will provide the basic and applied health-related research technology and the intellectual capital to enhance the activities of other education, research, and industrial entities in the region. The integration of functions in academic and clinical endeavors, and in the physical facilities of UCHSC, will foster a sense of community for faculty, students, and staff and for patients. Those functions and facilities will create a supportive culture that promotes the highest technological advances as well as human caring throughout the continuum of science and health care. The UCHSC will collaborate with and provide services to a global community through the application of innovative technologies in all of its missions.

Programs at UCHSC will evolve and be influenced by societal demands and the expectations embodied in changing demographics, competition, new financial opportunities and constraints, technology, and the continual application of rapidly expanding new knowledge. UCHSC will be successful because it adapts and maintains flexibility in a changing environment to accomplish its mission.

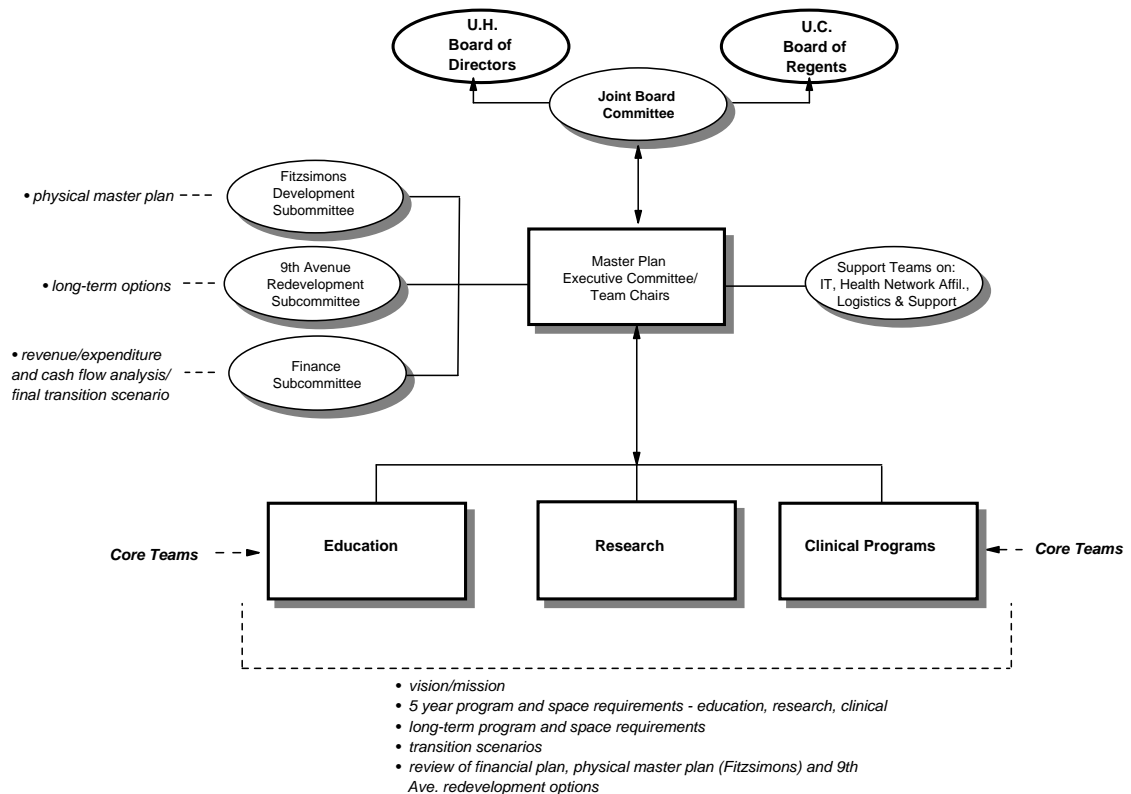
At the completion of the vision process, the 8 statements were disseminated for comment to the campus community via the campus web page on the Internet. These statements have been considered drafts throughout the entire planning process and will be periodically updated to reflect changes and refinements in the vision. Within the vision statements are key recurring themes which are considered touchstones or key concepts and themes for the master plan:

- UCHSC/UH will rank among the top 10 academic health center in the country
- Programs will have a regional, national, and international scope
- Programs will be integrated, interdisciplinary, and interprofessional in nature
- New technologies will be employed to enable all programs
- Programs will be more competitive
- Services and programs will be more customer-friendly
- New partnerships will be created
- The organizations will experience ongoing change and will be flexible

Today, the vision statements are embraced as the articulation of collective goals and aspirations.

## Master Plan

### UNIVERSITY OF COLORADO HEALTH SCIENCES CENTER & UNIVERSITY HOSPITAL MASTER PLAN ORGANIZATION



The planning process was reorganized to accommodate the transition from the vision process to the master plan process. The master plan process organization is depicted in the figure above. It is important to note that both the UCHSC and UH engaged in joint planning, overseen by the two governing boards of the institutions. These boards appointed a joint planning committee, comprised of four Regents and two UH Board members, who monitored the progress of the entire effort.

The 2020 Committee transitioned to become the Executive Master Plan Committee. The Executive Vice Chancellor served as the chair of the group and was responsible for the management of the planning process. The Committee and the entire process were supported by an administrative working group comprised of staff from the two institutions and a capable and experienced group of professional consultants.

The Education, Research, and Clinical Core Teams were created from membership of the vision teams. The purpose was to restructure the process to provide a greater focus on faculty roles and participation in the process. As a result, the three core teams became the central and most influential component of the planning process. At least three faculty co-chairs were identified for of these teams, who in turn were invited to all meetings of the Master Plan Executive Committee. The process required all planning components to be reviewed by these groups.

The Fitzsimons Development Subcommittee reviewed the elements of design as they evolved for the new campus. This group provided an opportunity to include representatives from the Aurora City Council, Aurora Planning Office, and Fitzsimons Redevelopment Authority in the planning for the new campus and to discuss issues regarding redevelopment of the boundary area.

The 9th Avenue Redevelopment Committee is working to define options for the reuse of the current campus and will issue an interim report to the Board of Regents in December 1998. Neighborhood groups, other CU campuses, and the Denver Mayor's Office are examples of external stakeholders on this group.

The Finance Committee was responsible for developing a plan to support the costs of the transition scenario, maintenance of the base of the institutions, and new program development. Principles and assumptions regarding both resources and requirements provided a framework for the final comprehensive analysis.

A context for planning was established by the UCHSC Chancellor early in the process. Assumptions were articulated to focus the planning process, including:

- The present UCHSC site will not accommodate the campus space requirements in the near and distant future.
- The goal is to develop a complete campus at Fitzsimons.
- UCHSC will have two campuses during the transition to Fitzsimons. It is essential that both campuses be functional during the transition and the quality of the programs and facilities of the 9th Ave. campus will not be compromised.
- The transition to the Fitzsimons site will create some inconvenience and disruptions for the UCHSC community, but every effort will be made to minimize these occurrences.
- Educational and research space remodeling will be done on the current campus.
- Planning for the clinical ambulatory center and a new research building will occur in conjunction with the master plan process.

- The master planning process will be conducted with the participation of faculty, staff, and students.
- The Master Planning process will focus on detailed identification of programs, inter-relationships of programs, campus structure, siting and layout, and facilities.

### **Resources**

The financial plan component of the master plan provides a realistic projection of resources and requirements to support the first twelve years of the transition to the new Fitzsimons campus. The University of Colorado has initiated a major fund raising campaign, a substantial portion of which will focus on program and facility development at Fitzsimons site. A State legislative initiative to create a Trust Fund for the development of Fitzsimons over the next ten years was successful. An aggressive federal funding strategy is being pursued by UCHSC faculty, the Chancellor, and the President of the University. UCHSC enjoys the financial position of having relatively small amounts of current debt, and debt capacities are projected to be adequate to support the development of critical components of the campus. Market indicators for UH clinical programs are positive and the competitiveness of these programs are expected to improve as they are reorganized on the new campus. The comprehensive financial plan provides a positive margin at the end of 12 years, which will enable some flexibility during the implementation of the transition to the new campus.

### **The Future**

The primary strength of the Fitzsimons initiative is that the UCHSC and UH will have an opportunity to grow and expand beyond the limits imposed by the current location. The transfer, at no cost, of property that is valued at over \$100 million is a compelling impetus for the campus. Furthermore, the location of the Fitzsimons site in the eastern metro corridor is the fastest growing area of the Denver Metro complex. It is close to the new Denver International Airport and industrial, manufacturing and office development sites that will add vitality to the area, and make it a regional commercial hub.

Future planning will be challenged by the need to continually adjust and accommodate to realities through the transition period. Projects and programs may be funded in an order that is not anticipated or desired by the plan. It may prove to be difficult to amass financial resources for large projects. Changes in federal, state, or other policies, or in technology, could radically change the plans after they are developed.

Finally, the largest challenge will be to maintain the quality of existing programs on the campus and ensure that no program is materially hindered by the transition. This will take the full cooperation, trust, and flexibility of all parties.

## SECTION III

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# CONVEYANCE AND ACQUISITION OF FITZSIMONS PROPERTY

*“Would it not be well to secure sufficient lands... on which to erect at some future day a medical college? ... I could give many reasons why we should have a medical college here ... “*

*McClelland, W.F., President of the Colorado Territorial Medical Society, 1873*

It has been apparent for the last several years that the University of Colorado Health Sciences (UCHSC) would require additional facilities to support its programmatic needs and programmatic expansion. Alternatives that were reviewed to meet needs included 1) constructing new buildings and remodeling existing buildings at the 9<sup>th</sup> Avenue and Colorado Boulevard campus; 2) leasing additional property and buildings at a variety of off-campus sites; and 3) acquiring additional large tracts of property. These alternatives were thoroughly reviewed and implemented in various ways over the time period.

It was determined that problems and major obstacles existed with each of the alternatives. There existed a two-fold problem with constructing new facilities at the existing campus-first, the campus is landlocked with few remaining building sites and second there was significant neighborhood opposition to building on these sites.

The major obstacle to the second option was that there were no single large buildings or property available to lease and this created an environment of multiple leases of small space at many sites. Although there are numerous leases for space off campus and a high volume of space remodels at 9<sup>th</sup> Avenue, the only feasible alternative meet the programmatic and physical needs of the UCHSC was to acquire a large amount of space in a single tract as close as possible to the current campus.

To accomplish this, the UCHSC reviewed the possibility of acquiring space at the former Lowry Air Force Base, at the former Stapleton Airport, lower downtown Denver, in Lakewood and at other sites. None of these proved to be feasible. Late in 1995, the Army announced it would close the US Army Medical Garrison at Fitzsimons in Aurora, Colorado. The reuse of property for the UCHSC was actively pursued by the City of Aurora and the University of Colorado. The opportunity presented included the acquisition of a large tract of property and associated buildings and personal property at no cost. This alternative provided the space to expand the facilities needed to support the mission of the UCHSC.

Property Acquisition Background. In the summer of 1996, the UCHSC commissioned a study of the Fitzsimons site to ensure it was feasible to move some or all of the programs to the area. The Plan for Acquisition and Development of Fitzsimons was completed in October 1996 and approved by the Board of Regents in November, 1996. This plan concluded that it was feasible to move the UCHSC to the site. As a result, the UCHSC initiated the process to acquire the property as quickly as possible under the Base Realignment and Closure (BRAC) process of the Department of Defense and the Army. Several actions were taken to implement this process.

It should be noted that under the BRAC process, a redevelopment body or entity must be established for the purpose of transitioning and developing the former military property into a new use. The Fitzsimons Redevelopment Authority (FRA) was formed early in the process. The Fitzsimons site consists of approximately 550 acres and the UCHSC is requesting approximately 217 acres of this. The remainder of the property will be conveyed to the Fitzsimons Redevelopment Authority (FRA) which is the legal redevelopment entity for the total site and will develop all the non-University owned property. The UCHSC has worked actively with the FRA to prepare coordinated development plans to ensure the consistency of development of each entities parcels and the total site.

In May 1997, the UCHSC leased approximately 300,000 square feet in the Administrative Building – Fitzsimons (AF-B), formerly the main hospital building, and is currently in the final phases of the initial remodel of the facility to accommodate the UCHSC, University Hospital (UH) and other groups assigned space in the building. This lease and initial remodel of the building is detailed in the “Revision to the Program Plan for the Administration Building.” This building contains approximately 450,000 square feet. In late April, 1998, in a supplement to this original lease, the Army released another 130,000 square feet of space in the building to UCHSC. In June, 1998, the UCHSC submitted to the Colorado Commission on Higher Education (CCHE) the “Program Plan for the Remodel of the Administrative Building – Fitzsimons, Phase II and Other Buildings.” This program plan details the use of this new space in the building and establishes the remodel budget. The remaining 20,000 square feet of space in the AB-F is assigned to the FRA and will be released to the UCHSC in 2001 when the FRA vacates the building. The above mentioned program plan will be amended at that time for this space.

In June 1997, UCHSC requested additional property for the site of the new Cancer Center/Urology Program Building. This property is adjacent to the AF - B and contains 10 acres of land and 5 buildings. The UCHSC submitted to CCHE the “Lease Letter/Program Plan” for this area on November 10, 1997. These areas were released to the UCHSC in April, 1998 in the supplemental agreement to the original lease mentioned above. See Table 1.

On August 12, 1997, the UCHSC submitted an “Application for Public Benefit Transfer of Surplus Federal Real Property for Educational Purposes to the United States”

Department of Education (DOE) for 186 acres of property and the buildings located on the property including the Administrative Building – Fitzsimons. Again, the UCHSC is requesting the property at no cost for the United States government. In order to receive the property at no cost, the University must apply for it under a Public Benefit Conveyance (PBC) from the federal government. As a public higher education facility, the University can apply for this surplus federal property if the purpose is to further its educational mission for the good and welfare of the citizens of Colorado. The application for the property must be through a sponsoring federal agency that is the Department of Education for the UCHSC. On September 29, 1997, the DOE approved the application and conveyance of the 186 acres was scheduled for Fiscal Year (FY) 2002-2003.

In September 1997, the Army informed the UCHSC that based on military closing procedures, it has the authority to convey property early to the new owner if the following criteria are met: 1) the Army is no longer utilizing the property and has vacated the areas; and, 2) the property is officially clear of environmental hazards. Based upon this criteria, 88 acres of property were made available for early conveyance to UCHSC. UCHSC submitted to CCHE the “Conveyance Letter/Program Plan” for this parcel on March 3, 1998. The Board of Regents approved this conveyance of property and the deeds at their April 23, 1998, meeting. The CCHE approved the conveyance of the property at their May 7, 1998, meeting. See Table 1.

As UCHSC develops this property with the remodel of existing facilities and the construction of new buildings, facilities program plans for each building will be created and submitted to CCHE for approval. Facilities currently being planned include the Cancer Center/Urology Program Building; the Native American and Alaska Native Programs, Studies in Public Psychiatry, and TeleHealth/Education Building; and, System-Wide Library Access Building. Facility Program Plans for each of these have been approved by the Regents and submitted to CCHE. Reuse of existing buildings in this property is detailed in the “Program Plan for the Remodel of the Administrative Building – Fitzsimons, Phase II and Other Buildings.” This program plan has also been approved by the Regents and submitted to CCHE.

Infrastructure and utilities are critical to the development of the above mentioned properties as well as to future leases and acquisitions. The approach is to utilize as much current, existing infrastructure as possible and integrate it with new utilities. Infrastructure and utilities are a key “underpinning” to the total development. The initial phase of the infrastructure work will begin soon. This work is detailed in the “Program Plan for Fitzsimons Infrastructure Development – Phase I” that was approved by the Regents, CCHE and funded by the legislature for July 1, 1998. It is anticipated there will be 6-8 phases of infrastructure development.

Real Estate Instruments Property Acquisition. There are four types of real estate instruments for the University to acquire the property. These will convert to actual



ownership of property by deed in 2003. The real estate instruments utilized have been a interim lease of property, a supplement(s) to the interim lease, conveyance of property by title and a Lease in Furtherance of Public Benefit Conveyance (LIFPBC). The interim lease and the supplements are long-term for 17 years with provisions and terms to change or modify the property to meet the programmatic needs. The intent is to lease the property and the lease contains no terms for ownership. The lease provisions do assure "payback" for the development investment. The interim previous lease and supplements at Fitzsimons have been among the UCHSC, the City of Aurora and the FRA. These lease and supplements are expected to convert to conveyance of property by title approximately January 1, 2003. UCHSC will then own the property outright at this point.

Conveyance of property by title is the process by which UCHSC has received ownership of land, buildings and personal property by transfer of title. This occurred in May 1998 when the Army transferred the property to the DoE which in turn conveyed ownership to the UCHSC. Deeds have been signed and recorded and ownership is now under the UCHSC. Ownership provides the sound basis for the major financial investments into the development of the new campus.

A Lease in Furtherance of Public Benefit Conveyance (LIFPBC) is the instrument that will used for the next acquisition and all future acquisitions. It is an instrument that although it is lease, it provides many of the advantages of ownership. The major difference between the lease instrument and a LIFPBC is that there is a written intent by the United States to convey the property by title to the leaseholder at a future date. In this case, the LIFPBC is expected to convert to conveyance of property by title approximately January 1, 2003. UCHSC will then own the property outright at this point. The LIFPBC, like ownership, provides the sound basis for the major financial investments into the development of the new campus. The parties in the LIFC will be the Army and the UCHSC. The City of Aurora and the FRA are not included in the agreement.

In May 1998, the Army requested that UCHSC assume responsibility for additional property at Fitzsimons. The Army wished to establish an achievable real property transfer and lease plan that was within its guidelines and objectives and which minimized its caretaker costs and maximized support for those who will use the Fitzsimons property.

In short, the Army has taken this approach and the UCHSC has agreed because :

- It reduces the cost and burden of processing "piecemeal" leases.
- It accelerates the pace of reuse opportunities for reusers by placing property in their hands quickly.
- It decreases Army operating costs.

- It recognizes the fact and integrates into the property release process that the Army cannot convey the property by title because portions are still being utilized and other parcels are not environmentally clear.

The UCHSC supported this strategy. It was apparent that the Army and UCHSC did not have the resources to proceed with the complex and large number of activities it requires to convey the property by title. This coupled with the fact that some of the areas are still under use by the Army and have not been vacated. Other areas have not yet been environmentally cleared and may not be for another 24 to 36 months. In addition, a lease requires nearly as much activity and due diligence as conveyance and the lease and supplements are interim and must be replaced by more permanent instruments. The LIFPBC provides the opportunity to conserve resources for all parties yet provide property for redevelopment.

This LIFPBC is anticipated to be signed in October 1998. It should be noted that the buildings in the parcel will not all be transferred at this time. This is necessary because some of these remain in use by the Army or their environmental issues have not been resolved. The whole parcel and buildings will be leased in October and by agreement they will all not be released to the UCHSC until the usage and environmental issues are completed. As a result, the property and buildings will be transferred under the LIFPBC incrementally from October 1998 through June 1999. The UCHSC will not be responsible for operating costs until the buildings are actually transferred.

Future Acquisition Steps. The LIFPBC for the property is expected to be signed in November 1998. As mentioned previously, although the lease will commit both the Army and the UCHSC to the transfer of the 70 acres and 50 buildings, the actual responsibility for these will occur incrementally from October 1998 through June 1999. This is because the Army is still utilizing some of the buildings and there are certain areas in some buildings to be environmentally cleared. By July 1, 1999, all areas will be transferred to the UCHSC.

A second LIFPBC is planned for November 1999. This will include any remaining parcels within the UCHSC requested conveyance. Terms of this agreement will be similar to the first LIFPBC. There are approximately 18 acres of land and 15 buildings. With the transfer of these on that date, the UCHSC will have all 186 acres of property requested in the original Public Benefit Conveyance (PBC) under lease, LIFPBC or conveyed by title.

By January 1, 2003, the lease and supplements to it, the LIFPBCs will convert to conveyance of property by title and UCHSC will have title to the 186 acres.

SUMMARY OF ACQUISITION ACTIONS AND SITE PLANS

Date	Document
December 1996	Approval of the "Plan for Acquisition and Development of Fitzsimons"
May 1997	Lease for space in the administrative building, Fitzsimons
September 1997	Approval of the Application to the U.S. Department of Education for a Public Benefit Conveyance (PBC)
April 1998	A supplemental agreement to the first lease providing an additional 5 buildings and 10 acres of land
May 1998	Approval of the early conveyance of property by title of 7 buildings and 88 acres of land
October 1998 through June 1999	Army requested a "lease in furtherance of conveyance" (LIFC) of 50 buildings and 70 acres of land
November 1999	A second LIFC for the remainder of the property to be conveyed for 15 buildings and 18 acres of land
January 2003	The public benefit conveyance or conveyance of property by title of all leased and LIFC property for a total of 78 buildings and 186 acres of land
January 2008	The Fitzsimons Redevelopment Authority (FRA) transfers to the UCHSC 30 buildings and 31 acres of land
Total	109 buildings and 217 acres of land

## SECTION IV

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### TRANSITION

*"We need to communicate/create a vision for the University community so that we can make each interaction with all faculty/staff/students/administrators a learning experience."*

*Total Learning Environment Focus Group, 1997*

#### A. GOALS AND PRINCIPLES

The purpose of this transition plan is to provide a framework for the logical phasing of University of Colorado Health Sciences Center and University Hospital programs from the 9th Avenue campus to the new Fitzsimons site. Many scenarios were investigated and analyzed in the master plan process, however, the single scenario that is presented in this chapter most closely meets the policy criteria established by the Board of Regents in August, 1998. These criteria include:

- Transition core activities to Fitzsimons in the shortest time possible (e.g., a "front-loaded" scenario); all new buildings will be at Fitzsimons;
- Balances realistic estimates of cost and achievable resources;
- Preserves the core principles from the vision development process;
- Protects program support to the maximum extent possible;
- Integrates and maximizes the use of University, State, Federal and private sector resources;
- Provides realistic staging including the transitional use of the current campus;
- Maximizes enterprise development options;
- Minimizes program disruption or degradation from a student, patient and services perspective;
- Expedites acquisition of research space;
- Preserves future development options for affiliates; and
- Preserves the physical integrity of the existing buildings and infrastructure at the current 9<sup>th</sup> Avenue campus to facilitate its reuse.

- The ultimate development of the Fitzsimons campus will involve the construction and renovation of over eight million gross square feet of education, research, clinical, administrative, and support space. There are three elements to this plan, as follows:
- Five million gross square feet (gsf) of renovation and construction to accommodate the needs of the Health Sciences Center and University Hospital. The long-term plan for this space will reflect generally the space requirements as determined by the education, research, and clinical leaders of the institutions and as indicated through responses to surveys and interviews during the spring and summer of 1998. The comprehensive results of this planning effort are reported in Section IV. In terms of space need, however, this process served to identify a total need of 4.7 million gsf.
- One million gsf of construction of additional facilities to house HSC and UH programs that have been discussed as components of a long-term vision for the Fitzsimons campus, but which are not included in the program projections as part of this plan. Facilities in this category might include a transitional care facility; temporary patient and family housing; additional campus amenities for patients, students, faculty, and staff; employee related family services; and facilities to house new programs developed in partnership with other CU campuses.
- Two million gsf of construction for at least two major affiliates to relocate in whole or in part.
- Transition planning has focused on the first component – the eventual development of space and facilities at Fitzsimons to accommodate the long-term projected need of UCHSC and UH programs as identified by faculty, academic administrators, and UH administrators over the last year.

## **B. TRANSITION PLAN**

### **Overview**

The single transition scenario that is described in this section of the master plan accomplishes the relocation of major components of the UCHSC and UH over a period of twelve years, including:

- The entire relocation of the education programs of the 5 health sciences schools
- The entire relocation of the clinical programs of the UCHSC and UH

- The relocation of approximately one-half of UCHSC research programs, and allowing for 100% growth in these programs over 12 years
- There are many factors that were considered in developing a single, financially viable transition plan, all of which are consistent with the broad principles established by the Board of Regents.

Time Frame. The planning time frame chosen for the scenario was 12 years. The transition schedule, actually displays a 14-year time frame in order to capture the previous year as a base year (FY 1997-98) and to show an additional year at the end of the planning period (FY 2010-11). Therefore, the 12-year plan includes the years FY 1998-99 through FY 2009-10. The twelve year time frame was chosen because it is the shortest possible span of time within which costs can still be reasonably spread to result in financial viability of the plan.

Use of Both Campuses. It is assumed that the UCHSC and UH will continue to use the facilities at the existing campus through the entire transition time frame, and that all research facilities on the campus will house UCHSC programs beyond the first 12 years. Therefore, the programmatic needs of the two institutions can be met by combining the resources of the two sites during and after the first 12 years. At the end of 12 years, there will be approximately 3.5 million gsf of new and renovated space at Fitzsimons. At that time, approximately 750,000 gsf of research space at the 9<sup>th</sup> Avenue campus will still be used. In order to complete the relocation of the entire campus after the first 12 years, an additional 1.5 million gsf will need to be constructed.

Flow of Funds. The cost model developed by Chi Systems provides annual inflated costs for all construction, planning, and design activities. This model combined with the Ernst and Young financial model, which provides annual revenue projections, produces projections of annual cash flow compared to anticipated costs. Using these dynamic models, construction of new spaces at Fitzsimons were adjusted to ensure that there are no projected annual deficits or deficits at the end of the transition period.

Market Opportunities. The market analysis conducted for UCHSC and UH as a component of this master plan indicates that there are opportunities in both clinical and research areas to increase current market shares. Developing these opportunities into new programs will require additional space, which does not exist on the 9<sup>th</sup> Avenue campus. Ignoring these market opportunities could jeopardize the competitiveness and stability of the institutions. Therefore, priority for early development of new facilities at Fitzsimons has been given to programs such as the ambulatory care complex and research buildings.

Implementing the Vision. Much of the deliberations within the planning process focused on how the vision statement themes would be implement in the development of the new campus. For example, an integrated approach to

education facilities evolved as a recommendation to support new interdisciplinary programs and changes in curricula. Therefore, the construction of new space at Fitzsimons does not include building self-contained schools, but rather models the development of shared instructional facilities and provides for relatively smaller “home bases” to accommodate school administrative spaces and specialized student services that are unique to a school or program.

Opportunistic Development. The transition plan, and future modifications to it, includes the development of facilities and programs that result from unforeseen and unplanned opportunities that may arise for a variety of reasons. For example, a donor may wish to accelerate the construction of a certain facility by providing the funds. Federal or state initiatives may result in the development of programs earlier than otherwise planned. It is important to note that opportunistic development is welcome by the two institutions, but will not be the primary strategy for the construction of the new campus.

### **Program Relocation Sequencing**

#### Education

Current instructional and library space at the 9<sup>th</sup> Avenue campus totals about 200,000 gsf. The Education Core Team identified a long-term need of 475,000 gsf, which will include: the library, clinical evaluation and teaching facilities for the School of Dentistry, and other instructional space. Instructional space is identified on the transition schedule as Education I through IV and includes the need in later years for an additional 90,000 gsf. This instructional space will be shared by all of the UCHSC education programs. The five health sciences center schools will each have an identity in the administration space (160,000 gsf), which will also include faculty offices that are not assigned in either research or clinical space and student support services that are unique to a school or program.

The funds to support the development of education space are anticipated to come primarily from state sources, and these resources will need to be reserved until the amounts are large enough to construct education facilities. The financial model demonstrates that early in the transition time frame, only approximately 100,000 gsf of instructional space is feasible. According to the model, the remainder of education facilities can be funded toward the end of transition time frame. This will result in education programs being separated because the facilities of both sites will be needed through the last year of the transition. The 90,000 gsf that is deferred is needed as programs, but the absence of this space will not prevent full relocation of all education programs by the end of the 12-year transition.

Because the the current 9<sup>th</sup> Avenue campus education space will be used throughout the transition time frame, initial new space at Fitzsimons will be dedicated to new types of education facilities that do not currently exist to support UCHSC programs. For example, simulation labs, computer labs, small problem-based learning rooms,

and learning/study carrels, will be built early at Fitzsimons, while the more traditional spaces will continue to be used at the 9<sup>th</sup> Avenue campus.

### **Research**

The projected space needs for the long-term to support UCHSC research 1.8 million gsf. This total includes wet laboratories, dry laboratories, office space for investigators, and support space including animal resources. The current space at the 9<sup>th</sup> Avenue campus for these same functions is 750,000 gsf. Therefore, a three-fold increase is needed.

The goal of transition planning for research was to create as much space as possible, at the earliest possible date, at Fitzsimons. There is an existing shortage of research space, which is negatively affecting faculty productivity and growth of programs. This serious shortage is impacting faculty recruitment and forcing the development of new programs to be indefinitely postponed.

In planning discussions, the research constituency at the UCHSC suggested that a "core" of research activities that are highly integrated and interactive could not be separated. Although this core has not been specifically defined, an estimate of the amount of space currently used to house the existing core activities is in the range of 500,000 gsf to 600,000 gsf of space. Therefore, the immediate goal for research space at Fitzsimons was estimated to be about 800,000 gsf of new space in order to accommodate this core and allow for at least a 30% increment of growth. The transition schedule shows this space being constructed in two increments, with the first 600,000 increment being completed in five years, and the second 200,000 increment being completed in 8 years.

Once this new space is completed and research programs from the 9<sup>th</sup> Avenue campus are relocated to Fitzsimons, the total research space available for UCHSC programs will have doubled, because the 9<sup>th</sup> Avenue space will be used to house existing programs, program growth, and new programs. As indicated in the "later years" column on the transition schedule, another 1 million gsf of research space will be needed at Fitzsimons in the long-term to accomplish the full relocation of all UCHSC research programs.

### **Clinical Care**

#### Colorado Psychiatric Hospital, Dept. of Psychiatry

The new Native American/TeleHealth Center is being constructed to support new research program growth and to establish a state-of-the-art clinical and education technology center that will house both distance education and telemedicine programs. Most, but not all, of these programs are associated with the Department of Psychiatry.



The Colorado Psychiatric Hospital (CPH) and the remainder of the Department of Psychiatry are scheduled to move coincident with UH inpatient programs. In addition, the timing reflects the need to reserve resources in advance of relocating. CPH inpatient will be built contiguous to the UH inpatient facility. CPH outpatient and departmental dry lab research and administration will be in one facility located in close proximity to CPH inpatient.

#### UH Clinical

The transition schedule illustrates that ambulatory care programs will relocate to new facilities at Fitzsimons early in the time frame. This plan will allow UH to capture market opportunities and reorganize the manner in which care is provided. This space will be built to more easily accommodate education functions, such as the presence of residents and students in exam and procedure rooms.

The School of Dentistry faculty practice will be located in the new ambulatory care center, which reflects the need to integrate that faculty into the clinical environment with other health sciences practitioners.

UH inpatient programs are planned to be relocated at the end of the time frame because of the time needed to build reserves and so that current debt obligations can be reduced.

#### **Support**

The enthusiasm for development of a new campus stems partially from being able to plan for the types of facilities and amenities that will add quality of life and a sense of community for everyone on the campus. Therefore, the student center (campus center) was considered essential to include as early as possible in the transition schedule. Other support services and amenities were delayed to support the financial feasibility of building the new center. Although the alumni center was not included in the 12-year schedule, it is hoped that donors might have a special interest in such a facility, allowing it to be constructed in an earlier time frame.

In the long-term, a communications center will be needed to serve as the hub of the complex campus information technology infrastructure. However, during the first twelve years, infrastructure support services can be expanded within Bldg. 500.

The proposed UH warehouse which is placed early in the transition schedule is essential because a current lease for warehouse space will terminate in the Fall of 2000. UH current provides warehouse services for the entire campus and will continue do so from a new Fitzsimons facility once it is constructed.

### Conclusion and Summary

This transition plan accomplishes the goals and policies established by the Board of Regents allows for immediate expansion of programs that are in critical need of new space, and accomplishes the move of the core of campus programs within 12 years. It involves the continued use of the 9<sup>th</sup> Avenue campus in the most appropriate and expedient manner, while accomplishing the orderly, rational, and substantial move of programs to new facilities and a new environment that will nurture the development of the academic health center of the 21<sup>st</sup> century.

The financial analysis of this scenario is detailed in Section VII, and a more detailed description of the facilities that will be built at Fitzsimons is in Section V.

## SECTION V

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### FACILITIES PLAN

*"Imagine the wonderful facilities to be constructed at Fitzsimons, like lanterns, guiding beacons of light shining brightly in the night to guide intellectual travelers on their passages along the dark prairie."*

*David Hansen, Principal Designer, Perkins & Will, 1998*

#### A. Summary of Space and Physical Inventories

##### 9<sup>th</sup> Avenue Campus

The current University of Colorado Health Sciences Center (UCHSC) campus is located southeast of the geographic center of the Denver metropolitan area at the intersection of Colorado Boulevard and East 9<sup>th</sup> Avenue. The campus encompasses approximately 46 acres and is neighbor to the Veterans Administration Medical Center and Columbia-Rose Medical Center, forming a medical complex. The remainder of the immediately adjacent community is comprised of a mixture of residential and commercial facilities. The neighborhood was originally suburban residential area and has slowly transitioned to an urban community over the last 65 years.

The UCHSC consists of five professional schools, Dentistry, Medicine, Nursing, Pharmacy, and Graduate. Additionally, the campus houses University Hospital, the primary teaching hospital for the UCHSC, and two affiliated institutes--Barbara Davis Center for Childhood Diabetes and Webb-Waring Biomedical Research Institute.

The campus is split into three segments by local streets. Ninth Avenue is a major east-west street and forms a strong north-south division and for many years controlled northward expansion so that the majority of campus facilities are to the south of this street. The second dividing street is Colorado Boulevard which runs north-south and is one of the heaviest traveled arteries in the metropolitan area. The one city block of the campus west of this street is largely underdeveloped, with only surface parking and four old residential facilities now used for interim offices and a few minimal patient care services.

The UCHSC facilities that house programs encompass approximately 2.4 million gross square feet (gsf) of on-campus and off-campus building space

to support its major educational, research, and patient care programs. Of this total, the majority of space is clinical followed by office and research space.

Room Type	GSF	% of Total
Office/Conference Space	602,637	24.9%
Instructional Space	209,475	8.7%
Research Space	521,918	21.6%
Clinical Space	901,402	37.3%
Animal Space	37,902	1.6%
Other	146,523	6.1%
Total	2,419,858	100%

The majority of the 2.4 gsf is used by the School of Medicine and University Hospital.

Schools/Major Units	GSF	% of Total
School of Medicine	882,638	36%
School of Dentistry	70,834	3%
School of Nursing	58,370	2%
School of Pharmacy	88,560	4%
Grad School Administration	1,191	0%
Psychiatric Hospital	109,372	5%
University Hospital	820,000	34%
Central Services/Admin	388,893	16%
Total	2,419,858	100%

To determine the amount of space for the facility master plan, future space projections for all of the major departments and programs were developed. The process used to determine the future space requirements by department or functional area included:

- Review of the market analysis to understand future trends as related to the department and then, document current space utilization.
- Distribution of a written survey to each department to document future programs, enrollment projections, staffing and associated space requirements.
- Analysis of space requirements using a series of space planning methodologies for education, office, clinical and research space (Appendix B).

- Validation of program plans and projected space requirements through individual interviews with each department.

Based on this analysis, the future space requirements are projected to increase from 2.4 million gsf in 1998 to 4.2 million gsf in 2003 and, then, to 4.7 million gsf in 2008.

## **Fitzsimons**

Historical Context. The 217 acre site of the new UCHSC/UH campus is a portion of the grounds of the United States Army Garrison-Fitzsimons, originally General Hospital No. 21, which was established on the plains east of Denver in the closing months of World War I. The hospital's specific mission was to care for the growing number of veterans suffering from tuberculosis and pulmonary diseases resulting from battlefield conditions during the war. The installation included medical buildings, residential quarters, administrative offices, recreational and educational facilities and agricultural fields. In composition, the hospital buildings embodied the latest medical philosophies regarding the treatment of tuberculosis.

The post represented the expansion of military medical services associated with the war and the recognition of the beneficial effects of the cool dry air and abundant sunshine of Colorado's climate on those afflicted with tuberculosis. Some of the early buildings were open air wards. Hospital administrators also believed that the creation of a pleasant landscape was important to the perception of the institution as a restorative place, a fact that is at least partially responsible for the park-like quality of the existing landscape at the Fitzsimons site. In 1926, in cooperation with the Forest Service, more than 200 trees were transplanted from Pike National Forest to the hospital grounds.

The post had been established on lands which had formerly been platted as a suburban residential development known as Gutheil Park, the site of the Gutheil Nurseries, which grew fruit and shade trees, shrubbery and plantings for the local market during the early twentieth century. According to reports, the nursery and surrounding grounds were considered a showplace by local residents and attracted many visitors. Gutheil lived on the site in a large two-story residence called Park Lodge, which today is the commanding officer's quarters.

Groundbreaking for the facility occurred in April of 1918. The site was located beyond the eastern limits of the Denver region's urbanization. The center of Aurora, whose 1920 population was just 983, was a mile to the west of the hospital. Colfax Avenue, which was later designated U.S. 40, linked the installation to Aurora and Denver.

Lt. Col. William P. Harlow, of Boulder, who had been Dean of the University of Colorado Medical School prior to World War I, was the first Commander of the hospital.

On June 26, 1920, the facility was redesignated Fitzsimons General Hospital. The post was named in honor of William Thomas Fitzsimons, the first Army officer of the United States to die in World War I. He was killed during an aerial bombardment on a field hospital on September 4, 1918.

The hospital continued to play a significant role in pioneering new forms of care and treatment for tuberculosis and in training specialists in the field. On December 3, 1941, a new hospital building, now known as Building 500, was dedicated just four days prior to the attack on Pearl Harbor. This new state-of-the-art facility was the largest Army general hospital in the country and one of the largest tuberculosis hospitals in the world. The installation covered nearly a square-mile of land and included more than 300 buildings. It served as a major center for general medical treatment during World War II, when the built environment of the post expanded to include a theater, an enlisted technician's school, facilities for members of the women's Army Corps. and a prisoner of war camp. Following the war, the installation continued to provide expanded services, providing treatment for casualties of the Korean and Viet Nam conflicts.

In 1996, after 78 years of service, the installation was formally closed by the Army in accordance with a base closure plan approved by Congress.

The site for the Fitzsimons campus is integrally linked to the history of the region, and rich in its ties to the history of military medical practice. It has significant associations with a number of historical events and trends in military post design and general hospital creation and development. The architectural traditions of building orientation and a healing environment, although cast in structures that were largely constructed as temporary facilities, endure to today. Building 500 is considered eligible for the National Register of Historic Places. Many of the other structures on the site have been or are to be documented according to the standards of the Historical American Buildings Survey/Historical American Engineering Record, and a cooperative agreement between the Army, the Colorado State Historic Preservation Officer, and the Advisory Council on Historic Preservation, with the concurrence of the City of Aurora and the University of Colorado Health Sciences Center, has been established.

To ensure that the legacy of this important site continues to endure, the master plan for the development of the Fitzsimons campus includes the preservation of significant historical landscape features such as the parade ground, the Sharon A. Lane Drive vista, and the informal park-like character of the landscape. Too, opportunities abound for historic references within the development of the new campus landscape, and artifacts, traditions and structures could be memorialized in a variety of ways within the fabric of the campus.

General's Park, the site of the original Gutheil Nursery and an important historical open space, is to be preserved as a City of Aurora park. And the historic 'gateway' structure which served as a primary entrance to the site at the corner of Colfax Avenue and Peoria Streets, will be preserved as a part of the park development.

The master plan also seeks to preserve significant structures such as the Auditorium Building, the Commander's House, Building 500, and with the cooperation of the Fitzsimons Redevelopment Authority (FRA), the historic Red Cross building, around which the original medical campus was planned. This historic structure is envisioned as the focal point in the development of a 'village center' of services to support the bioscience park and the UCHSC/UH campus.

The new UCHSC/UH campus extends from Colfax Avenue north to Harlow Boulevard. The campus will be built in phases as a replacement for the current 46-acre campus on Colorado Boulevard.

The UCHSC expects to reuse approximately 19 of the approximately 109 facilities it will receive on the Fitzsimons campus. These 19 facilities account for approximately 750,000 gsf. Within the first 12-15 years, it is anticipated that the UCHSC will demolish all other facilities on the Fitzsimons campus. By the time total redevelopment takes place in approximately 20-30 years, most of the reuse facilities will be demolished with the exception of the Administrative Building – Fitzsimons (Building 500), the Auditorium Building, and the Commander's Residence. These total approximately 500,000 gsf.



## **CURRENT SYSTEMS AND INFRASTRUCTURE**

### **Site Conditions: 9th Avenue Campus**

The current campus is divided into three activity areas: Clinical, Academic/Research, and Support, providing some unity to the campus.

The 3,623 parking spaces currently available on the 9th Avenue Campus are not sufficient to cover the existing parking demand. There are ample spaces for faculty, patients and visitors, however, long-term parking for staff and students are needed on the UCHSC campus. As functions are relocated to the Fitzsimons campus, the parking demand will decrease for these groups, and sufficient parking spaces for the total demand is anticipated. In fact the need has already decreased due to the renovation and utilization of Building 500. The decrease in traffic and parking requirements will make pedestrian movement easier and more pleasant.

Due to the density of the campus, there are a minimal number of open areas to provide pleasing walkways or adequate visual separation of buildings. As the campus transitions, it is anticipated that the density and congestion will be reduced, making the amount of open space more appropriate to the campus.

Standard urban easements and regulations apply to the parcels of land within the campus boundaries; however, because the University of Colorado is a constitutional entity, it has jurisdiction of the property regarding zoning and building department functions. This jurisdiction will apply as long as the University owns the property.

### **Infrastructure and Building Systems: 9th Avenue Campus**

The buildings that make up the UCHSC campus range in age from four to 74 years old. Normal upkeep and maintenance of all buildings, parking areas, and grounds will be required during the transition phase. Investment for the upgrade and replacement of aged and deteriorating portions of the infrastructure and building systems also will be required. An analysis of the facilities on the campus in April 1997 indicated that of the 19 facilities evaluated, approximately 40% are more than 30 years old, and 25% are more than 50 years old. In addition, of these 19 facilities, 22% were rated as being in poor condition, and only 20% were rated as being in good condition (excludes the Bellaire Building, which is in poor condition, and the University Hospital, which is in excellent condition).

The major utilities and infrastructure on the 9th Avenue Campus are sufficient to serve the existing buildings on the campus. The existing utilities

and systems will need to be maintained to remain operational. Key issues to be addressed include:

- The central plant, located in the southeast corner of the campus, was originally built in 1924. It has undergone extensive changes in the last 75 years, but will need additional upgrades to minimize problems due to equipment obsolescence.
- The telecommunication system is being upgraded for approximately \$2 Million dollars to increase capability and reliability of the new network.

For specifics and detail of existing space, infrastructure, building systems and other information, refer to Appendix C.

### **Site Conditions: Fitzsimons campus**

In contrast to the Ninth and Colorado Campus, there is sufficient land at the Fitzsimons site to accommodate the circulation and facilities for the UCHSC campus. The site is located in close proximity to downtown Denver and the Denver International Airport. The Fitzsimons site can be easily accessed from the freeway and by public transit. The size of the site makes the development of open spaces possible and provides the opportunity to provide pleasant pedestrian areas.

Parking currently includes on-street parking and surface lots. Existing off-street parking lots have a capacity for 2,148 cars. In addition, parking spaces for approximately 1,000 cars are available on the existing streets.

The existing easements and restrictions will be identified in the property conveyance transaction and in most cases will be maintained until the structures they serve are removed or until new access routes or services are provided.

Proposed land uses on the Fitzsimons site in addition to the Bioscience Park and the education/medical zone of the UCHSC/UH campus include areas for commercial, industrial/laboratory, service, residential, and educational facilities.

### **Infrastructure and Building Systems: Fitzsimons campus**

The 109 buildings on the UCHSC site were constructed between 1918 and the present. Their condition and suitability for reuse varies. According to a publication produced by the Colorado Historical Society, Office of Archeology and Historic Preservation, 1991, 25% of the buildings on the campus are rated in fair condition and 75% are rated as being on good condition.

The existing hospital, Administrative Building-Fitzsimons (Building 500) has been studied for its architectural, structural, mechanical, and electrical problems and found to be in very good condition. This building is in the process of being renovated.

While most required on-site infrastructure is in place to serve the base, much of it suffers from age and is in need of repair or replacement. Adequate capacity must be allocated in all systems to allow for future expansion. Each system must be examined to find a long-range solution that is also the most cost effective.

The existing heating plant will not be adequate to supply new buildings with steam and hot water. A new central plant will need to be built or the existing plant expanded to serve the new buildings. Capacity will vary as buildings are added and removed from the system. A new chilled water plant for cooling will be required as the campus expands.

Telecommunication systems will need to be updated or installed on the Fitzsimons campus including telephone and data communication components.

For specifics and details of the existing space and detail for space infrastructure, building systems, and other information, refer to Appendix C.

## B. LAND UTILIZATION PLAN

### 9<sup>th</sup> Avenue Campus

The overall goal for the master plan is to relocate the majority of the UCHSC campus to the Fitzsimons site over the next 12 years. Therefore, all new construction will be on the Fitzsimons site.

The Land Utilization Plan for the 9<sup>th</sup> Avenue campus, including University Hospital will consist of the following actions:

- **Eliminating leased facilities by relocating functions to the Fitzsimons campus or vacated space on the 9<sup>th</sup> Avenue campus.** In Phase I, this will include selected facilities leased proximate to the campus.
- **Selling peripheral properties that are no longer needed.** In Phase I of the facility master plan, one of the first facilities to be constructed on the Fitzsimons campus is an ambulatory care center. Once occupied, the East Pavilion and other campus-based facilities used for ambulatory care will be sold.
- **Consolidating functions on the 9<sup>th</sup> Avenue campus in vacated space with a minimal investment in renovation.** Another one of the first buildings proposed for the Fitzsimons campus is a research building. After it is constructed, it is anticipated that research space will be available on the current campus for expansion or relocation of other research programs that may be located off-campus or scattered between several areas. Reuse of some of the research space on the 9<sup>th</sup> Avenue campus may require renovation. A similar approach will be used to address office space deficiencies.
- **Decommissioning selected aged buildings as they are vacated.** Future renovation or demolition of the existing buildings will be dependent on the future use of the 9<sup>th</sup> and Colorado campus. In particular, aged buildings with numerous deficiencies such as the office annex will be decommissioned until the future use for the campus is determined. Demolition of existing facilities is not anticipated while the University owns the property.
- **Zoning.** The campus is currently divided into four activity zones: Clinical, academic/research, and support. The general zoning of campus has been established such that health care is located north of 9<sup>th</sup> Avenue and academic/research, administration, service and mixed use occur south of Ninth Avenue. There are some exceptions to this pattern. For example, located in the north or clinical zone is the School

of Dentistry and a biomedical research facility (the Barbara Davis Childhood Diabetes Center). Located in the southern portion is some health care activity in the Colorado Psychiatric Hospital. While most research is concentrated in the central area, a total blending of the two occurs in many areas. The campus administrative area and the campus support areas are located in the east portion of the campus. Areas designated for specific uses will change as departments leave are replaced by other function.

In summary, the capital investment on the current campus will be limited to maintaining the infrastructure and minor renovation to backfill vacated space and eliminating selected leased facilities.

## **Fitzsimons**

### Vision Statement Themes

Planning for the 21st century is an exciting challenge for any academic health center but for the University of Colorado Health Sciences Center and University Hospital, the new Fitzsimons campus offers unique possibilities. Creating a new concept for a total learning environment for the health sciences, promoting research, education, and clinical services, is the goal of the physical plan. The program plan for the replacement of the University of Colorado Health Sciences Center and University Hospital will be housed in facilities developed over time at the Fitzsimons campus

While the institutional master plan includes many components, the physical master plan outlines the development opportunities for buildings and land in a rational and lasting way. The physical framework principles developed as guidelines for the physical campus design will facilitate the successful implementation of goals and objectives supporting the vision of the academic medical campus of the future.

This section focuses on the physical aspects of the Fitzsimons campus as well as the condition of facilities at the 9th Avenue campus. This section also includes the proposed physical master plan concept for the Fitzsimons campus, as well as the principles used in developing this plan. As with any development, existing conditions, external influences, programmatic requirements, and phasing are integral parts of the facilities plan and these are described in this section.

The physical planning for the new Fitzsimons campus of the University of Colorado Health Sciences Center and University Hospital seeks to translate the institutional vision described in Section V into a physical form. The Fitzsimons campus, when constructed, should embody the themes that run through the vision statements developed by the seven vision teams.

Most aspects of the vision statements revolve around the research, education, clinical and public service missions of the University of Colorado Health Sciences Center and University Hospital. These easily translate into themes for the facilities and campus components. The campus plan focuses primarily on the themes of:

- **Interdisciplinary Work.** Discovery and innovation will increasingly be based upon interdisciplinary and multi-disciplinary work, including academic disciplines not traditionally part of health sciences education and research.
- **Integration.** Greater degrees of integration amongst research, education and clinical activities will encourage and facilitate increased synergy in education, discovery in research, and application of new knowledge in clinical arenas.
- **Access.** The new University of Colorado Health Sciences Center and University Hospital must be accessible to all potential users. This includes physical access for pedestrians as well as vehicles; access via telecommunications for learning, information, and resource sharing; and, friendly and welcoming access to the campus for all who visit, work, and study there.
- **External Partners.** Alliances, affiliations and partnerships with outside entities will be essential. These will include a broad spectrum of groups such as business and industry, government agencies, colleges and universities, and others in all areas of research, education, and clinical activity.
- **Core Support Services.** Consolidation of scarce or costly resources for shared access by the entire campus will become increasingly important. These resources include equipment, technology, scholarly resources, as well as people.
- **Technology.** Future developments in technology will both drive and enable new opportunities in all aspects of research, education and clinical activities. Technology encompasses all systems that use electronic voice, video, and data so that resources and ideas can be shared over a regional, national, and global network.
- **Flexibility.** Given the changes dynamic and changing environment in which an academic health center must learn to thrive, the new campus framework as well as the buildings and infrastructure must be designed with inherent flexibility to accommodate the future.

These vision themes have been incorporated into the physical framework principles and woven into the fabric of the campus development plan and the construct of how buildings will be designed.

#### Physical Framework Principles

In conjunction with the vision themes, physical framework principles were developed as part of the master plan process. The physical zoning and planning of the campus is based upon these principles, the proposed development plans of the Fitzsimons Redevelopment Authority (FRA) and the redevelopment plans of the City of Aurora. These principles embody fundamentals that will serve to shape the development of the campus in ways that further the mission and purpose and, provide a coherent and definable campus ambience. These principles include:

- Create a campus organized around the concept of planned open spaces and groupings of buildings that has a unified image and identity beyond the importance, identity, or function of any single component. It is important to achieve this quality as early as possible in the development of the new Fitzsimons campus.
- Define overall campus zones for research, education and clinical facilities that overlap to promote interdisciplinary development and activities, and sharing of resources.
- Create a pedestrian oriented campus to enhance access to open space and offer greater opportunities for informal interaction between faculty, students and staff.
- Provide connections to community amenities and resources, such as the adjacent open space of Sand Creek, as natural extensions of the open space of the campus.
- Maintain the historic “gateway” to the campus off Colfax Avenue to provide a recognizable entrance to the campus that is easily accessible.
- Enhance the image and identity of the campus edge with a landscape buffer along Colfax Avenue. This maintains the historic green zone of Fitzsimons along Colfax Avenue and differentiates the campus from the surrounding commercial development.
- Create a campus common area that relates to and enhances the village center that is to be developed at the juncture of the Bioscience Park, the commercial and civic area, and the campus. This proximity will promote interaction between the campus community and the surrounding public/private communities.



- Provide a framework for the campus plan of defined open spaces that gives identity to campus precincts, promotes pedestrian circulation, establishes a memorable campus movement sequence, and promotes orderly development of the campus.
- Provide multiple points of vehicular entry to the campus to increase accessibility for patients, faculty, staff, students and visitors. This will avoid congestion and will better accommodate the volume and variety of traffic generated by the academic health center.
- Create an internal campus vehicular circulation network to facilitate access from one area of the campus to another without utilizing neighboring public streets.
- Create a variety of building heights and forms that de-emphasize Building 500. New buildings should create an image for the University of Colorado Health Sciences Center and University Hospital that is differentiated from the historic image of Fitzsimons and conveys the future of an academic health science community.
- Preserve opportunities for future development by creating “land bank” areas on the site.
- Provide inherent flexibility to accommodate changes and new opportunities in both the campus plan and for individual buildings. The master plan framework should allow for the future expansion of buildings and the placement new buildings at logical sites.
- Provide for a logical, cost-effective sequence of development of the campus that maximizes the utilization of existing resources.

These Physical Framework Principles are the guidelines for the campus development and have been incorporated into the proposed Fitzsimons Campus Plan. These will also be coordinated and integrated with the principles and guidelines from the FRA and City of Aurora planning efforts.

Notable and memorable campuses have a cohesiveness in the outdoor spaces and the architecture of the buildings that knits the varied components together as a single campus entity. The outdoor spaces can be informal, formal, or both. The architecture of the buildings can have consistent style, scale, materials, and color or not. But, memorable campuses have *something* that pulls them all together: the quadrangle at the University of Virginia; the building materials and color palette at the Boulder campus of the University of Colorado; the landscaping and outdoor spaces of the University of California at Los Angeles; the cloister effect of Rice University; the different architectural style of each building at the University of Cincinnati.

For the new Fitzsimons campus of the University of Colorado Health Sciences Center and University Hospital, the concept of campus is embodied in two key themes:

- A planned framework of open spaces
- A Colorado palette of materials and colors

These strong themes will weave the fabric of the new campus and ultimately create a cohesive campus environment.

A Planned Framework of Open Spaces. A hierarchy of open spaces is utilized in the campus plan as the overall organizing element of the campus. These spaces define pedestrian circulation routes, provide connections between the various campus zones and precincts, and identify potential sites for buildings. In addition, the open spaces will offer views from buildings and pedestrian areas and will be focal points for groupings of buildings.

The open spaces will vary in size and importance based upon the location and function of each space. Quadrangles, linear greenways, gardens, intimate spaces, and informal and naturally landscaped spaces will offer a wide variety of scale and materials. Grand spaces will serve the needs of large and public groups while smaller spaces will provide quiet areas for solitude and meditation.

It is anticipated that the open spaces in each zone might be different to reflect the population primarily served by that zone. For instance, the research zone open space might be more conducive to small gatherings and promote interaction between building occupants. The clinical zone open space would likely be designed primarily for patient and family use, but also for staff. These spaces would be more contemplative and visual than active. The education zone spaces support students and function as the

center of the campus for students. Therefore, these spaces would be the least formal and the most active.

The existing parade ground will be preserved as an historical reminder of Fitzsimons' origin. A significant open space, or green, will be developed north of Building 500 in the heart of the campus where informal recreational activities can take place but also where formal events such as commencement ceremonies can be held.

The Colorado Palette of Materials. The design of the individual buildings, site structures, and hardscape on the site will not be limited to a specific architectural style. The built environment of the campus is intended to be a unified and complementary composition of built elements that define and reinforce the individual open spaces as well as the open space framework. Building forms and massing should be varied to provide visual interest to the overall composition as well as to the individual buildings and site structures. Variety of scale will also serve to de-emphasize Building 500.

The palette of materials and colors will serve as the unifying force for all the buildings on the campus. The recommended palette is based on colors and materials indigenous to, and representative of, Colorado. Included are a variety of stones and stone textures, wood, metal and glass. The terra cotta and buff tones of the native sandstone formations dominate the palette. White is used to provide contrast and adds crispness against the brightness of the sky in Colorado. Accent colors include darker values to broaden the range and are drawn from the earth tones of the soils and geology of the prairie and foothills.

The colors and materials can be used differently on each building and in varying proportions allowing great latitude in design. Not all materials and colors need to be used in every building. The materials and colors will be fully described and specified in the design guidelines for the Fitzsimons campus.

Based on the physical framework principles and the two dominant themes, the campus master plan for Fitzsimons is designed to provide flexibility in both the short-term and long-term implementation of the campus and to provide opportunities for creativity in the design of functional and centerpiece buildings and structures.

The Site. Fronting on Colfax Avenue and bounded by Peoria, Harlow and Van Valzah Streets, the site of the Fitzsimons campus of the University of Colorado Health Sciences Center and University Hospital is essentially a rectangle with the existing Building 500 centrally located on the site. Access to the site is primarily from Colfax Avenue along Sharon A. Lane that is centered on the axis of Building 500. The east-west Charlie Kelly Boulevard bisects the campus on the south side of Building 500.

Campus Zoning. The overall campus has been zoned for the primary activities of research, education, clinical, and campus support and amenities. As the zoning diagram on the following page illustrates, each zone overlaps with the other zones to create places for interdisciplinary facilities and shared facilities. Each zone is centered by a major open space as a focal point for that zone, with other planned open spaces providing linkages to adjoining zones and other groupings of buildings.

The research zone is located in the northwest area of the site proximate to the proposed Bioscience Park. The Clinical zone is located in the southwest area of the site, easily accessed, and visible, from Colfax Avenue for convenient and clear patient wayfinding. The juxtaposition and overlap of these two zones offers great opportunities to locate buildings for shared clinical and research activities and to promote synergy between the two in developing applications for new discoveries.

The research zone open space, a series of quadrangles, is designed to connect with the clinical facilities as well as the Bioscience Park. This alignment implies and reflects the direct relationship between discovery and application to market development and clinical application.

The clinical zone is designed primarily for patient convenience and comfort. Since this is the most publicly accessed part of the campus, clear wayfinding is essential. It is likely that most of these buildings will face out toward the "public" side of the campus with a more "private" face to the quadrangles and other open spaces that connect to the rest of the campus. In addition, future relationships on this campus with affiliates and other institutions must be accommodated.

The clinical zone design, both exterior and interior, should reflect a healing environment offering patients, families, and staff opportunities for meditation, stress reduction, and family gatherings. These areas could have water features which are psychologically relaxing; seating suitable for patients; wider walkways to accommodate wheelchairs, and so forth.

The education zone is located in the northeast area of the site, overlapping with both the research zone and the clinical zone. Although much of the education mission will be accommodated in shared classroom and teaching/learning facilities in the research and clinical buildings, there will be

some predominantly education facilities. Additionally, there will be administrative facilities for the Schools of Medicine, Pharmacy, Dentistry, Nursing, and the Graduate School in this zone.

Included in all three of these zones, as well as being located adjacent to the village center, will be facilities for amenities and support services such as an alumni center, faculty center, campus center, and so on. These will form the heart of the campus for students, faculty, staff and alumni and will be located near the village center, the Building 500, and the area along the east side of Sharon A. Lane Drive.

At this time the southeast area of the campus is reserved for future development and is indicated as undeveloped. This area of the campus is also a potential site for affiliated institutions that may want to locate to this campus.

In addition to the functional zones and the "land bank" zone in the southeast area, a landscaped buffer zone is planned along Colfax Avenue to recall the historic open space of Fitzsimons. The landscaping will establish an image and identity for the campus that differentiates it from the neighboring commercial and civic development.

Access and Circulation. As stated in the physical framework principles, the historic "gateway" to the campus off Colfax Avenue at Sharon A. Lane Drive will remain and will be enhanced and developed as the ceremonial entry. This entrance will also serve as the main entry point for patients and visitors to the clinical zone since it is highly visible and easy to find. This will allow the high volume of patient and visitor traffic to remain on the perimeter of the campus.

Other campus entry points will be off Peoria, Van Valzah, and Harlow Streets, connecting with the campus internal roadway system. A new "ring" road is planned within the campus to facilitate movement from one area of the campus to another without use of public streets. This road will also serve to keep most of the vehicular traffic on the perimeter of the campus and preserve the heart of the campus as a pedestrian zone. Two east-west streets, north and south of Building 500, will be developed to provide vehicular access to most areas of the campus.

Bicycle paths will be developed along roadways as well as through the campus and, ultimately, connecting to Sand Creek. Service vehicles will be limited to shared service courts so that intersections with pedestrians will be minimized.

To create a truly pedestrian campus, parking will be accommodated on the perimeter of the site, easily accessible from the "ring road" and neighborhood streets. With surface lots and parking structures dispersed, walking distances can still be minimized.

Pedestrian Circulation. The campus is designed as a pedestrian environment with relatively few roads in the center. Pedestrian movement will be through a sequence of open spaces, along walkways, adjacent to buildings, and on sidewalks bordering streets. A major east-west greenway across the campus will provide connectivity of all the major open spaces in each zone and serve as an informal gathering place for all of the campus community.

Connections. Connections between buildings and functions are critical to the concept of campus integration, interdisciplinary work, and shared resources. While the planned, linked open spaces will provide connectivity from one zone or area of the campus to another. A second level of connectivity is important to promote the integration of disciplines and activities amongst the research, education and clinical functions. This is the physical connection between buildings. These connections can take on a variety of forms from underground tunnels, open walkways at grade level, bridges, enclosed building sections, or a combination of these. The Fitzsimons master plan illustrates how groupings of buildings can be linked around planned open spaces.

Landscape. The landscape concept is to create a campus in a park. The proposed informal landscape emulates the characteristics of the existing General's Park. A limited amount of contrasting formal landscaping is to be used to create emphasis and to enhance wayfinding.

The campus plan includes a variety exterior spaces with distinctive scales, styles, and functions. Together they create an organized system of places that provide interest, order and orientation. These spaces fit together in a hierarchy that defines and relates their purpose, character, and relationship to the whole. Each space is to be designed in terms of its unique purpose, so the resulting landscape reinforces the basic program, organization and character of each area.

Campus edges are critical for establishing a first impression, a long lasting image and a sense of place. Edges include entrances, corners and the space in between. The landscaping is to be simple but elegant with special emphasis placed on major visitors' entrances and prominent corners. To tie the campus to the surrounding community, the landscaping of campus edges is to compliment the edges of surrounding properties including the native landscape of nearby creeks.

Quadrangles are the most commonly used exterior spaces. They provide relief from the density of the campus buildings, while they provide an informal yet symbolic landscape that clearly states “this is a traditional American educational campus.” They are the pedestrian crossroads of the Campus. As such, quadrangles express and facilitate the collegiality of the university environment. They should be designed for walking, waiting, playing, and gathering.

The character of landscaping in the quadrangle is intended to complement surrounding buildings and programs. When quadrangles are formed by buildings fronting on the space, an appropriate informal landscape is used to complement the character of the space. If the space is large, formal landscaping might be used around the perimeter to reduce the overall feeling of scale. When buildings do not face the space, or do not provide adequate enclosure, formal plantings are used to reinforce a sense of order and provide definition.

The landscape design of quadrangles seeks to encourage rather than restrict multiple use. Elements and functions that detract from this flexibility are strongly discouraged. Grading design and the placement of trees, lighting, and furnishings must enhance the potential variety of short and long-term uses. Appropriate design minimizes hard surfaces, barriers and other obstacles within large open spaces that compromise flexibility. Truck and auto circulation, service areas, storage, parking, and other uses that conflict with pedestrian enjoyment are also to be minimized in quadrangles. Building facades next to quadrangles should present a “front door” and a pedestrian-friendly facade at the ground level.

The development of the landscape for open spaces can contribute greatly to the enjoyment and security of the users. Shrubs and other elements that can obscure views should be used sparingly. Lighting from pedestrian-scale fixtures should provide the highest light levels at building entrances and at entrances to the exterior spaces, with the next highest light levels around the perimeter of the space to create a sense of safety and well being. To further enhance the use of exterior spaces, furnishings should be ample, but carefully located to relate to views, or provide a more intimate experience within the larger space. Fixed seating around the edges of the space provides private seating with views to the center and to passing pedestrian traffic.

The adequate landscaping of parking lots is critical to the overall landscape quality of the campus. Trees with large canopies provide shade from the hot Colorado sun, while they soften the appearance of vast amounts of asphalt and contribute to the campus image. Landscape patterns in parking lots can also act as way-finding mechanisms; planting islands serve as convenient places to pile snow.

The campus landscape envisioned by the master plan will visually unify the campus while providing interest as one travels from space to space. The campus' overall image is one of buildings set within an informal park. It is to be designed to provide comfort and shelter for people using exterior spaces. By creating unique qualities, patterns and character in the development of the landscape, it will serve as a way finding mechanism, providing orientation that helps direct people to their destinations. It is to be planned and designed to contribute to energy conservation and as a consequence a reduction in utility costs. Finally, the landscape will enhance the campus image and create a greater appreciation of programs occurring within campus facilities.

The successful implementation of the campus plan depends on developing enough critical mass of buildings grouped around specific open spaces to create a sense of place quickly. To that end, each building project must include some communal open space development so the overall campus is developed in an integrated fashion.

### **Site Development Phasing**

Given the enormity of the undertaking to replace and relocate the entire University of Colorado Health Sciences Center and University Hospital to Fitzsimons, tremendous resources and logistical planning are required. The goal is to create a core campus environment at Fitzsimons as quickly as possible. This will depend on developing, in the short-term, a critical mass of buildings grouped together to form the initial open spaces and to define the initial roadway system. Over the long-term, other groupings of buildings will be added to further define and extend the open space framework and the roadways.

Along with the architectural and site development components of the campus, the appropriate programs are needed in the short-term to provide the multi-disciplinary, interactive, and diverse community of patients, faculty, students, and staff that, in fact, make a dynamic and successful campus.

#### **Short-Term (5 years)**

As described in Section IV, Transition, the relocation of the University of Colorado Health Sciences Center and University Hospital to the Fitzsimons campus will occur over a period of years.

In the short-term period of 5 years, the emphasis for development will be research space and ambulatory care space with significant new buildings. New buildings for ambulatory clinical practice and education will be in place. Renovations to existing buildings on the campus will be completed to allow for long-term and interim use of the facilities, providing additional space for new and expanding programs that can no longer be accommodated at the



9th Avenue campus. In addition, construction of substantial research facilities will be underway along with construction of additional education facilities and support services facilities.

The placement and grouping of these buildings on the site will make a substantial beginning for the core of the new campus, including the definition and construction of the planned open spaces associated with these new buildings and their zones of the campus.

Roads, utilities, a central utility plant module and other infrastructure development to support these buildings will also be constructed during this period. All parking will be accommodated in surface lots adjacent to the buildings.

#### Long-Term

Over the long-term, programs will move to Fitzsimons as broadly outlined in the transition plan and in the physical master plan for the campus. The goal is to have the appropriate complement of programs and services at Fitzsimons and at the 9th Avenue campus so that the Health Sciences Center continues to operate effectively during the transition period.

This period of the transition plan will see most of education programs, administrative functions of the five schools, and the Campus Center, moving to Fitzsimons, facilitating the build-out of the center portion of the campus. Additional research facilities will be constructed, allowing a significant research zone open space to be completed. The replacement facilities for the University Hospital and the Colorado Psychiatric Hospital will also be constructed during this period. Along with the construction of these facilities would be the completion of the major open spaces for the clinical and education zones, as well as the landscape buffer zone and the village center connections.

The long-term period culminates in the addition of another 1 million square feet of research space at Fitzsimons and the addition of education and support spaces.

Incremental central utility plant modules, roadways, infrastructure, and utility distribution systems construction will occur as needed by the phased new building construction. The need for these elements is linked to the square footage of buildings constructed and to the location of the building groups on the campus.

Parking will continue to be accommodated in surface lots as long as they can appropriately meet the demand for parking space. As the demand increases, parking structures will be constructed in designated locations toward the perimeter of the campus. These locations align with vehicular

entry points to the campus and to the various functional zones. Most important, the peripheral location preserves the pedestrian nature of the campus center.

While the Fitzsimons campus will begin to feel and look like a campus with the completion of the short-term phase, the complete build-out of the program space (approximately 5 million square feet) will result in a comprehensive campus environment enlivened by the complete and diverse academic health center community.

Over the next century, additional facilities will likely be constructed in the "land bank" area and the density of the campus will increase as buildings are expanded and new buildings are inserted into the various functional zones, reaching the planned campus build-out of 8 million square feet.

Throughout the maturation of the campus, the fundamental themes of planned open spaces that connect and organize the campus and the Colorado palette of materials and colors will bind the pieces and parts together into a single, memorable campus.

#### The Fitzsimons Plan

As the new millenium approaches, the University of Colorado Health Sciences Center and University Hospital are uniquely positioned to become the foremost academic health center in the country. The opportunity to relocate the entire Health Sciences Center to the former Fitzsimons Army Medical Center campus is exciting and challenging not only for the University but for the growing Denver metropolitan area, the City of Aurora, and the professional community of the Health Sciences Center and University Hospital.

The opportunities afforded by the relocation of the campus to Fitzsimons are unprecedented:

- Virtually unlimited growth potential with 217 acres of land and infrastructure located at the intersection of two major interstate highways
- Total commitment and support of the University of Colorado Regents and the Colorado Legislature to the move will provide direct financial support and new mechanisms to develop additional funding
- A site located where significant regional growth stimulated by the new Denver International Airport, the redevelopment of Stapleton Airport, the redevelopment of Lowry Air Force Base and major new highway construction is taking place.

- The full support and cooperation of the City of Aurora in redevelopment of the surrounding neighborhood to provide complementary services and facilities and to improve the environs of the new campus.
- The Fitzsimons Redevelopment Authority's plan for the remainder of the Fitzsimons Army Medical Center base which includes development of a Bioscience Park, commercial and civic facilities, a village center, and other compatible services.
- A burgeoning telecommunications industry hub located in the Denver metropolitan area that affords access to and partnerships with cutting edge global technology and services.

This unique set of circumstances forms the context for a new campus that could be the place where innovation and discovery occur and the translation of these ideas into applications is developed.

To take full advantage of this opportunity, the University of Colorado Health Sciences Center and University Hospital embarked upon a highly participatory, year-long master plan process to:

- define the vision of the academic health center of the future
- develop a physical master plan which embodies the vision
- develop a transition plan to migrate from the 9th Avenue campus to Fitzsimons
- develop a financial plan that supports and enables a successful relocation

The process has been highly successful in achieving these goals which are described in this Institutional Master Plan.

## **Reuse and Demolition**

There are 109 structures associated with the property conveyance, totaling approximately 1,785,500 gsf. The buildings range in age from 10 to 80 years old. Over 72 percent of the total buildings were constructed before 1950. The majority of buildings were designed as temporary facilities to accommodate patient care or residential uses and are primarily masonry or wood construction.

### Building Reuse

All buildings have been surveyed to determine their potential for reuse. Of the 1,783,500 gsf of building area conveyed, 27 percent has been designated for long- term use and an additional 14 percent for interim term use.

Additionally, 19 percent of total building area will be conveyed at a later date. Until that time, the U.S. Army will lease these buildings for residential purposes.

The four buildings that have been selected for long-term use (Buildings 1, 2, 500 and 521) have the potential of being designated for the historic landmark register.

The master plan where possible took into consideration locations of buildings that were designated for reuse in order to maximize the investment in renovation.

The reuse plan shows the location of 16 buildings that will be reused.

**BUILDING REUSE**

<b>Bldg No.</b>	<b>Building Use</b>	<b>GSF</b>	<b>Comments</b>
1	Commander's House	6,615	Long-Term Use
2	Annex	1,475	Long-Term Use
500	Administration/Clinics	448,000	Long-Term Use
521	Auditorium	19,694	Long-Term Use
	Subtotal	475,784	
400	To be determined	27,193	Interim Use
401	To be determined	27,193	Interim Use
402	Air Force (leased)	22,632	Interim Use
406	Air Force (leased)	19,485	Interim Use
407	Air Force (leased)	19,509	Interim Use
410	Inventory Storage	13,910	Interim Use
419	Tri-County Health (leased)	12,984	Interim Use
421	Facilities	12,516	Interim Use
422	To be determined	16,443	Interim Use
504	University Police	17,503	Interim Use
508	Inventory Storage	21,516	Interim Use
514	School of Dentistry (Clinic)	8,510	Interim Use
610	Psych. Primate Lab	6,960	Interim Use
618	AHEC	19,714	Interim Use
633	Ground Storage	2,423	Interim Use
	Subtotal	254,885	

Building Demolition

During the next 12 years, 105 buildings will be demolished as required by the New Building Construction program. As funds become available, some building may be demolished sooner than required by the program plan to reduce maintenance costs, increase safety and to enhance the aesthetic quality of the campus.

The table above shows the location and the time period in which the building will be demolished.

The table beginning on the following page lists the buildings to be demolished and their associated building areas.

BUILDING DEMOLITION

Bldg. No.	Building Use	GSF
400	Hotel	27,193
401	Hotel	22,656
402	Hotel	22,632
403	Clinic	21,057
404	Clinic/Child Care	23,728
405	Hospital	11,977
406	Hotel	19,485
407	Hotel	19,509
408	Hospital	5,438
409	Hospital	15,261
410	Pharmacy	13,910
413	Child Care	6,206
416	Child Care	6,008
417	Hospital	12,206
418	Hospital	12,260
419	Hotel	12,984
420	Family Housing	16,106
421	Office	12,868
422	Training/Conf/Office	16,443
502	Science Lab	4,310
502	Hospital	14,124
503	Hospital	12,792
504	Police Station	17,503
505	Hospital	17,944
506	Hospital	5,740
507	Hospital	15,901
508	Storage	21,297
509	Admin Bldg	15,357
510	Admin Bldg	1,978
511	Med Library	46,988
511	Office	39,252
513	Hospital	1,539
514	Dental Clinic	8,496
515	Hospital	22,041
515	Community Facs	2,357
516	Ortho Brace Shop	2,889
517	Library Annex	9,350
519	CVRD STR Inst.	971
520	Community Fac.	29,103
526	Telephone Cable	8,178
526	Office	2,577

<b>Bldg. No.</b>	<b>Building Use</b>	<b>GSF</b>
527	Community Fac.	3,829
528	CVRD STR Inst.	6,054
529	CVRD STR Inst.	19,764
530	Community Fac.	3,361
531	Community Fac.	4,835
532	Emergency Gen.	975
533	Linear Accelerator	5,080
534	Angiography	3,299
600	Science Lab	10,335
600	Hospital	7,505
601	Research Lab	22,463
602	Analytical Lab	21,134
602	Office	9,516
603	Computer/Office	13,527
603	Office	8,379
604	Training	21,362
605	Training	27,133
606	Training	22,591
610	Animal Fac.	6,960
611	Office	17,842
612	Training	19,232
613	Training	19,232
618	Office	19,545
619	Community Fac.	18,098
630	COMMO Bldg.	4,690
631	UPH Enlisted	4,690
632	Family Housing	19,444
633	FH Det Facs	2,423
700	Housing	10,770
701	Housing	7,394
702	Housing	7,394
703	Housing	10,770
704	Housing	7,394
705	Housing	3,706
706	Housing	3,706
707	Housing	3,706
708	Housing	3,706
709	Housing	3,706
710	Housing	3,706
711	Housing	6,489
712	Housing	13,552
713	Housing	6,489
714	Housing	6,489

<b>Bldg. No.</b>	<b>Building Use</b>	<b>GSF</b>
715	Housing	6,489
716	Housing	6,489
717	Housing	10,770
718	Housing	6,489
719	Housing	7,005
720	Housing	12,732
721	Housing	11,380
722	Housing	12,732
723	Housing	11,482
800	Housing	12,731
801	Housing	18,397
802	Housing	12,731
803	Housing	18,397
804	Housing	8,109
805	Housing	8,109
806	Housing	18,397
807	Housing	12,731
808	Housing	12,731
809	Housing	15,409
810	Housing	15,409
811	Housing	15,409
<b>TOTAL</b>		<b>1,295,017</b>



## **C. INFRASTRUCTURE AND MAJOR SYSTEMS REQUIREMENTS**

The infrastructure and major utility systems are critical “underpinnings” for both the Ninth Avenue and Colorado Boulevard campus and the Fitzsimons campus. Adequate infrastructure provides the foundation for the continued use and maintenance of the current campus and for the development of the new campus at Fitzsimons. Infrastructure upgrades are necessary at the Ninth Avenue campus to ensure there are adequate utilities to provide the essential education, research and patient care activities until these can be moved to the new campus at Fitzsimons. These are also needed to maintain the value of the property and establish a sound basis for the redevelopment and reuse of the campus once many of the academic, research and patient care activities have moved.

### **9<sup>th</sup> Avenue Campus**

The Master Plan for this site includes the following goals for infrastructure and major utility systems:

- The infrastructure and utility systems will be operated and maintained at a high level to ensure the education, research and patient care goals are met.
- The infrastructure will be upgraded on a continual basis to ensure the mission continues and that there is an appropriate base for redevelopment and reuse of the campus.

To achieve these goals, the Capital Asset Management Program (CAMP) for the campus will be continued and this program will provide a systematic approach to protecting the current assets and provide a direction for upgrading the systems as required. It is envisioned that the preventive maintenance program will continue at its current level of activity and funding. Funding and resources will be required at their current levels to maintain this program. The UCHSC will also actively pursue State controlled maintenance funds for system replacement and upgrades.

### Utilities

Utilities at the 9<sup>th</sup> Avenue campus will be maintained and upgraded to meet the mission of the UCHSC while it occupies the campus. They will also be upgraded to ensure a sound underpinning for the future redevelopment and occupants. All major utility systems required to operate the current campus exist at this time. The major systems include: electrical, water, sanitary sewer, storm drainage, steam and chilled water and natural gas. In general, these systems must be operated, maintained and repaired at the current

high level and upgraded or replaced as needed to provide the necessary services to provide the activities of the campus.

Because there will be no new buildings built at the campus, large upgrades and replacement of utility systems to increase capacity will not be required. The current systems and infrastructure are available and have the appropriate configuration and capacity to provide the utilities needed for the programs. Key in both the short-term and long-term will be the maintenance of the systems, the selective upgrade of any “worn out” or deteriorated systems or portions of systems, and an investment in various systems to address the previous backlog or deferred maintenance issues. It is envisioned that as the campus and programs transition to Fitzsimons, the utility systems at Ninth Avenue and Colorado Boulevard will be maintained to current levels and upgraded to meet these levels. Systems will not be allowed to deteriorate or decommissioned but will be operated and maintained in a manner that supports full occupancy.

To achieve this, the current Capital Asset Management Program (CAMP) will continue to be followed to direct the maintenance and upgrade of the systems. The CAMP is a multi faceted program that includes sub programs needed to protect and enhance the physical assets of the campus. The four major sub programs are:

- Facilities Audit. This activity audits or surveys all infrastructure and utility systems, determines the condition and capacity, and establishes a maintenance, repair and upgrade schedule.
- Routine Maintenance. This preventive maintenance program is responsible for the day-to-day operation, maintenance and repair of the systems. It is designed to ensure systems are cared for in a systematic manner and do not deteriorate at an accelerated rate. There are currently 50 employees assigned to this program and this level of resources is expected to continue at this campus until the transition is made to the new campus.
- Controlled Maintenance Request. This program is the annual request for State appropriations to upgrade deteriorated or worn out pieces of the systems. The UCHSC has been receiving approximately \$2.25 million per year for the last several years to upgrade systems and this is anticipated to continue.
- Facilities Reserve Fund. This activity includes the establishment of a fund annually to upgrade systems and infrastructure on an as-needed and emergency basis.

The current water system has sufficient capacity to serve the needs of the campus through the transition period. There are no major new

programmatic or physical requirements that would dictate new or reconfigured lines. The major project for this system will be the installation of back-flow prevention and this will be completed by 2000. The current level of maintenance and repair will be required.

The electrical system has sufficient capacity and appropriate configuration to meet current and longer term needs. Most major changes to this system will occur within the existing buildings to ensure adequate capacity as areas are remodeled. One major system need that will be addressed in the next 2-3 years will be the upgrade and replacement of the Automatic Throw Over (ATO) switch in the south west quadrant of the campus. The current switch is 30 years old and requires change. A second major upgrade that will be required is the replacement of several of the distribution lines between the switches and building. The current level of maintenance and repair will be required.

The storm and sanitary sewer systems are of adequate capacity and configuration and no major upgrades are envisioned by programmatic or physical requirements. The current level of maintenance and repair will be required.

The natural gas system has the capacity to serve the needs. The current maintenance and repair program will be required.

The steam and chilled water systems have the appropriate capacity but need upgrade and replacement due to age and deterioration. There are several past projects and many new projects anticipated to upgrade the central plant boilers, chillers, cooling tower and distribution systems. Costs are estimated to be \$20 million. The plan is to continue the upgrade of these systems during the transition period.

All infrastructure and utility systems within the buildings will require continued maintenance and upgrades. There will be many projects in the next few years to upgrade elevators, roof and structural systems, electrical panels and wiring, drains heating, ventilation and air conditioning systems. It is estimated that to upgrade utility and building systems within the current buildings over the next 12 years will require \$20 million. The funds are needed to upgrade and replace deteriorated and old building utility systems as they exist but are not needed to meet new building or physical requirements.

It should be noted that if there is an unanticipated major catastrophic failure in these systems, major resource investment will be required.

The telecommunications infrastructure plan has two components: telephony and data communications. Each component will be discussed under two planning horizons: the short-term and the long-term. The short-term

planning horizon covers the time from the present to 5 years into the future. The period beyond 5 years makes up the long-term planning horizon. The plan assumes a relatively rapid move to the Fitzsimons campus.

The telephony infrastructure at the 9<sup>th</sup> Avenue campus is mature and approaching obsolescence. The telephone switch is the key component of this existing infrastructure. This telephone switch is old by current standards, as are the individual telephones it supports. Indeed, many modern dialing features are not available because of the switch's advancing age. However, given these inherent deficiencies, this infrastructure will be usable for the short-term. It has the capacity and configuration to serve the telephonic needs but must be continually maintained and enhanced to maintain the capacity. Modest incremental enhancements will be needed to ensure this system remains viable and maintainable. It is estimated that less than \$50,000 per year will be needed to maintain this existing infrastructure over the short-term. This amount will allow the replacement of hardware and software as needed. Should a major component such as the switch fail, additional investment will be necessary. The investment could be in a central component or in smaller individual components.

In the long-term, the telephony infrastructure will require a major overhaul. This overhaul will be needed because of both hardware and software concerns. The hardware will eventually no longer support the software as new features are developed. Additionally, the hardware components will become scarce and costly to procure. Over \$1 million will be required to replace the telephony switch and its 4,000 telephones.

Data Communications will have a modern, switched data network. Each user will have a 10-megabit per second (Mb/s) pathway to the network's core. The core network will form a mesh linked by redundant 155 Mb/s pathways. This is a modern communications network: viable, robust, and scaleable. Costs associated to maintain and enhance this network in the short-term will be minimal. Approximately, it is estimated that \$50,000 per year will be needed to upgrade existing device interfaces to bring the core's speed closer to the user.

In the long-term, the network will require replacement. No modern data network can remain reliable, available, and maintainable beyond 10 years. It is estimated over \$2 million dollars will be required to upgrade its existing network. Additional monies will be needed to replace or upgrade the cable infrastructure inside the campus's many buildings to meet new standards.

### Open Space

Open space on the campus will remain as is both in the short-term and long-term. Because there will be no buildings constructed on this campus by the UCHSC and University Hospital and there are no plans for the demolition of any existing facilities, the open space and green space areas will remain. It is anticipated that these spaces will be maintained in their current condition and enhanced where needed. A maintenance program is currently in place and will be continued. There are 6 FTEs assigned to maintain these areas and these will continue to perform the work in the grounds and open space areas. There will be several projects to enhance the spaces through additional and/or upgraded landscape. This will include trees, shrubs, grass, paving and sidewalk material and flower beds. Areas will be along the perimeter of campus next to major roads and residential neighborhoods. This work will continue until the transition is made to the Fitzsimons campus.

### Circulation and Access

Circulation and access to the campus will remain as it is currently configured. Again, because there will be no new buildings on site and no demolition of existing facilities, pedestrian and vehicular access to the campus will not be modified. Internal and external circulation modes and patterns are also anticipated to remain the same. With the decrease in activity, the circulation and access will become less congested and friendlier. There are no new requirements to direct a change in these.

### Parking

Parking at the campus will remain as currently configured. With no new buildings and no demolition of facilities, the number of parking spaces, their location and their access will remain the same in the short-term and long-term. In addition, with the move to Fitzsimons, the long-standing problem of insufficient parking spaces on campus will lessen substantially. It is envisioned that the approximately 3,600 parking spaces will be adequate to meet current and future needs.

At the present time and in the immediate future, there are sufficient parking spaces for patients, visitors, faculty, staff and students. This has been achieved because of the move of nearly 500 FTEs from this campus to Fitzsimons. There is sufficient and "no-wait" parking for patients and visitors. There is no waiting list for faculty and the waiting list for parking for staff and students has been reduced from 18 months to less than 9 weeks. The pattern of adequate spaces is expected to also continue in the long-term and there may be a point in the future as a significant number of programs move to Fitzsimons that there will be a surplus of spaces.

The major impact to this pattern of decreasing demand for parking and a stable supply of spaces is when the UCHSC and UH sell peripheral property that contain parking spaces. If this occurs, a plan has been developed to accommodate this loss of space. This plan indicates that any loss in spaces on the periphery of campus can be accommodated within the present spaces in the core of the campus. No new facilities will be needed and there will be adequate spaces to meet the demand.

## **Fitzsimons**

The Fitzsimons campus presents a variety of different issues and opportunities regarding infrastructure. Again, substantial infrastructure is necessary to construct the proposed build out of the Fitzsimons site. The infrastructure and utility systems to be constructed will provide the foundation and the physical “underpinnings” for the current and future development of the site. Much of the current infrastructure is old and deteriorated or does not exist; and, as a result, new or upgraded infrastructure is needed. It is envisioned that the new campus will have modern, up-to-date, high-tech research, education and health care facilities and adequate utility and infrastructure systems are required to support these. It is critical that these systems have the capacity to serve both immediate and long-term needs. The infrastructure will be constructed in phases over a period of years and it is essential the phases be integrated with previous phases to ensure continuity and the uninterrupted development of the site.

To achieve the large anticipated build out, major infrastructure and utilities construction is needed. Most of the infrastructure in the developed portions of the site is 50 to 70 years old and there is little to no infrastructure in the undeveloped portions of the site. Current plans are to develop the southern area of Fitzsimons for clinical, health care and educational activities and this area will require new infrastructure. Development will also occur in the central core area and in the northern areas where some current utilities and infrastructure exist. However, these utilities and infrastructure are aged, deteriorated and more important lack the capacity and the configuration to support the UCHSC mission. Replacement and enhancement of most systems is necessary. Again, infrastructure will be necessary to support approximately 3.5 million square feet of space within the next 12 to 15 years and eventually approximately 5 million to 8 million square feet in the next 20 to 30 years.

Clearly, the development of the new campus must have a utilities and infrastructure plan to provide the foundation for the rest of the physical development. It will be the basis for the phased construction of new buildings and the remodel of existing facilities. The infrastructure projects in proposed phases will be carefully planned to ensure that there is an appropriate direction and consistency in infrastructure development that will avoid duplication of effort and wasted time and funding.

The general guidelines and principles utilized in the Master Plan for the infrastructure and major systems of the Fitzsimons site are:

- Using as much of the existing infrastructure as possible for as long as possible is necessary. Existing utilities will be utilized and integrated into the development on a proactive basis.
- The construction of the infrastructure and utilities when they are needed or in phases to avoid unnecessary construction and excessive front end costs.
- The construction of the total or substantial portions of infrastructure systems when the need is substantiated and when the construction will avoid excessive future costs.
- The installation of adaptable infrastructure systems to ensure integration with future build-out in a manner which avoids duplication of projects and wasted effort and funds.
- The construction of maintainable systems to minimize future operations disruptions.
- The installation of systems with the longest life expectancy possible.
- The construction of systems, which minimize energy loss to avoid excessive future operating, costs.
- The integration of systems and specific projects with the Fitzsimons Redevelopment Authority Master Plan and with the City of Aurora and the Army planning efforts.
- The installation of systems which maintain the aesthetics of the campus.

In addition to the above, the specific early utility development guidelines include:

- A water supply system including loop configurations is essential to the development. Major water supply system and sub systems will be installed as quickly as possible.
- A central heating and chilled water plant(s) is needed for the campus. Use of the current heating plant for the foreseeable future will be necessary with the possibility of a new heating plant in the future. A central chilled water plant is needed immediately because there is no centralized chilled water generation at the site. If heating capabilities are needed in the future, they can be installed within this plant. The



co-generation of electrical service may also be feasible and necessary within this new plant.

- A large capacity electrical infrastructure including several levels of redundancy will be installed as quickly as possible. This is necessary to avoid patient care, educational and research interruption and the associated risks.
- Utility corridors to route the various utilities systems together in a logical manner are needed in the early development.
- New roads and other access facilities will be constructed to support the early buildings in the development and anchor portions of the infrastructure.

Water, storm drainage and sanitary sewer will be provided by the City of Aurora. The construction, ownership and cost sharing responsibilities of each party are detailed in the Intergovernmental Agreement among the City, the FRA and the UCHSC. See Appendix D. Natural gas and electricity will be provided by vendors, while steam and chilled water will be provided at the current plant by vendor or internal UCHSC staff.

In addition, the UCHSC and UH have developed an Optimum Energy Services Strategy (OESS) for Fitzsimons. The goals of this strategy include: 1) the provision of utilities at the lowest possible cost; 2) obtain the most reliable and dependable sources of utilities and commodities; and, 3) coordinate and implement the strategy with the FRA. Principles of the OESS are as follows:

- Steam and chilled water from a central plant will be the most cost effective and efficient approach to these utilities. A chilled water plant is needed in the initial phases of development.
- The current heating plant at the site should be utilized until approximately 2003. It is estimated that in 2003, the UCHSC will require additional steam due to large expansion. To achieve this, use of the current heating plant will be terminated and expansion will occur in the chilled water plant to be constructed on the UCHSC site.
- Co-generation of steam and electricity will be actively studied and implemented if it proves to be feasible.
- A large capacity and redundant electrical system will be required at Fitzsimons.

- The purchase of electricity at the wholesale rate is cost effective and must be pursued.
- Natural gas should be purchased at the lowest rate possible. Open market purchases should be continued and the feasibility of constructing a gas pipeline to Colorado Interstate Gas should be studied.

### Utilities

Steam. The existing steam heating system on the Fitzsimons campus consists of a relatively new (1992) central heating plant and a distribution system, which is between five and fifty years old. The boiler plant was constructed in 1992 and includes the central boiler and auxiliary equipment. Capacities and auxiliary equipment are described below. The boilers are fired to maintain a 125-128 PSIG steam header pressure in the boiler plant.

The campus is fed from a 125 PSIG 12" branch steam main and a 6" branch condensate return main from the new boiler plant. These lines traverse from the plant above ground and are supported on pedestals the old steam plant. These are valves and PRV's in the valve room of the old steam plant. Steam pressure is reduced and distributed at two pressures from this valve room. The lower pressure, labeled the "heating steam system", is distributed at 30 PSIG during peak flow conditions and is manually adjusted to lower pressure during lower load conditions. This system is shut off during the summer months. The higher pressure system is labeled the "process steam system" and is distributed at 60 PSIG. This system runs year round and serves domestic water converters, sterilizers, cooking, and building heat. Building 500 has two mains, both reported at 60 PSIG, which run in the same tunnel. One is used and the other has historically served as backup.

Generally, for the "heating steam", the isolation valves and pressure-reducing valves (PRV's) were replaced in the old steam plant in 1996. The condition of the piping, valves, steam powered condensate pumps, steam traps, and PRV's appears to be in generally good condition. It is understood, all condensate piping is Schedule 80 weight piping, which is considered standard practice.

In the main steam utility tunnel, which leads south to the hospital, the expansion joints have been repaired and/or replaced. New hangers and insulation are evident and supports have been refurbished and reused.

Numerous areas in the tunnel system will require repair and or replacement within the next five years. The main header system at the old central heating plant (Bldg. 215) should be replaced to accommodate the capacities

required for the short-term use by UCSHC. In addition, the condensate return system throughout the distribution system must be converted to pumped condensate return. The existing pumped and gravity systems have been interconnected resulting in ineffective operation of both.

Several modifications are also required for the existing heating plant. These include the following:

- Add motor controlled steam valves on each boiler
- Add UPS backup for the boiler control system
- Implement an electrical coordination study in boiler plant.
- Add operator interface hardware/software to the boiler control system
- Relocate burner motor starters to the boiler room MCC.
- Add manual override switch panel in control room.

The existing boiler plant includes three, packaged boilers with 60,000 lb/hr capacity and one, packaged boiler 30,000 lb/hr boiler. The capacity of the plant is 150,000 lb/hr with one boiler (60,000 lb/hr) in standby mode.

The short-term (5 year) plan provides for the re-use of the existing heating plant and distribution system to supply the heating and process heating needs for the UCHSC and UH campus. The approach is desirable as it provides time for UCHSC to budget, design and construct its own central utilities plant within the confines of UCHSC property. Installation of individual boiler systems for each UCHSC facility was evaluated and found to be cost prohibitive.

Operation of the plant and distribution system can be provided on a lease basis from the FRA. UCSHC will either operate/maintain the plant with UCHSC operating personnel or it will subcontract the operation of the plant to a third party operator.

The operating capacity of the existing heating plant approximately matches the 5-year requirement of the UCHSC development. At the end of the five years, a new central utilities plant will have been developed for the UCHSC campus. See below.

The initial development of the UCHSC campus will be served by steam from the existing central heating plant. Program Plans for 1997 and 1998 include development of tie-ins to the existing system to serve the heating and cooling equipment energy requirements. Direct-buried steam/condensate lines located east of Bldg. 500 will connect the initial utility tunnel (1997 Program Plan) with the steam lines located northwest of Bldg. 500. This connection to the first phase of the utility tunnel will provide the interim steam supply for the 5-year development (700,000 sf new bldgs) on the southwest portion of the campus.

The second phase of the short-term development will be the creation of a central utilities plant on the east end of the UCHSC campus. This plant will serve the heating/ cooling/ electrical requirements of the long-term development of the campus. The central utilities plant facility will consist of three independent equipment/system bays for initial and future development – a chiller bay, an electrical distribution bay, and a future boiler/generator bay. Each bay will be self-contained for the utility system it contains. The boiler bay will include high-pressure boilers, gas-turbine generators and auxiliaries. The design of the boiler/generator bay will be expandable to provide space for additional boiler/generator capacity, as site needs dictate. The short-term (5 year) requirement for high pressure steam is approximately 150,000-180,000 #/hr of available boiler capacity.

The basis of the central steam system long-term plan is the expansion of the high pressure steam plant and distribution system initiated under the short-term plan.

The build-out of the steam heating plant will consist of the addition of high pressure boilers and/or gas-turbine generators to a total steam plant capacity of approximately 350,000 lbs/hr (excluding future non-UCHSC loads). Provision of the future non-UCHSC loads will add an additional 210,000 tons of steam load. The boiler/gas-turbine bay of the central utilities plant will be expanded to accommodate this future load as it occurs with 70,000 lb/hr increments occurring approximately every five years.

For a campus of this size, the cogeneration option with gas-turbine generators and waste heat steam boilers provides for an optimum energy use plant. The total site build-out will accommodate approximately 15-20 MW of electrical cogeneration with waste heat steam generation of 120,000 #/hr. Supplemental waste heat boilers (60,000 lb/hr) will be added to the existing boiler capacity (150,000-180,000 #/hr) and the waste heat generation (120,000 #/hr) to provide to total plant steam capacity requirement of 350,000 #/hr.

The distribution system will also be added in phases as the site development dictates. After the short-term build-out, major utility tunnel build-outs will be required for the west end of Charlie Kelley Blvd. and for the entire length of E. Bushnell Ave. The Bushnell build-out is required to allow the development of the Northwest corner of the UCHSC campus.

The final phase of the steam/condensate distribution system will be the connection of the Bushnell Ave. and Charlie Kelly Bldg piping runs. A north/south utility tunnel along S. Hutton street will connect the two piping runs.

In addition to the main east/west utility runs, north/south branch utility tunnels or direct-buried distribution piping will be installed to major building centers.

Chilled Water. There is no existing central chilled water system on the Fitzsimons campus. Bldg. 500 has central chilled water from an in-building chiller plant. Several of the smaller, outlying buildings have DX HVAC systems space and process cooling. The only system of any size is located in the Bldg. 500 and is a relatively new system. The system was installed in 1990-1992 and is in good condition. The Building 500 central chilled water plant was sized to accommodate 4, 300-350 ton chillers. There are currently three (3) installed. A fourth is currently being considered to accommodate the new cooling requirements due to the renovations in the building.

The Building 500 system will be reused for the short-term cooling requirements of Building 500.

Central chilled water will be the most economical short and long-term method of air conditioning the facilities expected to be constructed on the campus.

The central cooling plant would be located on the UCHSC campus on the east end of the campus. The new UCHSC central cooling plant would be sized to handle the short-term cooling requirements of the UCHSC initial new and existing build-out (approximately 1.2-1.5 Msf). The initial cooling capacity would be approximately 2,000-5,000 cooling tons. The facility housing the chillers would be sized to accommodate the future cooling capacity requirements (13,000 to 15,000 tons) of the UCHSC and UH buildup.

The chilled water distribution from the new central cooling plant to the Short-term development area will consist of chilled water supply/return piping located in a new utility tunnel running west from the new central plant. The chilled water distribution system will be variable volume and will be one of the secondary loops of the central primary/secondary CHW distribution system.

The Central Utilities Plant facility will consist of three independent equipment/system bays for initial and future development – a chiller bay, an electrical distribution bay, and a boiler/generator bay. The design of the chiller bay will be expandable to provide space for additional chiller capacity, as site needs dictate. The cooling towers for the central chiller plant will be located east of the plant building.

The electrical bay will house the main facility electrical switchgear and electrical distribution panels. The site electrical loops will be served from this location.

The basis of the chilled water system long-term plan is the expansion of the chilled water plant and the chilled water distribution system initiated under the short-term plan.

The build-out of the chilled water plant will consist of the addition of 2-stage steam absorption chillers and/or electric drive centrifugal chillers to a total chiller plant capacity of approximately 15,000 tons (excluding future non-UCHSC loads). Provision of the future non-UCHSC loads will add an additional 8,000 tons of cooling. The addition of chillers and cooling towers will occur in 1,500-2,000 ton increments to match available equipment capacities. The chiller bay of the central utilities plant will be expanded to accommodate this future load as it occurs with 3,000 ton increments occurring every five years over years six through twenty.

The distribution system will also be added in phases as the site development dictates. After the short-term build-out, major utility tunnel build-outs will be required for the west end of Charlie Kelley Blvd. And for the entire length of E. Bushnell Ave. The Bushnell build-out is required to allow the development of the Northwest corner of the UCHSC campus.

The final phase of the chilled water distribution system will be the connection of the Bushnell Ave. and Charlie Kelly Bldg piping runs. A north/south utility tunnel along S. Hutton street will connect the two piping runs.

In addition to the main east/west utility runs, north/south branch utility tunnels or direct-buried distribution piping will be installed to major building centers.

The anticipated pumping system will be primary/secondary for the chiller plant and distribution system. Tertiary pumps stations will be installed in each building for distribution flow in the building.

The chilled water needs of the "Future Affiliates" can be provided by a separate chilled water loop connected directly to the chilled water plant. The proximity of this development area allows for a separate loop to be installed at some future date. A separate loop allows for independent operation and metering of the chilled water use for non-UCHSC affiliates.

Natural Gas. Natural gas is provided to the Fitzsimons site through two main metering points located on the west side of the site along Peoria Street. The main metering point (Metering Point #1) is located at the intersection of Peoria and West Harlow Ave. Natural gas is fed from the

PSCo mains at 100 psig) and reduced in pressure to 33 psig for on-site distribution. The main 8 in buried distribution line is a 40 plus years old. It runs from the site entry point under the golf course north east to Bldg 133 and then east to the old central steam plant. Various taps are made to this main gas line, including a new 6 in main to the new Central Utility Plant. Several distribution mains run from the old central plant location, including a 4 in line to the south central area of the site. Building 500 is served from this 4 in line. A relatively recent addition to the central gas system was installed in the early 1990s. It consists of a 4 in line originating from the southeast corner of Building 500, running south to the south east of the parking lots. The line T's with a 4 in branch to the 700 area and a 3 in branch to the 600 and 800 areas. This new system is coated and wrapped steel. The original 8 in and 4 in lines are bare steel and bare cast iron.

A second 4 in supply line (Metering Point #2) feeds the southwest housing area on the site. This main is approximately 40 years old and supplies gas at 10 psig to the area. This line is independent from the 33 psig line although a normally closed crossover connection exists between the two systems.

The condition of the natural gas distribution system is varied as it includes relatively new piping as well as 40 year old piping. The entire system is protected by a cathodic protection system, which was installed and/or upgraded within the past 10 years. The newer sections of the system typically are fabricated of coated and wrapped steel. The older sections of the system are typically bare steel or bare cast iron.

The short-term plan for the UCSHC development will require the reuse of sections of the natural gas distribution system. The UCSHC and UH will acquire the use of this system through a lease with the FRA. The actual operation/maintenance of this distribution system will be by UCSHC O+M staff or by subcontract to a third party.

The second metering location (Metering Point #2) will be discontinued by UCHSC.

A new natural gas main from Colorado Interstate Gas (CIG) is a possibility for a new gas service to the new central utilities plant. The new 2.2-mile gas line would provide the UCHSC/Fitzsimons site with a new high-pressure (300-psig+) gas service for immediate and future gas needs. The 4" gas line would be direct buried on the UCHSC campus site as well as from the site to the CIG gas connection. Utility easements will be required for offsite routing. New pressure regulation will be required at the existing heating plant to reduce the gas supply pressure from 300+psig to the 30+psig pressure needed in the plant.

The on-site gas distribution system will consist of new direct-buried gas mains and branches to the individual buildings, which require natural gas service. The routing will follow the proposed routing of the steam/CHW utility tunnels.

The new gas service offers significant savings to UCHSC by reducing the distribution costs of the gas supply. The other gas service options include utilizing the existing Public Service Company of Colorado system to the site.

The development of the long-term natural gas distribution system will parallel the development of the chilled water and steam systems distribution. The natural gas distribution will be direct buried in close proximity to the central utilities tunnels.

The long-term requirements for natural gas on the site are undefined. However, with the availability of central steam and chilled water, the requirement for natural gas at the building level is moderate, typically for lab use, process/clean steam generation or for medical equipment purposes. An extensive gas distribution system on the site is not anticipated.

Electrical. Two (2) main 15 kV feeders from PSCo-East and Havana Substations supply the existing FAMC site. One feeder is considered the primary source of power for the site and the other feeder is operated as a back up. The feeders enter the site on the North and East portion of the site and enter the existing heating plant via underground duct banks. One feeder supplies normal power to the site. The other feeder is supplied by an automatic throw over (ATO) switch and provides additional reliability for the critical facilities on the site.

The two feeders supply site main switchgear, which is located in the existing heating plant. Four (4) feeders supply the campus from the main switchgear. Two (2) of the feeders, C13 and C14, supply normal power to the site. Feeders C11 and C12 are fed from PSCo's (ATO) switch and supply Bldg. 500. The feeders leave the heating plant via underground duct banks and supply the building transformers from both underground circuits and overhead lines. Feeder C11 feeds Building 500 and some of the other building in the same vicinity. Feeder C12 feeds Building 500 and many of the buildings located along Bushnell Avenue. Feeder C13 feeds primarily the buildings on the West Side of the campus and feeder C14 feeds primarily the buildings on the East Side of the campus. The primary distribution voltage for the site is 13.2 kV

Emergency power is not distributed throughout the site. Two diesel powered 600 kVA generators supply emergency power for Building 500.

The original electrical distribution system voltage on the site was 4.16 kV. In 1988 -1991 the entire system was re-built in order to increase the system



operating voltage to 13.2 kV. This conversion resulted in the replacement of all the existing underground distribution circuits, the building transformers, and required all of the overhead lines to be re-built. Consequentially, the electrical distribution system is only seven years old and, overall, is in good condition. The main switchgear was replaced recently and is approximately four years old. Typical life for a electrical distribution system is approximately 40 - 50 years.

The capacity of the incoming feeders from PSCo is approximately 15 MVA. The four (4) feeders leaving the main switchgear can supply the site with approximately 200 A or 4.6 MVA each or a total of approximately 14 MVA. The existing peak demand, according to site personnel, is roughly 7.5 MVA. Typical load estimates for the type of buildings planned is based on 10 W/sq. ft. Using these numbers for a rough approximation results in a system capacity capable of serving approximately 1.4 million square feet of facilities.

The planned building types include clinical, research, administrative, and educational facilities. These types of facilities require a high level of electrical service reliability. The existing UCHSC campus is served by an ATO switch, which provides redundancy for the entire site. The existing campus also has limited generation capability, which also increases the system reliability. Only feeders C11 and C12 meet UCHSC requirements for electrical reliability.

A second consideration in re-using the existing distribution system is its location. Since the main switchgear is located in the existing heating plant, issues such as plant ownership and right of way may make re-use of the existing system difficult or impossible.

Various electrical distribution system configuration have been reviewed to determine the system, which best meets the requirements of the UCHSC. These configurations included expanded radial, primary selective, primary loop, and secondary selective system configurations. Based upon the UCHSC reliability requirements and economic considerations the best alternative is the primary loop configuration.

The short-term system will consist of switchgear, two (2) main feeders from PSCo, distribution feeder breakers, concrete encased duct banks, manholes, and pad mounted gear. The new switchgear will be located in the existing heating plant and will be rated 13.2 kV, 3000 A to meet the build out of approximately 3.5 Msf. The PSCo main feeders will be rated at approximately 30-35 MW. The two main breakers and the transfer breaker will be controlled by an ATO scheme. Two underground feeders from PSCo will supply power to the main switchgear.

The main switchgear will supply the feeder breakers. The distribution system will be looped so two (2) feeder breakers will be required for each loop. The campus will be divided into areas based on functions. Two (2) circuits in a looped configuration will then feed the building groups. Building transformers will be fed by pad mounted gear configured as indicated. The electrical duct banks will follow the pipe routing as much as practical. The duct banks will consist of concrete encased 6" conduits and will include manholes as required.

To meet the requirements for the short-term development, such as the Cancer Center and the Eye Clinic, the existing electrical system will be utilized. This decision is based on time considerations and present funding. Circuits C11 and C12 will be extended from Building 500 to the new buildings. This extension will be designed such that it meets the objectives of the master plan and the long-term build out.

To serve the initial development a main duct bank will be required from the existing boiler plant to the initial development zone. A duct bank consisting of concrete encased 6" conduits and manholes will be installed adjacent to utility tunnel, which will run along Charlie Kelly Boulevard. Additional electrical distribution systems will be required internal to the initial development zone and will be based upon the future site layout. The internal distribution system will consist of duct bank, manholes, and pad mounted switches to interconnect building transformers. The new distribution system will interconnect to the power feed for the immediate build out. Fitzsimons existing electrical system will be utilized to feed building loads.

Phase II will be installed in conjunction with the new UCHSC Central Utilities Plant (CUP). Two new feeders from PSCo will be brought into the boiler plant to feed the new switchgear. The switchgear will be installed in a primary loop configuration. Duct bank will be installed from the CUP electrical room to the duct bank installed in Phase I. The Fitzsimons electrical system will be removed and all loads will be fed from the new switchgear. Building 500 will be re-fed from the new system and disconnected from the Fitzsimons system. Additional duct bank, manholes, and pad-mounted switches will be required to feed any additional buildings.

Water Supply System. Water supply historically provided to the Fitzsimons Army Medical Base has been provided by the Denver Water Board. This supply is characterized by low available pressure. Currently, the supply is being transferred to the City Of Aurora. The Aurora supply increases the pressure available to the UCHSC by approximately 60 pounds per square inch. This provides a significant improvement to the systems capability and flow rate capacity.

The overall water supply for the UCHSC is provided by the existing and well-established systems of the City of Aurora. The water supply is generated from a combination of underground reservoirs and surface renewable reservoirs. All of the City's water supply is treated to the levels of purity required by Federal and State law. Cross-connection and back-flow prevention measures are extensively employed and maintained throughout the City to prevent point source contamination.

The existing water system within the campus area is reusable to a partial extent. The existing major trunk lines along the north and east sides of campus, as well as the Building 500 loop, are capable of providing long-term benefit. A portion of the existing secondary supply loops may also be utilized, but conflicts with the planned development and other programmed utilities may also result in replacement. Portions of the old Fitzsimons water distribution are undersized for the type of facilities to be provided for the UCHSC. These pipelines may be reused for short-term, limited needs, but will eventually be replaced. Much of the southern portion of the UCHSC site currently has no water distribution, and new water loops are required.

The Army has been steadily identifying sections of the water system that are leaking or otherwise require unusual maintenance. Over the past five years, these problem areas have been programmed for correction or replacement. Only a portion of that planned corrective work has been accomplished, leaving some of the piping sections substandard. These sections will require replacement or abandonment prior to being subjected to the higher pressures of the City Of Aurora supply. Isolation valves are well organized on the existing system, which will help in this effort. The increased pressure from the new water supply will also create a need to regulate the pressure to some segments of the existing distribution system in order not to overpressure the building systems served.

The existing system is not adequate to provide the full fire protection demands of the Army Base, and much less capable of providing the demand flows of the planned Health Sciences Center. The shortage is due to a combination of undersized mains and a lack of adequate loops in the system.

The short-term (5 year) plan provides for the re-use of water distribution lines surrounding Building 500, the mains in Bushnell Avenue, and the mains in Van Valzah Street. These mains are also to be re-used for the long-term development with some improvement and relocation to conform to the Master Plan. A portion of the secondary water loops will also be re-used for the short-term, where initial development is limited, and the lines do not conflict. This is primarily true in the northeast quadrant of the campus where the short-term facilities are sparsely located. Re-use of these systems is made possible by the incorporation of a primary main located along Charlie Kelly Boulevard during the first phase of construction.

The initial short-term phase of the water system construction provides the campus with the primary distribution loop serving the entire campus, and secondary loops for the development of the UCHSC in the southwest quadrant of the campus. These primary and secondary loops provide the domestic and fire water service requirements of each of the new facilities over the short-term development, as well as improving water service to the existing buildings identified to remain.

During the short-term period, the sparsely located facilities in the northeast quadrant will continue to rely on the existing water system available within that area. Isolated improvements to the water system will be provided only as necessary to provide individual building needs on a case by case basis. The construction of the primary main described above provides the source for these existing secondary loops, and provides additional capability. This increases the re-use potential.

The basis of the water supply system long-term plan is the expansion of the primary and secondary water mains initiated under the short-term plan, along with the re-use of the existing water system to the extent possible.

The configuration of the UCHSC water distribution system is a logical network of primary loops, secondary loops and individual services. The onsite water supply of the UCHSC campus and the northern portion of the Fitzsimons land is supported by five connections to the City of Aurora water mains. The use of multiple connections to the Aurora mains optimizes the system capability and reliability.

Installation of the water supply system is master planned to comply with the facilities and roadways master planning. In addition, it is planned for coordinated relationships to the other underground utilities such as sanitary sewer, storm sewer, electrical duct banks and steam tunnels. Each is programmed to be installed in unison along dedicated utility corridors, or to avoid interference by taking non-conflicting routes.

Phased construction of the water system, planned in association with the facilities development, provides for optimization of short-term resources, while master planning of the long-term build-out assures the overall system capabilities. Each phase of development requires portions of the trunk lines to create adequate supply loops to protect the property during fire situations.

As the development of the UCHSC continues to extend beyond the southwest quadrant to the northwest and northeast quadrant, additional secondary water system loops are extended from the primary water loop provided initially. The capacity of the primary loop, in conjunction with the improvements provided by other developers in the north half of Fitzsimons, is adequate to serve the planned development. As each area is developed, the new secondary loops replace the aged and undersized distribution lines that exist.

The long-term development of the southeast quadrant of the UCHSC campus is anticipated to include approximately 3 million square feet of additional building floor area. As this area develops, additional provisions for water service will have to be developed to support the increased demands. Replacement of the existing water main in Colfax Avenue by the City Of Aurora is expected to be required by this time. This is anticipated not only for the UCHSC, but also for the anticipated growth of businesses along Colfax. The City already has larger mains in Colfax east of this site and in Peoria Street to the west. The future interconnection of these two larger lines is a logical development of the City's system. In conjunction with the City's main improvements, the UCHSC can provide for the additional demands by extending the primary water main loop through the southeast quadrant. These extensions are connected to the City's enlarged Colfax main at least one additional point. With these improvements, the planned development of the southeast quadrant should be adequately provided with domestic, fire protection and irrigation water supply.

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Sanitary Sewer Collection System. Sanitary sewer collection and treatment historically have been provided by the Fitzsimons Army Medical Base. As part of the overall redevelopment plan, all of the Fitzsimons property is to be served by a Joint Water Reuse Plan between the Metro Wastewater and Reclamation District and the City of Aurora. The City of Aurora has a 42" sanitary interceptor line that will provide the outfall of the sanitary collection lines from the Fitzsimons property. All discharges from the UCHSC campus are eventually transferred to, and treated by, the Metro Wastewater Reclamation District. The District operates fully licensed, permitted and monitored collection and treatment facilities.

Many of the existing sewers are at less than 0.4 % slope, and are constructed of clay pipe, which is not consistent with current City of Aurora Standards. The existing lines throughout the majority of the planned UCHSC campus area have historically been maintenance problems for the Department of the Army during their operation of Fitzsimons. The age of the material and the lack of adequate slope of the pipelines creates a significant amount of plugging and system backups.

The existing system is not adequate to provide the full capability to serve the demands of the planned Health Sciences Center. The shortage is due to a combination of undersized mains and a lack of adequate slope in the system. Some of the newer mains north of Building 500 will be adequate to serve short-term development, and will be employed. Further development will require extensive upgrades throughout the campus as well as to the offsite outfall lines to the north to provide adequate capacity.

The short-term (5-year) plan provides for the re-use of one primary collector line north of Building 500, on a temporary basis, to serve the development of first few UCHSC facilities. Before additional short-term buildings are constructed, this primary collector is also replaced. Short-term development of the UCHSC campus in the northeast quadrant generates a low demand for sanitary sewer capacity. Initial facilities take advantage of re-use of the existing systems to the extent possible.

The initial short-term phase of the sanitary sewer collection system construction provides the central portion of the campus with the primary collection main and secondary lines with capacity for only a few buildings. The overall short-term development of the UCHSC campus is provided with sanitary sewer collection service by a new primary main which outfalls to an existing main in Harlow Avenue north of the Building 500. Secondary mains will be extended throughout the eastern and central portions of the southwest quadrant. Additionally, the routing of this system allows for some development to also occur in the eastern portion of the campus' northwest quadrant.

Short-term development of the UCHSC campus in the northeast quadrant generates a low demand for sanitary sewer capacity. Initial facilities take advantage of re-use of the existing systems to the extent possible. Isolated improvements to the sanitary sewer collection system will be provided only as necessary to provide individual building needs on a case by case basis.

In the long-term, the University of Colorado Health Sciences Center campus sanitary sewer collection system is a logical network of primary collectors, secondary collectors and individual services. The onsite collection system of the campus outfalls to three mains provided by the Fitzsimons Redevelopment Authority in the northern portion of Fitzsimons. These three FRA mains eventually carry the flows to the interceptor line in Sand Creek to the north.

Installation of the sanitary sewer collection system is master planned to comply with the facilities and roadways master planning. In addition, it is planned for coordinated relationships to the other underground utilities such as water distribution, storm sewer, electrical duct banks and steam tunnels. Each is programmed to be installed in unison along dedicated utility corridors, or to avoid interference by taking non-conflicting routes. Each facility connecting to the collector system provides control over their discharge to verify that only domestic class wastewater is conveyed.

Phased construction of the sanitary sewer collection system, planned in association with the facilities development, provides for optimization of short-term resources, while master planning of the long-term build out assures the overall system capabilities. The phasing of development of the FRA property to the north of the UCHSC is important due to the reliance on their outfall systems. Initial phasing is directed at utilizing outfall locations, which are not dependent on participation by other developers. Each phase of development will require that portions of the trunk lines be constructed to create adequate collection for the campus.

As development expands to the western portions of the southwest and northwest quadrants, an additional main routed along the western side of the campus provides the remaining collection capacity. This main requires coordination with the development of one of the planned sanitary sewer outfalls by the FRA.

As development continues in the northeast quadrant, the new primary sanitary sewer collector for this area is constructed along with the secondary collector mains throughout. Installation of a sanitary sewer outfall planned by the FRA, again must be coordinated to support build-out of this quadrant.

Completion of the collection systems within the southwest, northwest and northeast quadrants of the UCHSC, along with the development of the outfalls by FRA, will allow the build-out of the campus to approximately 5 million square feet of floor area.

The long-term development of the southeast quadrant of the UCHSC campus is anticipated to include approximately 3 million square feet of additional building floor area. As this area develops, additional provisions for sanitary sewer collection and outfall will have to be constructed to support the increased demands. The restrictions of available capacity downstream of the UCHSC campus and the lack of elevational rise across the Fitzsimons land create the need to develop a fourth outfall point. This fourth outfall will be routed to the east along Colfax Avenue. In sizing this outfall, the City Of Aurora considerations of the anticipated development of businesses along Colfax must be considered as well. This outfall main will also discharge to the 42 inch interceptor as it extends south through Toll Gate Creek. In conjunction with the City's main improvements, the UCHSC provides for the additional demands by extending sanitary sewer collectors through the southeast quadrant. These extensions are connected to the City's new Colfax main.



Storm Drainage System. The site has two major drainage ways immediately available for discharging storm water runoff. Sand Creek to the north and Toll Gate Creek to the east. The City of Aurora has been recently performing improvements to both creeks to increase their performance during major storm events. Storm water runoff is routed to two outfalls north of the campus to Sand Creek, and one to the east to Toll Gate Creek. Due to the relative proximity of these two major floodway creeks, the City Of Aurora has determined that the Fitzsimons property is not required to provide detention.

The existing onsite storm sewer components are apparently sized to handle minor storm runoff conditions. During major storm events, the runoff water is currently allowed to drain across the large, open, grassed areas throughout the site. Eventually this water will drain off through the small storm sewer system or be eliminated by ground absorption and evaporation. Development of the UCHSC campus, although providing a significant amount of landscaped area, will not have sufficient open space to allow the continuation of this type of drainage. The existing lines throughout the majority of the planned UCHSC campus area are undersized for consideration of the UCHSC campus. Condition of the system and maintenance requirements is not a concern as a new system must be provided. In addition, capacity of the existing onsite system is limited to a very minor storm event. In any moderate or major storm event, site flooding will occur.

The first one or two buildings constructed as part of the UCHSC can take advantage of the large undeveloped grassed areas to dissipate the storm water runoff. All additional development will require the establishment of new storm drainage systems to prevent nuisance flooding. Impact of the first few buildings will result in minimal impact to the runoff rates and conditions within the immediate area, and therefore can rely on the existing system for drainage.

As development of the short-term planned facilities continues, new drainage systems are required. For the extent of the short-term facilities, three separate collection systems and outfalls are required. Immediately surrounding the buildings, surface drainage and grass lined swales are employed to the maximum extent possible to reduce overall runoff and to increase water quality. No onsite detention will be provided beyond the linear detention provided by these swales. In order to prevent excessive accumulation of water and to work around the adverse grades available on the surface, storm sewer collection systems will be required to intercept the flows as they cross the streets.

Development of the facilities within the northeast quadrant requires the construction of the storm sewer collection system along Charlie Kelly Boulevard. This system extends to the east and ties into the existing outfall and discharge to Toll Gate Creek.

The facilities constructed within the southwest and northwest quadrants of the campus will drain via local storm sewers to the planned drainage way bisecting the campus to the west of these facilities. This requires the development of this natural drainage way, not only through the UCHSC campus, but also through the FRA development area in order to support short-term programs.

In the long-term development, the University of Colorado Health Sciences Center campus storm drainage system is a network of surface drainage, grass lined swales and storm sewers. Surface drainage and grass lined swales are utilized to the maximum extent possible within the first sections of the storm water runoff route. Surface drainage should be used near all of the buildings provided that the flows will not generate undesirable flow conditions for pedestrian and vehicular traffic, and that excessive potential for ice formation is not created. If these potential conditions exist, storm sewer will be installed.

The roadways will be provided with drainage swales paralleling them. As much flow as possible is directed into these swales where slow velocities provide an opportunity for effective linear detention and water quality treatment through biofiltration. These swales represent the extent of detention and water quality best management practices to be employed on the campus.

The flat surface grades of the site force the interception of these flows periodically throughout the site. Storm sewers will be constructed to provide interception within each quadrant of the campus. The southeast quadrant and the southern portion of the northeast quadrant outfall to the Charlie Kelly storm sewer main that discharges to the east to Toll Gate Creek. The northern portion of the northeast quadrant is collected and discharged to an FRA outfall main at Building 500 is intercepted by a storm sewer system which also discharges to an FRA outfall main on Bushnell north of the Building 500. The entire eastern portion of the site will drain through swales and storm sewers to the planned drainage way cutting through the eastern section of the campus. All of the outfalls with the exception of the Toll Gate Creek outfall require close coordination with the development of the downstream systems of the FRA in order to function appropriately.

### Telecommunications

As site planning proceeds in the future for relocation of UCHSC and UH constituents who currently reside on the main campus location, sufficient telecommunications infrastructure must be in place to accommodate growth at the Fitzsimons. Adequate infrastructure to meet the needs of the relocations and growth is currently being planned to meet long-term requirements of the new location. The planning has identified the need for a secure telecommunications infrastructure that will provide sufficient communications transport bandwidth to all buildings, equipment and end users. A key element in the design of telecommunications is the provision for automatic recovery and business continuance in the event of a service interruption. As relocation occurs, it is essential that the infrastructure is in place and available for use prior to and during major construction and addition of new facilities.

Infrastructure planning and budgeting is the single most important effort required for successful development of new telecommunications facilities at Fitzsimons. Aggressive strategic/tactical planning and development of telecommunications infrastructure will avoid short-term facility exhaustion and address long-term incremental reconstruction over time. Therefore, these issues are being addressed as part of Phase II planning.

In conjunction with current and future Master Planning for Fitzsimons, a proposed site plan was provided to UCHSC and UH information systems (IS) departments that describes the future planned utilities corridors for routing facilities for utilities and services. This site plan on the next page encompasses a rectangular area of approximately 4,000 feet on the east and west boundaries and approximately 2,000 feet on the north and south boundaries. As the site plan indicates, the overall site planning will be based on design of specific utility service corridors as a primary architecture strategy. This strategy is consistent with future site preparations using state-of-the-art communications infrastructure.

This project will install concrete encased ductbanks and cable vaults for fiber optic and copper media. These will be installed based upon the plan schematic diagram depicted in the drawing on the next page. The design of the infrastructure is intended to meet immediate needs and provide adequate capacity for anticipated growth and flexibility to handle a number of different alternate development scenarios.

Project components include:

- Excavation of pavement and soil to prepare the site for deploying underground communications infrastructure.

- Concrete encased duct banks are pre-fabricated concrete slabs that have been formed around conduit to provide a highly secure underground pathway for communications media. The duct banks will typically contain eight four-inch conduits and comprise a total of 24,000 linear feet.
- Pulling vaults are necessary for providing access to the underground media assets and to allow for incremental addition of media. The pulling vaults will be placed every 500 to 600 feet.
- Fiber optic media provides the high-speed communications pathway for voice and data communications to traverse the site. It is estimated that the site will require 100,000 linear feet of fiber optic cable.
- Copper media will be used for delivery of voice communications and low speed data services. It is estimated that the site will require 200,000 linear feet of twisted pair copper wiring.

The system characteristics are described below. The pictorial depiction of a self-healing ring communication infrastructure shown in Drawing T-2 is designed to be in harmony with future projected growth patterns of Fitzsimons.

Quadrant 1 is planned as part of the Master Plan Phase II effort. The ring topology design is planned as Asynchronous Transfer Mode (ATM) transport for Quadrant 1, 2, 3 and 4 with an interface to the Public Switched Network (PSN) at a higher bandwidth on a Transport Ring.

Possible future alternate service entrances for PSN carriers may be considered for the Harlow Avenue entrance to the site.

In a typical quadrant, numerous buildings may be constructed and require the services for diverse communications protocols. Bandwidth requirements may range from slow speed communications to high speed T1s, Ethernet or ATM. Shown for planning purposes, typical interfaces to ring topology are node designations. If there are four buildings, two methods could be employed to connect nodes. Each node could be attached to each other in a ring or a building could be connected separately using a diverse route with dual entry/exit services.

It is planned to time construction and align design whenever possible to coincide with other utility construction including roads, power, sewer, gas, and wastewater.

The present point of intersection is Building 500. Adequate entrance duct for present and future expansion was provided at Building 500 as a part of

the Phase I planning in the Master Plan. It is anticipated that construction of a new communications center to become the central point of aggregation for all facility electronics will be required in the future.

Redundancy and fault tolerance requirements will be met by constructing a Self-Healing Ring topology for a backbone network. To achieve redundancy and fault tolerance for communications, each building will have two physically separate service entrances connecting to a Self-Healing Ring.

Multiplexing each node to achieve bi-directional communications between nodes will provide inter-nodal drop and insert capabilities.

Providing for high bandwidth across the Transport Network to the PSN using speeds greater than ATM will allow flexibility in the future for operating in a Synchronous Optical Network (SONET) environment. Building design for telecommunications rooms and distribution should follow TIA-568, TIA-569 and TIA-607 standards. Electronic equipment should be kept at a constant temperature that would be a comfortable office temperature. Backup power sources are needed at nodes. Room size requirements are also greater than in the past because of the tendency to fill them with equipment.

### Open Space

Open spaces on and around the existing site are extremely varied, from agrarian fields to parade grounds, soccer fields to traditional park settings, vast open areas to intimate spaces. In addition, Tollgate Creek on the east, and Sand Creek to the north, are extensive areas of native vegetation. Toward the southwest lies a city park containing the historic gateway to the former Fitzsimons Army Medical Center (FAMC).

As the growth of the health sciences complex occurs, the system of open spaces envisioned by the master plan will provide a fundamental framework for the development of the campus. In the first five years, the placement of ambulatory care, research and educational facilities, along with Building 500, will begin to form two of the primary open spaces: 1) a commons which will extend from the clinical zone through the research area to the bioscience park to the north, and 2) the major east/west pedestrian way to be developed along the existing alignment of Charlie Kelly Boulevard. Sharon A. Lane Drive, to be preserved as an historic view corridor, will gain additional importance as the primary access to the first phase development in the clinical zone.

The existing stands of mature trees along Sharon A. Lane Drive and Charlie Kelly Boulevard will significantly enhance the quality and character of these initial spaces. Elsewhere on the site, mature specimen trees anchor existing spaces and contribute to the park-like quality of much of the site. Unfortunately, some of the individual trees are diseased and a program of replacement may need to be undertaken immediately to ensure that the beauty of the site and landscaping are preserved and enhanced.

One of the goals of the development of the open spaces in the short-term is to create a sense of 'campus', a feeling of 'place', that begins to reflect the goals of a unifying and healing environment. The long range objectives include the development of a series of diverse spaces that respond to a set of defined needs and purposes. These spaces include large open spaces typically defined as a campus green or commons, courtyards of varying sizes, and even gardens and atria that are associated with individual buildings, which together provide enormous opportunities to create a broad range of memorable places and experiences. As the campus evolves, these spaces from casual to ceremonial are destined to embrace the emerging traditions of this new center of health sciences education and practice.

### Circulation and Access

The site of the new Fitzsimons campus is well situated within the Denver metropolitan freeway system. Access from Interstate-70, located about 2 miles north of the site, is via Peoria Street. Access from Interstate 225,

located directly east of the site, is via Colfax Avenue. The intersection of Interstates 70 and 225 occurs approximately two miles north and east of the site. Colfax Avenue, which forms the southern boundary of the campus, carries a state highway designation, and connects the site with Denver's central business district and extends from the western to the eastern reaches of the metro area. Travel to the Boulder campus by freeway takes approximately 40 minutes.

Freeway access to Denver International Airport is excellent, with an average travel time of 20 minutes. Travel from the site to the existing UCHSC campus takes approximately 15 to 20 minutes. An inter-campus shuttle system currently operates on a 30-minute departure/arrival interval.

Vehicular Access. Two main vehicular entrances currently serve the site. The 'signature' approach is via Sharon A. Lane Drive, entering the site from the south at a signalized intersection at Colfax Avenue. A second major entry to the site is at Harlow (the extension of Montview Avenue) from Peoria Street.

Although much of the site is undeveloped, the Fitzsimons site currently has approximately 15 miles of internal streets, configured in an irregular network of discontinuous roadways and surface parking areas which carve the site into a series of small parcels. The majority of the streets within the site are two lanes ranging in width from 24 to 48 feet. Parking is permitted on many of the existing roads.

Over the next five years, the current roadway system is adequate to meet most of the demands of the campus. But, as the campus at Fitzsimons develops, additional roadways will be required to handle the increased volume of vehicular traffic, and new or improved vehicular entrances will need to be developed to disperse traffic and maintain volumes at various intersections around the campus at acceptable levels

Under the master plan, a loop road surrounding the core elements of the campus is proposed to provide for on-campus vehicular circulation without the use of adjacent public streets. Seventeenth Avenue is envisioned as a combined vehicular and pedestrian way connecting the eastern and western portions of the campus, with an extension to Peoria Street to provide an additional point of access to the main part of the campus. It is also anticipated that this street will be the primary route to the future in-patient hospital for emergency vehicles. Sharon A. Lane Drive, which provides direct access to both the loop road and Seventeenth Avenue, will continue to serve as the 'signature' entrance to the campus.

Modifications to Van Valzah and Hutton Streets will be necessary to improve their capacity to serve as thoroughfares and provide primary access to campus parking and service facilities. As a part of these improvements, signalized intersections may be required at Colfax Avenue.

A service road to be developed along the existing alignment of Bushnell Street will provide an additional access to facilities in the northern portion of the site. Throughout the campus, service drives or roadways will alternate with dedicated pedestrian ways to provide convenient access to campus facilities for vehicles and pedestrians alike.

To encourage a variety of circulation modes, roadways will be developed with dedicated lanes for bicycles, and where bus transit may occur, specially designed transit stops will be incorporated into the roadway system. Access for emergency vehicles will be accommodated in the design of many of the pedestrian ways, as well as provided for in the design of the roadway system.. Conversely, most vehicular paths will also be designed to provide a safe and welcoming environment for pedestrians.

In the short-term, although existing surface streets will continue to provide access to much of the campus; portions of the new roadway system will be constructed as projects are developed, including a portion of the loop road bordering the southern portion of the site for the new Cancer Center and the Center for Advanced Medicine (CAM). As the first phases of infrastructure are developed along the alignment of Charlie Kelly Boulevard, the existing roadway will be reconstructed as a major pedestrian way, as defined by the master plan, which will ultimately link Building 500 with clinical and educational facilities.

In the long-term, most of the existing system of roads within the core of the campus will be replaced as the vehicular and pedestrian circulation network envisioned by the master plan is developed.

Pedestrian Circulation. The campus envisioned by the master plan is structured around a series of open spaces and pedestrian ways to facilitate and encourage pedestrian circulation. Pedestrian linkages between buildings may also be developed to maximize the potential of pedestrian movements and develop the 'connectivity' between the various functional parts of the campus that will support and encourage personal interaction in an interdisciplinary environment.

Fortunately, the size of the campus is conducive to a predominately pedestrian environment. It is an easy six minute walk from the center of the campus to any point on the loop road. The master plan recognizes the profound effect that the design of the pedestrian environment will have on the quality of life on the campus. As development occurs, it is important that the concession and support facilities, classrooms and meeting spaces,



parking and vertical circulation elements be organized in ways that are convenient to, and encourage, pedestrian traffic. Too, in the design of buildings, the development of architectural and landscape amenities at all levels of pedestrian activity is extremely important in the creation of a successful pedestrian environment.

In the short-term, new projects will be designed to provide convenient access for pedestrians, and to begin to establish the pedestrian linkages envisioned by the master plan. An example of this is in the development of the clinical zone, where the internal and external elements of the pedestrian circulation system are being organized to provide convenient access and movement in the first phase ambulatory care buildings, and to provide for the connection of future buildings to expand the pedestrian system to in-patient facilities, the research complex, and other campus facilities.

The long-term development of the pedestrian system will require enhancements to provide safety for pedestrians at major intersections, adequate lighting, wayfinding, access for individuals with disabilities, and landscape amenities.

Public Transportation. While the Fitzsimons Army Medical Center (FAMC) remained open, the Regional Transportation District (RTD) provided bus service to Fitzsimons with three routes. Routes 20 and 15 provided service to the interior of the FAMC, while the 15 LTD, an express route, stopped adjacent to Fitzsimons along Colfax Avenue. In the short-term, these routes will continue to provide the primary transit access to the Fitzsimons site.

In the long-term, it is anticipated that public (bus) transit will continue to play an important role in providing transportation alternatives for visitors and employees at the Fitzsimons campus. Additional routes are being considered that will provide improved access to the campus near the village center, and an on-campus circulator route may become viable as the campus population continues to grow. In addition, there are other planning efforts currently underway which are investigating other modes of public transportation which may affect Fitzsimons in the future.

Light Rail. Corridors for the potential development of future light rail transit include both I-70, and I-225. If constructed, light rail will probably include a stop near the intersection of I-70 and Peoria Street, and could include a major transit interchange near the intersection of I-225 and Colfax Avenue, which could provide a significant transit amenity for the campus if convenient transportation between Fitzsimons and the light rail stops is available.

Air-Train. Study has been made of a heavy rail connection from Downtown Denver to Denver International Airport projected to follow the Smith Road/Union Pacific corridor near I-70, approximately two miles north of the

site. Current plans do not include a stop at Peoria Street, and connections to the site by Air Train would probably require a secondary connection via shuttle bus, cab, or surface bus.

Inter-Campus Shuttle. The inter-campus shuttle system, which has been in operation only a short time, will continue to provide regular service between the two campuses. As the relative population of Fitzsimons grows, it is anticipated that more frequent service will become both necessary and viable.

### Parking

Parking facilities at the Fitzsimons site presently include both on-street parking and surface lots. Previous studies conducted by the Army Corps of Engineers documented parking for 3200 vehicles, including on-street spaces. Existing off-street parking lots have a capacity of 2,148 cars. (Approximately 3,600 parking spaces are currently available on the Ninth Avenue and Colorado Boulevard Campus.)

In the short-term, new and renovated structures will utilize the existing parking areas to the extent possible, providing new parking facilities where necessary to meet patients' needs and provide reasonable surface accommodations for faculty and staff. As facilities are developed over the next five years, the reservoir of existing parking will be diminished as roads are realigned and surface parking areas are claimed as sites for new buildings. As demands continue to increase, and land available to provide surface parking areas becomes increasingly scarce, it will be necessary to construct parking structures, and/or provide parking as an integral component of new buildings.

The long-term plan for parking facilities envisions a variety of parking facilities distributed throughout the site. Some parking will be provided near buildings to meet the needs of the handicapped and to provide close-in parking for a number of the building occupants. Surface parking areas will be provided in selected locations to provide convenient parking for patients and visitors. To conserve land for the development of new facilities and open space, structured parking will be developed on sites located at the periphery of the campus. The dispersed locations of these facilities will minimize vehicular congestion and traffic on campus roadways, while still providing convenient pedestrian access to all areas of the campus.

## **D. SUMMARY OF PLANS FOR MAJOR CONSTRUCTION PROJECTS**

### **Overview**

The approach to development at the 9<sup>th</sup> Avenue and at the Fitzsimons campus is to create and implement the type and number of projects that will meet the mission at both sites. At the current campus, there will be no new buildings constructed yet there will be significant remodels of existing space and backfill space as programs move to Fitzsimons. In addition, the infrastructure and utility systems will be maintained and upgraded to support the current activities as well as future reuse.

At Fitzsimons, new buildings will be constructed and existing buildings will be reused to support the campus. New infrastructure and utility systems will be built and existing systems upgraded in a phased fashion as the development proceeds. Below is a list and description of the major projects that will occur at both sites in the short-term and long-term. State controlled maintenance projects are also described.

### **9<sup>th</sup> Avenue Campus**

#### Major Renovation Projects

Pharmaceutical Care Learning Center – School of Pharmacy. This project calls for the creation of a pharmaceutical care learning center. This 3,000 sf facility will be located in current space in the School of Pharmacy Building at the 9<sup>th</sup> and Colorado Boulevard campus. This project creates a space that facilitates simulations of work place settings and the observation and video recording of students in these settings. The scope of work includes designing laboratory space to be combined with space for the teaching of patient assessment, patient counseling, and prescription filling through demonstration, observation, video taping, and computer assisted instruction.

This project is needed at the School of Pharmacy because of the changing workplace environment in the pharmacy and pharmaceutical industry. In the educational process of pharmacy students, it has now become essential to teach patient interfaces, including patient assessment and patient counseling. This project will provide a high-tech methodology to assist students in meeting patient needs in the 21<sup>st</sup> century.

There is no viable alternative to this project. This program must be housed in existing space with other School of Pharmacy programs to be effective.

Research Space Renovations-Phase II. Although UCHSC is making the transition of the campus at 9<sup>th</sup> Avenue and Colorado Boulevard to Fitzsimons, it is necessary to continue to remodel of facilities at the current campus. This project will renovate approximately 20,000 square feet of existing research and office space at 9<sup>th</sup> Avenue with up-to-date, state-of-the-art research space. There is an immediate need for this space and this project will remodel space for several School of Medicine Departments in the School of Medicine Building, Biomedical Research Building, the Research Bridge Building and the Administrative Office Building (formerly the Department of Health Building. Departments include Immunology, Genetics-Phase II, Pharmacology, Pediatrics, Infectious Diseases and others. The project will be phased over a two- to three-year period.

There is a deficit of modern research space at the current campus. Many research programs cannot conduct efficient research activities because their space is old, deteriorated and inappropriately configured. Many labs are not as effective as possible because they are not designed, furnished and equipped to conduct modern, high-tech research activities. In addition, several research programs require expansion space to be effective. This project will solve the research space issues for these departments until new research facilities can be completed at Fitzsimons.

There is no viable alternative to this project. The alternatives reviewed include leasing offsite space although this is not conducive or amendable to research activities and is very expensive. Additional buildings at Fitzsimons are not available currently for this type of activity.

School of Dentistry Orthodontics Program. The School of Dentistry is adding a post-doctoral orthodontics program which will include a clinic to treat children with facial deformities as part of the residency program. A 5,000 square foot area in the multi-use structure at 11<sup>th</sup> and Colorado will be renovated as clinical and office space. It will include patient-treatment areas for patient care and teaching, laboratory support for clinical and teaching activities, a consultation area and office space for faculty and residents.

Renovation. As the transition to Fitzsimons takes place, additional remodels at the 9<sup>th</sup> Avenue campus will be necessary. The vacated, or backfilled space, will require renovation of research space with some administrative and other space also needing renovation. Also there are a large number of existing and proposed infrastructure and utility projects, and these are listed in the table at the end of this section

## **Fitzsimons Campus**

### Major Renovation Projects

Building 521-Auditorium Remodel. This project will remodel the 1,000-seat theater at Fitzsimons for academic, research, patient care and community service conference and classroom needs. The Health Sciences Center currently has no large auditorium.

At the present time, the Health Sciences Center campus has no large auditorium for academic, research patient care and community service conference and classroom needs. This type of auditorium space was initially planned in the Campus Center project on the 9<sup>th</sup> Avenue campus. With the cancellation of this project, it is critical that the Health Sciences Center have this type of space. The current auditorium at Fitzsimons provides a unique opportunity to offer an activity to the Fitzsimons site as well as provide for the need mentioned above.

There are no viable alternatives to this project at the 9<sup>th</sup> and Colorado Boulevard campus and existing space is available at the Fitzsimons site.

Buildings 1 & 2 - Commander's House. The UCHSC proposes to use the Commander's House for the Chancellor's official functions at Fitzsimons. The Commander's House and the Carriage House (Buildings 1 & 2) are located near the southwest corner of the Fitzsimons site, secluded in a grove. The Commander's House incorporates sufficient space to accommodate limited food service or catering for such functions. The building has historic character and value, and the exterior will be maintained "as is." The interior will be changed minimally for special events.

The use of the 8,090 sf in the Commander's House and Carriage House will provide the Chancellor's Office with space to conduct official functions necessary to the UCHSC's public relations function. The project is a cost-effective approach to accommodate a program within an existing facility.

Buildings 400, 401, & 422 - University Hospital Expansion. University Hospital requires building space in existing Fitzsimons facilities to accommodate their rapid move to the area. UH has a need for existing space to house programs while new space is constructed. In addition, some programs may reside permanently in these buildings.

No programs have yet been identified to occupy these buildings; however, these spaces are designated for office purposes and programs, or groups of office programs that can stand alone or do not require co-location with the programs they serve or that serve them. These buildings affords the UH the opportunity to move administrative functions and stand-alone programs to the Fitzsimons site to support the UH development.

Buildings 400 and 401 each occupy 27,193 square feet and are sized appropriately for programs requiring office space to serve administrative functions. Building 422 occupies 16,443 square feet and was remodeled in the 1980's to create open office areas, smaller closed offices, and two conference-sized rooms.

Buildings 402, 406, & 407 – Air Force. The U.S. Air Force currently leases space for military personnel housing and will continue to lease through the year 2001. The three structures slated for continued occupation are Fitzsimons Buildings 402, 406, and 407. Under the lease provisions, the U.S. Air Force may perform remodels to the structures. This work must follow all UCHSC codes and standards and will require UCHSC written consent. The U.S. Air Force will also be responsible for all remodel costs and all operating costs for the buildings.

The UCHSC and UH will utilize the facilities for housing or administrative use after the lease has expired.

Buildings 410 and 508 - Inventory Storage. The U.S. Army and the UCHSC have identified and inventoried more than \$2.7 million of furniture and equipment that will be conveyed to the UCHSC at no cost. This inventory is furniture and equipment that the U.S. Army does not plan to keep and that can be utilized for appropriate UCHSC and UH program which locate to the Fitzsimons site. The U.S. Army has stored the inventoried equipment in Building 410. This building provides approximately 12,000 square feet of secured storage space. Building 508 is also needed to store the large amount of furniture and equipment.

The UCHSC requires a building to store the furniture and equipment being conveyed by the U.S. Army. The furniture and equipment is required in the lease agreement to stay on site and be used only at Fitzsimons. A storage site is required until the equipment can be moved to the receiving department.

Building requirements for the storage of the inventoried equipment include minimal heating air-conditioning to defray humidity problems and temperature related deterioration, roof and shell integrity to eliminate leaks and security systems to deter theft and vandalism.

Building 419 - Tri-County (Lease). The Tri-County Health Department's mission is to promote and protect the health and environment of Adams, Arapahoe and Douglas County residents, and it serves approximately 900,000 people in an area of about 3,000 square miles. The Department also offers the opportunity for rotation/internship experiences for the School of Nursing students. Building 419 occupies 12,984 square feet of space and is appropriately sized for the program.

Tri-County's move from the Aurora office to Fitzsimons represents a necessary relocation of approximately 60 personnel and office stock. Tri-County shares the site with the Aurora City government, which seeks to utilize the space. The Fitzsimons site provides a central location for Tri-County's clientele. The clientele generally represents the lower income strata in the southeast part of Adams and east part of Arapahoe counties. Access to the Tri-County/Fitzsimons site will be enhanced by the fact that Fitzsimons lies on the same major RTD bus line as does the current site. The move provides Tri-County with the opportunity to integrate and coordinate activities with the UCHSC and UH.

Building 421 – Facilities. The move of the Facilities Projects and Facilities Operations Departments to Fitzsimons is necessary to provide support services for the continued development of the site. Building 421 is a two-level building with 12,868 square feet and is appropriately sized for the two departments.

Facilities Projects must move its operations base to Fitzsimons in order to be on site to manage the large volume of work. The 9th Avenue and Colorado Boulevard campus will focus on renovation of existing spaces, while the work at Fitzsimons will center on both new construction and renovation of existing facilities. The department's on-site location at Fitzsimons affords its project managers the best control and management opportunities and eliminates travel time between the two campuses.

Facilities Operations must move to Fitzsimons to provide the maintenance, building operations and repairs of the facilities. It is advantageous to be on-site to manage and direct the operations. It provides the opportunity to maintain and repair without delays. It also improves the response time for emergencies.

Building 500 – Administration. Under the initial phase of renovations at Fitzsimons, the UCHSC remodeled approximately 298,000 square feet in the Administrative Building-Fitzsimons. With this initial remodel nearly complete, the UCHSC will renovate additional space in the building. In this phase, another 130,000 square feet is available for use. The space has been retained by the U.S. Army and has recently been released to the UCHSC. The remaining 20,000 square feet in the building will not be made available until the year 2001.

The programs to be included in this phase will be located in a variety of areas on the basement, first, second, third, and seventh floors of the Administrative Building-Fitzsimons. The programs include: general office/administrative space, Cancer Center Faculty and other faculty offices, Office of Laboratory Animal Research, UH Human Resources, School of Nursing Research programs, Dining Facility, and Facilities Operations.

The space will be remodeled as office and dry research space. There is no wet laboratory or clinical space anticipated at this time. The space will be remodeled to standard or generic office/administrative space to ensure flexibility in future space use when and where assignments change. In addition to office and administrative space, the UCHSC will utilize much of the basement area for Facilities Operations. Most of this space is mechanical rooms and physical plan support space. The UCHSC and UH will also use the current dining and cafeteria area.

Building 504 - University Police. The University Police requires the establishment of an autonomous security, protection, and law enforcement operation on the Fitzsimons site with the capacity to grow proportionately as the campus is developed. By July 1, 1999, the U.S. Army will no longer maintain a security presence at the Fitzsimons site. In the interim, the U.S. Army monitors the security, fire alarms, close circuit TV, radio and emergency phone systems. The operation is slated to reside in Building 504 which occupies 17,503 square feet of space. Building 504 is currently used by the Base Provost Marshall and functions similar to the space required by the University Police.

Building 514 - School of Dentistry Clinic. The School of Dentistry will utilize Fitzsimons Building 514. This facility is a 8,510 sf building which functions as a 13-chair operational dental clinic. The facilities will be utilized as a satellite location for its Advanced Clinical Training and Service (ACTS) Program, its General Practice Residency (GPR) Program in the SANDS Clinic and its Faculty Practice Clinic.

The ACTS Program allows students to provide the equivalent of one academic year of direct dental services to under served communities in Colorado and develop increased professional competence through these additional clinical experiences. At the heart of the ACTS Program is the cooperative effort among the School of Dentistry, community-based providers and under served Colorado residents.

The GPR Program offers formal 12 month and 24 month residency programs in general dentistry in the hospital setting, stressing a clinical emphasis on all aspects of general dentistry. The current facility, the SANDS Clinic, houses 13 operatories in which residents and faculty provide patient care to a varied patient population.

The Faculty Practice Clinic provides the School of Dentistry clinical space for the following functions: generating funds for the School of Dentistry programs of academic enrichment and program development; controlling clinical settings and populations to facilities clinical research; increasing clinical opportunities for pre-doctoral dental student education in advanced techniques and specialty care; developing center of excellence for specialty



clinical care; expanding hospital dentistry programs, fellowships, and specialty post-doctoral education; and providing additional dental care options to local residents.

Building 610 - Psychiatric Primate Laboratory. The Department of Psychiatry's Primate Laboratory is a satellite facility of the UCHSC Center for Laboratory Animal Care and currently occupies 3,439 square feet of space in the basement of the Colorado Psychiatric Hospital. The Primate Laboratory needs to relocate its facility in order to eliminate the problems that continually deteriorate the existing space in one of the oldest buildings on the current campus. Building 610 was constructed as an animal care facility with 6,960 square feet and features the Primate Laboratory will need for their program.

Ongoing research (noninvasive) in the Primate Laboratory focuses on behavioral development and risk factors in health. The Laboratory houses closed colonies of bonnet and pigtail macaques. The Lab cares for approximately 130 animals and has space to house singly or in pairs, another 10 animals. The facility on the current campus did include a sterile surgery suite which no longer meets the current standards.

Building 618 – AHEC. The Area Health Education Center (AHEC) system consists of a partnership among the five regional Area Health Education Center, the core AHEC office in Denver, and the UCHSC. AHEC's mission is to improve the supply and distribution of health care professionals to medically underserved regions of the state. AHEC currently manages 18 ongoing projects and is located in 6 areas on and off the current campus. Building 618 is a two-level building occupying 19,714 square feet and requires a minimum amount of changes to the walls for AHEC.

The AHEC is having difficulty in functioning effectively and efficiently because it is located in six different areas. The program has also indicated that it will double in size within seven years with the acquisition of new, centralized space. Without new space, AHEC cannot hire new personnel and this hinders its ability to implement new grant awards.

Building 633 - Grounds Storage. The grounds keeping section under Facilities Operations is charged with the maintenance of all lands associated with the buildings conveyed to the UCHSC from the U.S. Army. This function includes all mowing, trimming, watering, and botanical operations, and requires the storage of numerous items of equipment and materials, such as mowing tractors, lawn mowers, weed eaters, pallets of ice melt, snow plows, sweeper brooms, mower decks, back hoe, front end loader, grass catcher, irrigation supplies, trucks, wheelbarrows, tool and moving boxes, air blowers, filters and other power and hand tools. The Grounds section needs secure storage space for its equipment at the Fitzsimons site in order to maintain its program for the site. This eliminates

the need to transport equipment between the two campuses which saves both time and money and maximizes equipment usage. The storage space also eliminates damage due to weather exposure.

Building 633 is a multiple garage facility that occupies 2,423 square feet and will be used for a temporary storage facility for grounds keeping. The items to be stored are appropriate for this type of facility.

#### New Construction: Short-Term

Library System Access Building. The Library System Access Building will be constructed to house less frequently used books, archival materials, and other items now stored in the libraries and other facilities located currently at the University of Colorado Health Sciences Center, the University of Colorado at Denver, the University of Colorado at Boulder, and University of Denver. This facility will be 14,020 square feet on approximately 3.0 acres of contiguous land at the Fitzsimons site.

The Library System Access Building has two basic components. The primary component is the Central Storage Module and the other component is the facilities needed for support of that space, including on-site reading rooms, a processing area, space for a loading dock and storage for equipment. The Central Storage Module is extremely complex in its environmental needs and security. The space is programmed to house the maximum number of items in a minimum amount of space, but under extremely tight environmental and lighting controls that need to be designated to enhance the preservation of all materials stored in the facility.

Warehouse. A new warehouse will be constructed and owned by University Hospital. University Hospital will provide services and space to the UCHSC. The existing lease for the current warehouse expires in the fall of 2000.

Cancer and Urology Center. This project calls for the creation of a Cancer Center/Urology Program to house the clinical programs for the Cancer Center and Urology Program. This 93,000 square foot facility will be located at Fitzsimons. The Cancer Center and Urology Program will encompass a number of existing medical services now housed in inadequate spaces and disparate location across the existing UCHSC campus. The new Fitzsimons facility will provide for an expansion of space and services beyond the existing capacities to provide the foundation for growth of overall UCHSC cancer and urology programs.

The Cancer Center, which received National Cancer Institute designation in 1988, is a multi-disciplinary practice with over 20 subspecialty oncologists. Besides providing diagnostic and treatment services, the Center will offer prevention, wellness, and screening programs. The Urology Program is an

integrated multi-disciplinary, clinical program committed to patient care, education, and clinical research trials.

At this time, these programs have already experienced and continue to project increases in patient volume that warrant a large and modern facility.

Ambulatory Care Center (Center for Advance Medicine--CAM). A new Ambulatory Care Center facility will be constructed to house the ambulatory clinics. These clinics include: rehabilitation therapy and clinic, ambulatory surgery, neurodiagnostics and neurology and neurosurgery clinics, endoscopy lab, ENT and audiology, GYN, OB, prenatal diagnostics, family medicine, general surgery clinics, chronic pain clinics, dermatology clinic, seniors clinic, infectious disease clinics, rheumatology clinic, UMGP clinic, GI clinic, reproductive endocrinology, orthopaedic clinic, plastic surgery, clinical trials, dental clinics, CNM clinics, telemedicine consult clinics, and general medicine clinics.

Rocky Mountain Lion's Eye Institute. A facility will be constructed to house the Rocky Mountain Lion's Eye Institute in partnership with Rocky Mountain Eye Bank. This facility will include clinical and outpatient functions.

Research Complex 1. There is a deficit of modern research space at the current campus. Many research programs cannot conduct efficient research activities because their space is old, deteriorated and inappropriately configured. Many labs are not as effective as possible because they are not designed, furnished and equipped to conduct modern, high-tech research activities. In addition, several research programs require expansion space to be effective. UCHSC is committed to moving research space to Fitzsimons and will establish large research complexes there. This will require the construction of large buildings. This project is the first phase of the development of research space at Fitzsimons.

There is no viable alternative to this project. The alternatives reviewed include remodel of space at 9<sup>th</sup> Avenue; however, there are no large amounts of space available and construction of new space will be constructed at Fitzsimons rather than on the current campus. Lease of offsite space was reviewed; however, this is not conducive or amendable to research activities and is very expensive. There are no existing buildings at Fitzsimons that will accommodate this activity and new construction is essential.

The complex will contain approximately 600,000 gsf. It will house the basic sciences activities and those research activities related to ambulatory care services and disciplines. It will be located in the northwest quadrant of the site and cost approximately \$216 million. It will be a phased project, taking approximately five years to build.

Perinatal Research Expansion. This project will construct a 10,000 sf addition to the existing facility at Fitzsimons to consolidate the Molecular and Cellular Biology research program. Research is currently conducted at Fitzsimons and at the UCHSC campus. The expansion of the facility will allow research work to be accomplished more efficiently and coordinated in a single location.

This expansion is needed to continue the research activities of the Health Sciences Center. This program and associated project provide the unique opportunity to establish and conduct additional research activities at Fitzsimons while decreasing the deficit of research space campus-wide. It also provides the opportunity to co-locate interdisciplinary research activities.

There is no viable alternative to this research space at the 9<sup>th</sup> Avenue campus. There is no sufficient space at the current campus and the current perinatal research activity is conducted at the Fitzsimons site. The only viable alternative is to construct the space at Fitzsimons adjacent to the current research activity.

Center for Studies for Clinical Performance. This project will construct a building for the program on Studies for Clinical Performance with activities in the areas of assessment, research and learning. At the core of this program will be a dedication to producing humanistic, health care providers, using innovative methods to evaluate the essential skills needed by these individuals to serve the citizens of Colorado. The building will be approximately 17,000 square feet and will have the most modern, up-to-date research and assessment equipment. It will also contain a well-equipped learning resource center for health professionals. This program was recently awarded the Program of Excellence Award by the Colorado Commission of Higher Education.

The current and future health care delivery environment requires that professionals learn to deliver effective, high quality, and humanistic care within pluralistic communities and complex organizations. This expectation must be met immediately. UCHSC School of Medicine must evaluate their students/residents in order to decide if they learned the essential professional skills, knowledge and attitudes to succeed and serve into the next century.

The project alternatives include: (1) remodel of existing space at the current campus. This is not feasible because there is no available space at the current campus and because HSC policy is to provide construction of new buildings at Fitzsimons. (2) remodel an existing building at Fitzsimons. This is not possible because no building at Fitzsimons has the high-tech infrastructure to support this activity and because this building will be an anchor building for the new education complex at Fitzsimons.

Native American Center. This project will construct a facility with approximately 50,000 gsf at Fitzsimons. The facility will accommodate the relocation and program expansion requirements of the Division of American Indian and Alaska Native Programs, Programs for the Public Psychiatry, and the UCHSC TeleHealth/TeleEducation Program Office.

The Division of American Indian and Alaska Native Programs is a unit of the Department of Psychiatry of the School of Medicine. The Division is currently comprised of six centers, each national in scope, that cover the development life span in terms of research, training, continuing education, technical assistance, and information dissemination specific to the health of this special population. The programs include: 1) the National Center for American Indian and Alaska Native Mental Health Research; 2) the National Program Office of the Healthy Nations Initiative; 3) the Native Elder Health Care Resource Center; 4) the Circles of Care Evaluation Technical Assistance Center; 5) the Native Elder Research Center, a Resource Center for Minority Aging Research; and 6) the new Center for Native American TeleHealth and TeleEducation.

The mission of the Division is to promote the health and well-being of American Indians and Alaska Natives, of all ages, by pursuing research, training, continuing education, technical assistance, and information dissemination within a biopsychosocial framework that recognizes the unique cultural contexts of this special population.

The Program for Public Psychiatry unit is comprised of a series of public/academic collaborations in public psychiatry and psychology. The programs share the tripartite mission of: 1) enhancing Colorado's public psychiatric and psychological work-force; 2) providing education to legal, health, and mental health professionals, students, families, consumer groups, and the public about mental health issues; and 3) conducting and coordinating research in public psychiatry and psychology. The Program for Public Psychiatry unit is one of the largest and fastest-growing division-level program units of the Department of Psychiatry. Its faculty are active and widely recognized for their work at regional, national, and international levels.

The UCHSC TeleHealth/TeleEducation Program Office was developed with the primary purpose of coordinating and providing the necessary support services for the numerous campus TeleHealth and TeleEducation program activities. The primary goal for the office is to work with other state entities to develop a network to provide consultative medical services and education to the state and region. The TeleHealth/TeleEducation program will improve access to health care and education for the citizens of the State and serves as another mechanism for the UCHSC to fulfill its mission.

Infrastructure (Phase I). The move of the University of Colorado Health Sciences Center to the Fitzsimons site will require substantial infrastructure support in order to facilitate the ultimate build-out of the facilities necessary to achieve the long-term mission of the UCHSC. Most of the site utility infrastructure is 50 to 70 years old and much of the southern portion of the UCHSC property has no infrastructure. This project is the initial phase of the infrastructure development of the site and will facilitate the development of the new campus.

The first phase of the infrastructure will include the installation of a 16-inch water line along Charlie Kelly Boulevard, the installation of a section of the sanitary sewer system to support the early new buildings, the construction of an electrical duct bank along Charlie Kelly Boulevard, the construction of a utility tunnel for steam and chilled water along Charlie Kelly Boulevard, and the installation of a steam line to connect the new buildings to current heating plant steam distribution system.

This project is needed because substantial infrastructure is necessary to build out the Fitzsimons site. The infrastructure and utility systems to be constructed will provide the foundation for the current and future development of the site. It is envisioned that the new campus will have modern, up-to-date, high-tech research, education, and health care facilities and adequate utility and infrastructure systems must support these. These systems must have the capacity to serve both immediate and long-term needs.

Infrastructure (Phase II). The move of the University of Colorado Health Sciences Center to the Fitzsimons site will require substantial infrastructure support in order to facilitate the ultimate build-out of the facilities necessary to achieve the mission of the UCHSC. Most of the site utility infrastructure is 50 to 70 years old and much of the southern portion of the UCHSC property has no infrastructure. The second phase of the infrastructure will enhance the first-phase projects and include a main water line to the UCHSC site; a sanitary sewer to serve the area south of Charlie Kelly Boulevard; a utility corridor and electrical duct bank including electrical lines, steam and condensate piping and chilled water supply and return lines to serve current building and future construction; and the development of a large capacity, redundant electrical power distribution system. These systems must have the capacity to serve both immediate and long-term needs. It is also essential that the second phase of the project integrate with the first phase to ensure continuity of projects and the uninterrupted development of the site.

Projects in the second phase will include the development of a redundant electrical system, additions to the sanitary sewer system, new roadways including curb and gutter, a new central energy plant with chilled water capabilities with the eventual potential of steam generation; a natural gas

supply line and fiber optic loop system to serve information systems and communication needs. These projects will be located in a variety of areas at Fitzsimons and will be located within the 186 acres of conveyed or leased property to the UCHSC.

There are no alternatives to meet the program and facilities requirements. Because there will be a large build-out and the current infrastructure cannot support the development, these projects are necessary. Without them, the Fitzsimons development cannot occur. All projects in Phases I and II are considered essential. UCHSC will review and consider construction methodology and approaches to the projects and review alternative project delivery approaches. UCHSC will also continue to review alternatives in the phasing and scheduling of the project to avoid unnecessary time and expenses.

#### New Construction (Long-term)

Education Complex II (80,000 gsf). This educational component represents an expansion of the Center for Studies in Clinical Performance to support all schools and programs – multidisciplinary/multiprofessional. Discipline-specific simulated learning clinics and specialized learning labs are included. Computer-based learning, small group learning, and self-directed/collaborative learning environments complement the purpose of the facility, that is, clinical performance learning and assessment. Specific space to be tentatively included in this project includes microcomputer laboratories, simulated learning laboratories, specialized learning laboratories, classrooms and small group/seminar rooms.

Education Complex III ( 65,000 gsf). This educational component represents the transition of classrooms and other environments. This space will be utilized to accommodate the majority of basic and clinical science education to accommodate all educational programs. The tentative instructional space will include multi-purpose wet and dry labs, classrooms, small group/seminar space and individual study space.

Education Complex IV (65,000 gsf). This educational space will include additional classrooms, studio and media preparation space for Educational Support Services, additional small group/seminar rooms and self-directed/collaborative learning carrels to accommodate all campus programs.

Library (120,000 gsf). This facility will provide replacement and expansion space for the current Denison Memorial Library. Denison Memorial Library is the largest biomedical library in Colorado, providing information and services primarily to students, faculty, and staff of the UCHSC. The library provides print and electronic resources, education on information retrieval and management, and access to worldwide information networks. The

primary mission of the Denison Library is to assist the UCHSC in accomplishing its mission and goals in education, research, patient care and community service.

Student Center (94,000 gsf). This facility will include a campus union and recreation center. To be tentatively included in the campus union will be space for the following function: food services, bookstore and related retail, conference and meeting facilities, and student support space. The recreation center will include space for recreational and fitness programs to be made available to the entire UCHSC community. Functions may include gymnasium, aerobics, cardiovascular and weight areas, swimming, racquetball and squash courts.

Student Dental Clinic (35,000gsf). Facility will support the instructional program of the School of Dentistry. Space will include specific simulated learning clinics and specialized learning labs necessary to train dental health care professionals.

Facilities Workshops (50,000 gsf). The UCHSC will require a facility to house workshops, motor pool, and other units responsible for the maintenance of open space, infrastructure, and buildings at Fitzsimons. In addition, this facility will house printing services and other auxiliaries that require similar space for their functions.

Schools' Administration Building (160,000 gsf). Most of the instructional space will be shared among schools and located in appropriate areas across the campus. Each school, however, will require a "home base" to house administrative functions, student support functions that are unique to a school or program, and faculty offices that are not otherwise assigned in clinical or research space.

CPH Outpatient (90,000 gsf). This space is necessary to house programs in education, clinical units and research for the Department of Psychiatry, School of Medicine. This facility will primarily replace the current Colorado Psychiatric Hospital facility located at 9<sup>th</sup> Avenue.

CPH Inpatient (130,000 gsf). This facility will house the Colorado Psychiatric Hospital. This facility will replace the University North Pavilion located near 9<sup>th</sup> Avenue and Colorado Blvd.

University Hospital (700,000 gsf). University Hospital is a regional, acute care teaching hospital, which offers a full spectrum of primary, secondary, and tertiary adult services, supported by medical staff/faculty representing all major medical and surgical subspecialties. UH provides a comprehensive array of diagnostic and therapeutic services on both an inpatient and outpatient basis. This facility will be a 300-bed replacement facility.



Parking Structures. The move of the University of Colorado Health Sciences Center to Fitzsimons will require parking to support the volume of faculty, staff, patients, and visitors that will be visiting this site. As the new site is developed, the need for a parking structure will increase.

Research Complex II. This 200,000 gsf facility will house additional basic sciences research activities, as well as additional interdisciplinary research functions.

Infrastructure Phases III and IV. Several phases of infrastructure and utility development will occur in the first ten years. Projects will include more roads and access, telecommunications additions, co-generation of electricity and steam, the addition of steam boilers, electrical distribution, and additional water and sewer/storm system work.

### **Demolition**

The UCHSC will receive 217 acres of land and associated buildings and personal property at Fitzsimons by the year 2008. The initial conveyance, which will be completed no later than 2003 will include 186 acres and nearly 80 buildings. The remaining 31 acres and 30 buildings will be utilized by the FRA until the UCHSC requests them in approximately 2008. In total, the UCHSC will receive over one hundred buildings.

The approach the UCHSC and UH have determined regarding the buildings is to utilize some buildings both short and long-term and demolish the remaining.

Reuse. Several buildings will be utilized at Fitzsimons. The buildings will be utilized for a variety of activities and functions from administrative use to inventory and equipment storage. There are well over a dozen buildings to be remodeled and utilized for UCHSC and UH activities. These are specified and defined in the Program Plan for the Remodel of the Administrative Building, Phase 2 and Other Buildings and the Program Plan for the Auditorium Renovation at Fitzsimons.

These buildings were selected for reuse because their physical condition will allow for reuse at a minimal cost and because they meet the programmatic needs of several support and clinical activities at the current campus. There will be little to minimal remodel of these facilities and they will be utilized "as is" as much as possible. In the short-term and during the initial development period of 12-15 years, these buildings will be utilized. These reuse facilities are listed in the attached table. If it is determined that any of these facilities are in the way of development or new buildings, the facility will be reevaluated and demolished if needed. In the long-term, nearly all the current buildings in the UCHSC site will be replaced with new

facilities. It is envisioned that when development of the campus is complete that only 3 or four current buildings will remain. These include Building 500, the Auditorium and the former Commander's residence and associated building.

Demolition. All other buildings on the site will be demolished to establish the space for the new development including buildings, roads and access, utilities and infrastructure and open space. The approach to demolition will be to raze these structures when the sites are needed and funding is available. It is envisioned there will be a phased approach with buildings being demolished incrementally over a period of several years to make way for the new development. In the short-term and during the initial development period, many buildings will be razed and in the long-term, only 3 or 4 of the current buildings will remain. In the attached table, there is a list of the buildings to be demolished in the initial period of development. Specific buildings to be razed will be determined at a later date as the sites are required for new use.

CAPITAL AND MAJOR CONSTRUCTION PROJECTS SUMMARY

	BUILDING AREA (GSF)	PROJECT COST (1998 \$)	YEAR OCCUPIED
<b>9th &amp; COLORADO</b>			
<b>Major Renovation (Short Term)</b>			
Pharmaceutical Care Learning Center	3,000	\$400,000	2000
Research Space	20,000	\$4,192,000	2001
School Of Dentistry Orthodontics Program	5,000	\$1,283,800	2002
Research Space (Backfill)	100,000	\$4,000,000	
Administration (Backfill)	50,000	\$1,000,000	
<b>New Construction: None planned</b>			
<b>Demolition: None planned</b>			
<b>Controlled Maintenance Projects</b>			
Air Quality & Ventilation Improvements	N/A	\$2,060,000	
Power Plant & Campus Cooling System Improvements	N/A	\$7,491,000	
Power Plant Heating & Electrical System Improvements	N/A	\$2,910,000	
Colorado Psychiatric Hospital Infrastructure	N/A	\$2,468,000	
Campus Roof & Window Replacement	N/A	\$1,689,000	
Campus Elevator Upgrades	N/A	\$1,968,000	
Expansion Of Fire Detection System	N/A	\$500,000	
SOM Deionized Water System Replacement	N/A	\$799,000	
Expansion & Upgrade Of Emergency Power Distribution	N/A	\$750,000	
Replace Underground Storage Tanks	N/A	\$1,500,000	
<b>FITZSIMONS</b>			
<b>Major Renovation (Short Term)</b>			
Bldg1&2 Commander's House	8,090	\$266,047	2003
Bldg 400	27,193		2003
Bldg 401	27,193		2003
Bldg 422	16,443		2003
Bldg 402	22,632		2003
Bldg 406	19,485		2003
Bldg 407	19,509		2003
Bldg 410 Inventory Storage	13,910	\$209,353	2003
Bldg 419 Tri County (Lease)	12,984	\$538,263	2003
Bldg 421 Facilities	12,868	\$533,593	2003
Bldg 500 Administration	130,000	\$1,842,815	2003

	<b>BUILDING AREA (GSF)</b>	<b>PROJECT COST (1998 \$)</b>	<b>YEAR OCCUPIED</b>
Bldg 514 School Of Dentistry Clinic	8,510	\$358,126	
Bldg 520 To Be Determined	29,103	\$0	
Bldg 521 Auditorium	19,694	\$2,195,000	2000
Bldg 610 Psych Primate Lab	6,960	\$387,332	
Bldg 618 AHEC	19,714	\$546,686	
Bldg 633 Grounds Storage	2,423	\$83,026	
<b>New Construction (Short Term)</b>			
Archive Library	20,000	\$4,220,000	2001
Warehouse	50,000	\$5,189,000	2000
Cancer / Urology Center	95,000	\$21,600,000	2000
Ambulatory Care Center (CAM)	260,000	\$55,367,000	2001
Rocky Mountain Lion's Eye Institute	45,000	\$8,865,000	2000
Research IA	300,000	\$67,072,000	2001
Research IB	300,000	\$88,464,000	2001
Bldg 260 Perinatal Research Expansion	10,000	\$3,226,000	2000
Native American Center	45,000	\$10,400,000	2001
Center On Studies For Clinical Performance (Education I)	20,000	\$3,960,000	2001
Infrastructure (Phase I&II)	N/A	\$26,000,000	2002
<b>New Construction (Long Term)</b>			
Research II	200,000	\$58,976,000	2005
Education II Instructional	80,000	\$15,841,000	2002
Education III	65,000	\$12,871,000	2008
Education IV	65,000	\$12,871,000	2010
Student Dental Clinic	35,000	\$7,453,000	2004
Library	120,000	\$25,321,000	2009
SOM, SOP, SON, SOD	160,000	\$23,438,000	2008
CPH Outpatient	90,000	\$13,184,000	2010
CPH Inpatient	130,000	\$27,683,000	2010
Hospital	700,000	\$235,704,000	2008
Campus Center	94,000	\$16,781,000	2006
Facilities Support	50,000	\$5,189,000	2004
Infrastructure (III, IV, V, VI, VII)		\$119,000,000	
<b>Demolition)</b>			
Bldg. 400	27,193	\$190,351	
Bldg. 401	22,656	\$158,592	
Bldg. 402	22,632	\$158,424	
Bldg. 403	21,057	\$147,399	
Bldg. 404	23,728	\$166,096	
Bldg. 405	11,977	\$83,839	
Bldg. 406	19,485	\$136,395	

	<b>BUILDING AREA (GSF)</b>	<b>PROJECT COST (1998 \$)</b>	<b>YEAR OCCUPIED</b>
Bldg. 407	19,509	\$136,563	
Bldg. 408	5,438	\$38,066	
Bldg. 409	15,261	\$106,827	
Bldg. 410	13,910	\$97,370	
Bldg. 413	6,206	\$43,442	
Bldg. 416	6,008	\$42,056	
Bldg. 417	12,206	\$85,442	
Bldg. 418	9,748	\$68,236	
Bldg. 418	2,512	\$17,584	
Bldg. 419	12,984	\$90,888	
Bldg. 420	15,326	\$107,282	
Bldg. 420	780	\$5,460	
Bldg. 421	12,868	\$90,076	
Bldg. 422	3,176	\$22,232	
Bldg. 422	13,267	\$92,869	
Bldg. 502	4,310	\$30,170	
Bldg. 502	14,124	\$98,868	
Bldg. 503	12,792	\$89,544	
Bldg. 504	4,121	\$28,847	
Bldg. 504	13,382	\$93,674	
Bldg. 505	12,250	\$85,750	
Bldg. 505	5,694	\$39,858	
Bldg. 506	5,740	\$40,180	
Bldg. 507	15,901	\$111,307	
Bldg. 508	21,297	\$149,079	
Bldg. 509	15,357	\$107,499	
Bldg. 510	1,978	\$13,846	
Bldg. 511	46,988	\$328,916	
Bldg. 511	27,106	\$189,742	
Bldg. 511A	11,245	\$78,715	
Bldg. 511B	901	\$6,307	
Bldg. 513	1,539	\$10,773	
Bldg. 514	8,496	\$59,472	
Bldg. 515	22,041	\$154,287	
Bldg. 515	2,357	\$16,499	
Bldg. 516	2,889	\$20,223	
Bldg. 517	9,350	\$65,450	
Bldg. 519	971	\$6,797	
Bldg. 520	29,103	\$203,721	
Bldg. 526	8,178	\$57,246	
Bldg. 526	2,577	\$18,039	
Bldg. 527	3,829	\$26,803	
Bldg. 528	6,054	\$42,378	
Bldg. 529	19,764	\$138,348	
Bldg. 530	3,361	\$23,527	
Bldg. 531	4,835	\$33,845	
Bldg. 532	975	\$6,825	
Bldg. 533	5,080	\$35,560	
Bldg. 534	3,299	\$23,093	

	<b>BUILDING AREA (GSF)</b>	<b>PROJECT COST (1998 \$)</b>	<b>YEAR OCCUPIED</b>
Bldg. 602	9,516	\$66,612	
Bldg. 603	13,527	\$94,689	
Bldg. 603	8,379	\$58,653	
Bldg. 604	21,362	\$149,534	
Bldg. 605	24,716	\$173,012	
Bldg. 605A	2,417	\$16,919	
Bldg. 606	22,399	\$156,793	
Bldg. 607	192	\$1,344	
Bldg. 610	6,960	\$48,720	
Bldg. 611	17,842	\$124,894	
Bldg. 612	19,232	\$134,624	
Bldg. 613	19,232	\$134,624	
Bldg. 618	19,545	\$136,815	
Bldg. 619	18,098	\$126,686	
Bldg. 630	4,690	\$32,830	
Bldg. 631	4,690	\$32,830	
Bldg. 632	19,444	\$136,108	
Bldg. 633	2,423	\$16,961	
Bldg. 700	10,770	\$75,390	
Bldg. 701	7,394	\$51,758	
Bldg. 702	7,394	\$51,758	
Bldg. 703	10,770	\$75,390	
Bldg. 704	7,394	\$51,758	
Bldg. 705	3,706	\$25,942	
Bldg. 706	3,706	\$25,942	
Bldg. 707	3,706	\$25,942	
Bldg. 708	3,706	\$25,942	
Bldg. 709	3,706	\$25,942	
Bldg. 710	3,706	\$25,942	
Bldg. 711	6,489	\$45,423	
Bldg. 712	13,552	\$94,864	
Bldg. 713	6,489	\$45,423	
Bldg. 714	6,489	\$45,423	
Bldg. 715	6,489	\$45,423	
Bldg. 716	6,489	\$45,423	
Bldg. 717	10,770	\$75,390	
Bldg. 718	6,489	\$45,423	
Bldg. 719	7,005	\$49,035	
Bldg. 720	12,732	\$89,124	
Bldg. 721	11,380	\$79,660	
Bldg. 722	12,732	\$89,124	
Bldg. 723	11,380	\$79,660	
Bldg. 727	102	\$714	
Bldg. 800	12,731	\$89,117	
Bldg. 801	18,397	\$128,779	
Bldg. 802	12,731	\$89,117	
Bldg. 803	18,397	\$128,779	
Bldg. 804	8,109	\$56,763	
Bldg. 805	8,109	\$56,763	

	<b>BUILDING AREA (GSF)</b>	<b>PROJECT COST (1998 \$)</b>	<b>YEAR OCCUPIED</b>
Bldg. 810	15,409	\$107,863	
Bldg. 811	15,409	\$107,863	

## SECTION VI

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# REDEVELOPMENT PLAN FOR 9<sup>TH</sup> AVENUE AND COLORADO BLVD. CAMPUS

*“The University of Colorado as a whole and, in particular, the UCSHC, is participating in a historic and exciting endeavor that will not be repeated in our lifetime ... I encourage and welcome others to help shape a future for the UCHSC that will put us on the map as national leaders and reshape research, teaching and clinical care for the new millennium.”*

*James H. Shore, Chancellor, UCHSC, 1998*

The eventual relocation of UCHSC and UH programs to Fitzsimons creates opportunities for the University of Colorado to rededicate the education, research, and clinical facilities of the 9<sup>th</sup> Ave. campus to new and innovative uses. The University’s plans to maintain the existing facilities throughout and beyond the transition period will ensure that the urban campus can be transformed to meet new challenges to serve the State of Colorado. This commitment is embedded in the financial assumptions (i.e., costs of maintaining, renovating, and operating the 9<sup>th</sup> Ave. campus) of this master plan and has been articulated in a policy statement. On August 6, 1998, the Board approved a resolution which stated that a single master plan scenario must apply several criteria, including one that “preserves the physical integrity of the existing buildings and infrastructure at the current 9<sup>th</sup> and Colorado campus to facilitate its reuse.”

In order to establish a rational process that would include many internal and external groups in the deliberations on the long-term redevelopment of the campus, a subcommittee was established within the planning process. This group includes membership from the planning offices of each of the other three University of Colorado campuses and the President’s Office, neighborhood representatives, administrators from agencies in the City and County of Denver, faculty, staff, and a member of the Board of Regents.

In August 1998, the Board of Regents provided principles and planning guidelines to focus the planning discussions and to establish parameters for recommendations regarding the long-term use of the campus. The resolution creating this framework is attached to this section. While the Board reserves all rights to make specific decisions regarding future use or disposal of property, the resolution establishes a hierarchy of logical redevelopment options for the several different types of properties that comprise the UCHSC. For all but the “peripheral” properties, the highest



priority will be to use the land and facilities for "UCHSC programs that do not relocate to Fitzsimons."

The planning subcommittee has noted that the transition plan involves the use of almost the entire 9<sup>th</sup> Avenue campus for at least 10-12 years. Therefore, minimal changes are expected that would impact the community in the near term. Because it is difficult to make recommendations and engage in meaningful planning when the timeframe is greater than ten years, the subcommittee will identify key issues that will require ongoing communication and consultation on operational (e.g., traffic and parking), and land use or land disposal issues. These issues will be outlined in a report that will be completed in December 1998. As the transition progresses and approaches the later years, this group will become engaged in the planning for specific redevelopment options.

## SECTION VII

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### FINANCIAL PLAN

*“We have to use our resources in new ways to provide new educational opportunities, taking advantage of all the new technological advances.”*

*Regent Kelly, University of Colorado, regarding TLE, 1997*

#### BACKGROUND AND INTRODUCTION

With the closure of the Fitzsimons Army Medical Center, the UCHSC coordinated with the City of Aurora, the U.S. Army, and the federal Department of Education to prepare a redevelopment plan for the base. The redevelopment plan submitted by the UCHSC calls for a 30- to 50-year transition of the base into a state-of-the-art academic health sciences center with ties to the adjacent Biomedical Research Park being developed by the Fitzsimons Redevelopment Authority. Under this plan, the UCHSC will gain title to 217 acres of land and 71 buildings at no cost.

The next step in the planning process for the UCHSC in partnership with UH is the formulation of a comprehensive Master Plan for the current 9<sup>th</sup> and Colorado Boulevard campus and the new site for the campus at the former Fitzsimons Army Medical Center. In March 1998, in the early phase of the Master Planning process, the UCHSC and UH undertook a preliminary financial feasibility study for relocating the campus to the Fitzsimons site in a ten-year period of time. The Finance Subcommittee for the Master Planning process conducted the preliminary financial feasibility study. The preliminary study was intended to provide the UCHSC and UH constituents with a general sense of the financial feasibility of moving the campus in ten years. Although the information available to conduct the preliminary financial feasibility study was qualified as limited, and numerous concerns were raised about the assumptions used for the study, it was considered sufficiently reliable to conclude that it is financially feasible to transition to the new Fitzsimons site.

On July 1, 1998, during the next phase of the Master Planning process, the Executive Master Planning Committee approved four transition scenarios for a more complete financial study. The Master Plan Finance Subcommittee with the help of an external consulting group (Ernst & Young LLP) conducted the financial analysis. Ernst & Young LLP participated in the processing of the financial study assumptions and assisted in the documentation of the assumptions. The financial study consisted of a financial plan for each transition scenario. The transition scenarios and the related financial study were presented to the various Master Planning committees and the campus community in July 1998 and to the Board of Regents Capital Planning Committee and the University Hospital Board in August 1998.

The financial study of these four transition scenarios assisted the planning process in narrowing the transition options to a single transition scenario that will be the basis for the Master Plan. This report summarizes the financial plan for the single transition scenario.

## OVERVIEW OF METHODOLOGY

A Finance Subcommittee for the Master Planning process was appointed to analyze, critique, and provide information for the financial study of transitioning to the Fitzsimons site and reuse of the current 9<sup>th</sup> Avenue campus. The Subcommittee used projected transition cost data developed by the Master Plan Working Group and Consultants as the basis for distributing available projected resources under the transition scenario.

The Finance Subcommittee held weekly meetings to: establish methodology for developing the financial plan; make decisions about the resource variables to include in the financial plan; develop assumptions to apply the projected resources to the financial plan; and monitor the progress of the financial plan development. These meetings were “open” meetings, and other individuals, such as faculty members, interested in the deliberations attended and gave input to the Subcommittee.

The Subcommittee received assistance from Ernst & Young LLP, an external consulting firm with expertise in both higher education and hospital finance. Ernst & Young LLP was selected to participate in the development of the financial plans by providing analysis, financial modeling, information related to trends in health care and higher education, and by testing assumptions.

The single transition scenario, as well as the four transition scenarios, were formulated through the Master Planning process with input from three core teams comprised of leaders in the clinical, education and research programs of the UCHSC and UH. These teams forwarded recommendations to the Master Plan Executive Committee, which approved the various transition scenarios for financial study.

Like the methodology used for the four transition scenarios, the financial plan for the single transition scenario includes a detailed estimate of the total cost requirements. A team of external consultants engaged to participate in the Master Planning process completed the detail cost estimates. The Master Planning consulting team consisted of architects, engineers, planners, and estimators under the direction of Davis Partnership. The projected cost requirements for the transition scenario are comprehensive and include the full requirements for relocating to the new site and UH and UCHSC reuse of the current site. For example, the cost estimates include: all types of professional fees; furniture, equipment and furnishing requirements; moving and relocation costs; site preparation and construction costs; campus infrastructure costs; and controlled maintenance costs. The cost estimates include a four percent compounded inflation factor and a project contingency of five percent.

Furthermore, the consulting team calculated the cash requirements for each year of the transition period based on the length of time typically required for planning, design, construction and final occupancy of various types of space and structures.

The Finance Subcommittee spent considerable time developing estimates of one-time and incremental resources that could be available for: 1) meeting the facility requirement identified for the transition scenario; 2) maintaining the base campus programs; and 3) enhancing existing or creating new programs. In addition, the Finance Subcommittee determined guidelines to direct the allocation of projected resources in the financial plans to facility requirements identified for the transition scenario, maintaining base programs, and enhancing existing or creating new programs. The Finance Subcommittee did not identify specific requirements for program enhancements and new programs due to the infinite nature of such requirements and the limitation of time available to conduct such an analysis.

Once the requirements and resources were defined, the projected resources were allocated to the requirement estimates in order to identify the margin. The margin analysis was conducted both on an annual basis and in total for the transition scenario. In the study of the four transition scenarios, the Subcommittee reviewed the results of the margin analysis and reached conclusions regarding each transition scenario. As a result of comparing the four scenarios, the resource gaps were too significant to recommend proceeding with any of them.

The University of Colorado Board of Regents reviewed the results of the four transition scenarios and directed the UCHSC to develop a single transition scenario for the Master Plan that accommodates the following criteria:

Transition core activities to Fitzsimons in the shortest time possible (a front-load scenario) with all new buildings at Fitzsimons.

Balance realistic estimates of cost and achievable resources.

Preserves the core principles from the vision development process.

Protects and enhances program support to the maximum extent possible.

Integrates and maximizes the use of University, State, Federal, and private sector resources.

Provides realistic staging including the transitional use of the current campus.

Maximizes enterprise development options.

Minimizes program disruption or degradation from a student, patient, and services perspective.

Expedites acquisition of research space.

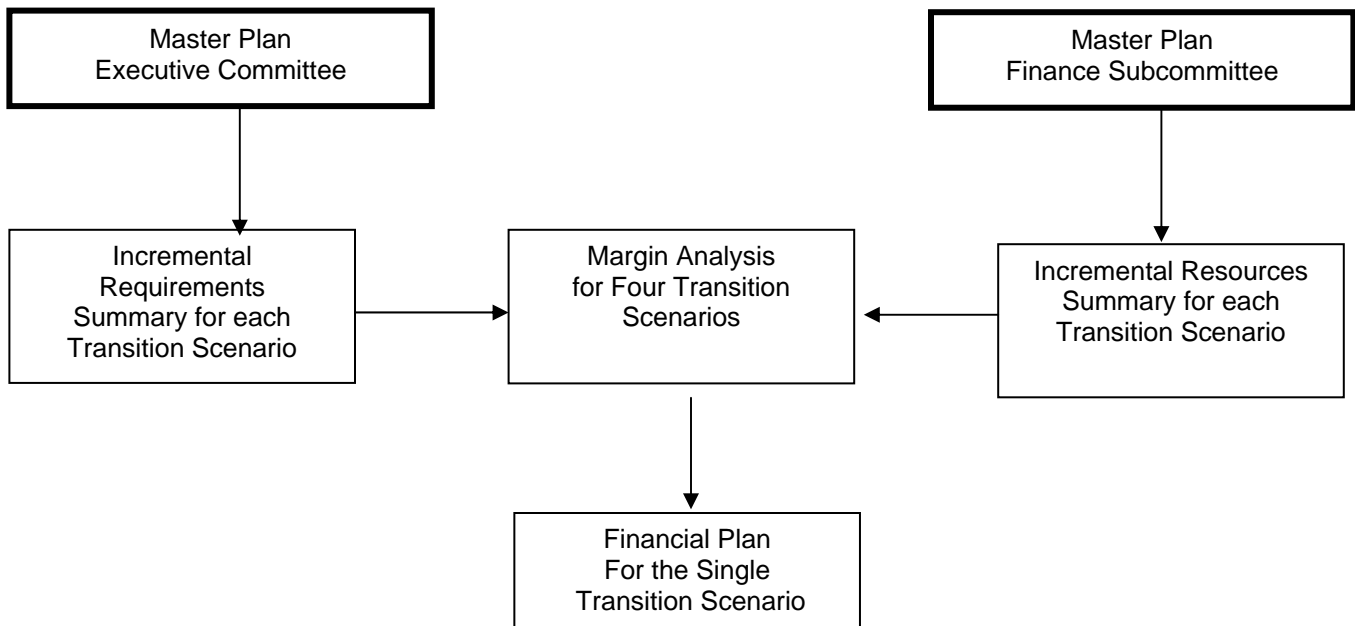
Preserves future development options for affiliates.

Preserves the physical integrity of the existing buildings and infrastructure at the current 9<sup>th</sup> and Colorado Boulevard campus to facilitate its reuse.

Based on the direction of the Board of Regents, the Executive Master Plan Committee restructured transition plan to proceed with the transition as quickly as financially feasible. This approach eliminates the gap and identifies a transition scenario that is financially viable given the current set of assumptions. This financial plan is the basis of the projections within this report.

The methodology for constructing the financial plan is characterized in the following chart:

**FINANCIAL PLAN METHODOLOGY**



### **Assumptions for Requirements**

The assumptions for estimating the financial requirements were documented extensively during the estimation process. Consultants specialized in various aspects of construction, engineering, design, planning, and development were employed to assist in the task of converting the transition plan into detailed components that drive the financial requirements. While it is not practical to list every assumption or estimation method used in the preparation of the requirement estimates, the major assumptions are listed below:

- The first year of the model is considered to be fiscal year 1997-98. This year is used as the base year to recognize the impact of projects currently underway at the UCHSC, UH, and Fitzsimons sites.
- As appropriate, UCHSC and UH programs currently located in off-campus leased space are assumed to be initially relocated to UH and UCHSC back-fill space or to the Fitzsimons site.
- In general, each building component is assumed to have a planning, design, and construction period of four years, which is comprised of one and one half years of planning/design and two and one half years of construction. Some smaller components have a shorter duration, and some larger components are estimated to have a slightly longer duration.
- Research space is assumed to be shared among all schools with a distribution of space between wet labs, dry labs, faculty offices, support staff offices, and animal space. An additional one-percent of the total research related space was added to accommodate graduate education programs.
- Instructional space is assumed to be interdisciplinary, inter-professional, and shared by all schools and includes space for faculty offices and school student support services.
- The new UH inpatient facility is planned for 300 beds.
- Total UH space is 1,100,000 gross square feet, with 40,000 gross square feet allocated to office space for faculty.
- The project includes construction of an Ambulatory Care Complex estimated at 260,000 gross square feet.
- Other clinical space includes the Cancer Center (estimated at 95,000 gross square feet), and the Eye Institute (estimated at 45,000 gross square feet).

- For the Colorado Psychiatric Hospital (CPH), clinical space includes inpatient beds, day program space, and space to co-locate the Department of Psychiatry with CPH.
- The infrastructure cost estimates include all roads, an energy plant, utility distribution systems, water, steam, storm drainage, sewer lines, landscaping, site-lighting, sidewalks, bike paths, information technology, building demolition, and other campus infrastructure costs. These costs are distributed over the transition period based on the critical mass of development at the Fitzsimons campus.
- In each scenario, new auxiliary functions and self-funded programs (i.e. hospitel, faculty club, etc.) are assumed to be constructed after the transition period, and therefore, the requirements for these facilities are not included in the cost estimates.
- All UH and UCHSC administrative functions can be accommodated within Building 500 at the Fitzsimons site.
- An annual, compounded inflation factor of four percent is built into all facility cost estimates, and a five percent contingency factor is added to all estimates.
- Construction costs are generally based on the mid-range of the cost estimation amounts except when it is known that a particular building will vary significantly from mid-range. The construction cost amounts are based on historical experience and costs of construction in the State of Colorado. Construction cost estimates include computations for both new facilities and remodeling of existing space. The firm of Hanscomb Associates, Inc. established the cost estimates.
- Equipment, furnishings, and furniture estimates take into consideration requirements for new, replacement, and reuse of existing equipment, furnishings, and furniture as well as requirements for art in public places. Estimates do not include purchasing items of new research equipment costing \$250,000 and more, such as a CT Scan or MRI, because it is assumed that these items will be purchased with direct sponsored program funding.
- Professional services cost estimates include fees for construction management, engineering, architects, designers, planners, and other professional consultants typically involved in a construction project.
- The cost estimates include controlled maintenance for both new and existing facilities as well as an estimate of the deferred maintenance costs at the current 9<sup>th</sup> and Colorado Boulevard site.

- Webb Waring and Barbara Davis are excluded from the cost estimate in order to make these entities cost-neutral for the purposes of transition planning.
- It is recognized that costs will be incurred as a result of transitioning from the 9<sup>th</sup> and Colorado Boulevard site to the Fitzsimons site. The costs can be segmented into inconvenience costs and duplicative costs. Inconvenience costs can be described as additional time required by faculty and staff commuting between service locations without the need to hire additional personnel. Duplicative costs arise when the inconvenience cost becomes so significant that additional personnel must be hired. Duplicative costs also occur when personnel are required to operate two service locations. The projection of duplicative costs for the financial plan was based on information gathered during an extensive interview process with key faculty members, department heads and administrators at both the UCHSC and UH. The faculty and support staff cost estimates were developed by CHI Systems Practice of Superior Consultant Company, Inc., and UCHSC and UH administrators developed duplicative cost estimates for their departments.
- Requirements for parking at the Fitzsimons site were estimated, but are not included in the total amount of projected financial requirements. Parking operations are self-funded. If any requirements were included for parking, equivalent resources would have to be added to the identification of resources. At this point in time, it is assumed that the UCHSC and UH will separately operate parking programs to meet their needs at the Fitzsimons location.
- In the scenario, debt outstanding for UCHSC facilities will be retired before the buildings are decommissioned. The only exception to this is the debt outstanding on the 9<sup>th</sup> and Colorado Boulevard Parking structure, which will expire in 2016. It is assumed that any new occupant of the 9<sup>th</sup> and Colorado Boulevard Parking structure will be responsible for the remaining debt at the time the new occupant assumes responsibility for the structure. As a result, the requirement estimates do not include amounts for retiring the principal of any UCHSC debt.

### **Assumptions for Resource Projections**

Assumptions for estimating the financial resources were developed for both UH and the UCHSC. The financial plan model was designed to estimate both one-time funds as well as incremental funds available annually from on-going activities. For UH, the resource projections were developed using a nationally recognized model for estimating financial activity. The Ernst & Young LLP consulting team has considerable experience with the model used by UH and provided valuable insight into national health care trends; however, UH management is responsible for the development of all assumptions used in the model. A similar model does not exist for



higher education due in part to the complexity and diverse nature of funding for academic medical centers. For the UCHSC, an extensive inventory of one-time and on-going sources of funds was created and built into a forecasting model. The following list of assumptions is not exhaustive, but does include the significant determinations of the Finance Subcommittee:

**UCHSC:**

- All categories of auxiliary and self-funded activities are included for the purpose of estimating resources. Projections of growth or decline are developed for each major category of auxiliary activity. Projections are based on a five-year historical trend, and adjustments are made for any known future expansion or contraction of the auxiliary’s activity. The resources of the parking auxiliary as it currently exists are included in the analysis, and they are not adjusted to reflect changes that may be required to provide services at Fitzsimons because Parking is excluded from the financial requirements. Parking operations for the UCHSC must be self-funded per Colorado Revised Statutes. It should be noted that both parking income and revenue bonds issued on behalf of the UCHSC parking auxiliary would impact the debt capacity of the UCHSC.
  
- The cash balances of the UCHSC are considered one-time funds for the purposes of the financial plan model. The allocation of these funds for facility requirements, maintenance of the base programs, and new and existing program enhancements varies based on “ownership” and source of the cash balance.
  
- The University Treasury gave the Subcommittee feedback on the appropriateness of the variables impacting the cost of capital for certificates of participation and various types of revenue bonds. Variables impacting the cost of capital include interest rates, issuance fees, and term of the loan. The chart on the following page documents the terms used for the financial plan projection.

**UCHSC COST OF CAPITAL VARIABLES**

Type of Borrowing	Interest Rate	Issuance Costs *	Term
Research Building Revolving Fund	6%	.5%	25 years
Revenue Bonds	6%	.5%	25 years
Certificates of Participation	6.5%	.5%	10 years
Internal Treasury Loans	6.75%	0	5 years

\*Issuance costs are estimated as a percent of the loan.

**Projections are made for funding received by the UCHSC as a result of the Total Learning Environment initiative, the President's initiatives, and other initiatives of the Chancellor to enhance investment in the UCHSC. These projections are based on historical trends and conservative projections of potential support from the President and the Board of Regents.**

- In cooperation with the CU Foundation, the Subcommittee received estimates for all types of giving. These estimates are based on historical trends, an independent market analysis conducted for the CU Foundation, capital campaign plans, and institutional benchmarks. Projections are made for fund raising by the CU Capital Campaign, the Fitzsimons Campaign, estate and planned giving, and in-kind gifts and donations. In addition, separate projections are provided for growth in true and quasi-endowments. The growth in the principal of the endowments is comprised of donations and investment earnings based on historical trends. For the purposes of the financial plans, it is assumed that no principal will be withdrawn from the quasi-endowments.
- Projections of the resources that will be available from federal appropriations were prepared by the University's federal liaison and are projected from both earmarked funding opportunities and competitive, peer-reviewed opportunities. The estimates are conservative due to the uncertainty associated with the composition of the congressional leadership and federal spending policy.
- The Unrestricted Fund was analyzed by component and separate projections are developed for student fees, indirect cost recovery, tuition, state general funds, patient revenue, and miscellaneous revenue. The significant portions of the Unrestricted Fund are state general funds and indirect cost recovery. State general funds are projected to grow at three and one-half percent per year, and indirect cost recoveries follow the projections made for sponsored program growth. Although it is acknowledged that there has not been campus-wide consensus on the appropriate use of indirect cost recovery policy funds, the committee report uses a 50% allocation of school funds and a 100% allocation of Chancellor funds designated under the policy for investment in facilities.
- Incremental school-based carry-forward projections are minimal based on the assumption that 50% of the indirect cost recovery policy funds in the future will be directed toward the construction of new research facilities.
- Incremental Central Services & Administration carry-forward funds are projected at historical levels due to increasing demands on this budget.
- The UCHSC will realize savings from the implementation of the Administrative Streamlining Project and from the phase-out of certain off-campus leases. The Administrative Streamlining Project staff prepared estimates of the savings resulting from the project; however, for the purposes of the financial plan,

these savings were reduced in recognition of the potential to gain costs in the academic units and for information technology requirements. Off-campus lease savings are based on an average of \$200,000 per year for phase-out of leases.

- Funds in the Plant Fund were analyzed to determine the availability of these one-time funds for investment in facilities and new and existing program enhancements. It was determined that campus unit funds in construction project accounts will be allocated to facility requirements at the current 9<sup>th</sup> and Colorado Boulevard campus. Plant Fund reserves for the units are considered separately from those designated for Central Services and Administration (CS&A). In both cases, these reserves are allocated to facilities requirements.
- The Agency Fund of the UCHSC is primarily used to receive funds from University Physicians, Incorporated (UPI) for payment of a portion of the compensation of the School of Medicine faculty. These funds are projected to grow at slightly less than historical trends, and 100% of them are allocated in the model to maintenance of base programs and program enhancement and new program development.
- The UPI Academic Enrichment Fund is projected to grow an average of 5% per year which is commensurate with UH clinical activity. UPI funds are allocated primarily to existing program enhancements and new programs.
- The income from the practice plans of the Schools of Nursing, Pharmacy, and Dentistry is assumed to be invested in the base program with the exception of any debt issued for space identified in the scenario for these programs.
- Income from the School of Medicine practice plan (UPI) is excluded from the financial plans except for the Academic Enrichment Fund and funds that flow to the UCHSC Agency Fund for faculty salary support. Growth in the funds is assumed to support base maintenance and new programs or program enhancements with 90% allocated to base and 10% to programs. Although the financial plans exclude the funds retained by UPI, it should be recognized that these funds are substantial and are used for both investments in the base and enhancing new and existing programs.
- The scenario calls for minimal disposition of existing property at the 9<sup>th</sup> and Colorado Boulevard site. Accordingly, only proceeds from the sale of East Pavilion and properties west of Colorado Boulevard are included in the study for the UCHSC. The proceeds are estimated based on the most reliable information available for the current market value of the property less any outstanding debt service related to the property.

- For purposes of forecasting, sponsored program activity is categorized as follows: federal on-campus research; federal off-campus research; privately funded research; and instruction, training, and service programs. Projections are made for each category and consider program growth, research inflation, and program deflation due to limitations in space. National NIH funding trends and the timing of new research space impact the Subcommittee's projections for growth. In addition, the projections for sponsored program growth are adjusted for the proportionate increase in space. Two adjustments were made to the proportionate increase in sponsored program activity attributed to new space: one adjustment discounts the growth by 20% to take into consideration decompression, and the other adjustment takes into account the time lag to fill new research space. For the purposes of projecting indirect cost recoveries, the Subcommittee took into account the projections for sponsored program activity, trends in federal reimbursement of indirect costs, and historical collection patterns for indirect costs. The projected federal on-campus indirect cost reimbursement rates are 51% for years 1 - 2, 48% for years 3 - 4, and 50% for years 5 - 20.
- The State of Colorado provides the University with funding for "controlled maintenance" projects. The UCHSC will be eligible for these funds for both the 9<sup>th</sup> and Colorado Boulevard location and the Fitzsimons campus. This resource is projected in the financial plans by reviewing historical trends and integrating information into the model regarding the current initiatives of the State Legislature. Based on history, the UCHSC appropriations for controlled maintenance are estimated at 40% of projected total controlled maintenance appropriations to the University.
- The State Legislature appropriates funds for capital construction each fiscal year. The UCHSC will be eligible to receive appropriations from this source for both the current 9<sup>th</sup> and Colorado Boulevard campus and the Fitzsimons site. Projections for this resource are based on historic trends, integration of predictions on future legislative initiatives, and requirements of the UCHSC.
- In addition to the controlled maintenance and capital construction appropriation, the UCHSC will benefit from appropriations to a special trust fund established by the State for construction of facilities at the Fitzsimons campus. The trust fund will earn interest from the State Treasury that will be reinvested in the principal of the trust. For the purposes of the financial plan, it is assumed that the State will contribute at least \$7,700,000 per year to the trust, which with interest earnings will accrue to \$100,000,000 over the initial ten-year life of the trust. It is also assumed the State will continue to contribute appropriations at a rate of \$5 million per year for the years that follow.
- Tuition is projected to grow at historical rates and is not inflated or deflated to reflect any overall increase or decrease in total student enrollment for the

UCHSC. All resources from tuition are allocated to maintenance of base programs.

- The debt capacity of the UCHSC is based on a detail-forecasting model that uses a conservative approach in order to maintain the credit rating of the University of Colorado. It is assumed that some of the units within the UCHSC have a limited ability to service debt; therefore, the model did not project debt for these units. For the UCHSC, total debt capacity is calculated using an average annual rate of growth of 7% for the campus and adjusted upward in certain years for projected growth in sponsored programs. The current debt capacity limits established by the University for the UCHSC are not exceeded in any of the debt projections. The first priority for use of debt capacity is assigned to the Research Building Revolving Fund debt, which is used to finance research space and is backed with indirect cost recoveries from sponsored programs. The following chart summarizes debt projections for the transition scenario:

UCHSC DEBT PROJECTIONS FOR THE TRANSITION SCENARIO

Debt Type	Amount
Research Building Revolving Fund	\$223,000,000
Clinical: Colorado Psychiatric Hospital	\$30,000,000
Student Fees	\$2,000,000
Total	\$255,000,000

Besides the impact of debt capacity, the amount of debt projected varies due to the timing outlined for each facility, i.e. facilities cost more in later years due to the impact of compound inflation on construction costs.

The following chart summarizes the incremental resource projections for the UCHSC for the transition scenario:

UCHSC INCREMENTAL RESOURCE PROJECTIONS

Incremental Resource	Amount
Auxiliary & Self-Funded	\$131,572,248
Carry-Forward	\$38,122,224
Cash Balances	\$74,044,651
Clinical	\$63,334,730
Chancellor Special Initiative	\$11,500,000
Donations	\$378,610,218

Federal Support	\$76,246,000
Fees	\$2,170,968
Other	\$6,512,616
Plant Fund	\$30,838,332
Agency Fund	\$59,542,262
Practice Plans	\$132,290,752
Property Income	\$7,500,000
Sponsored Programs Direct	\$339,149,624
Sponsored Program ICR	\$392,753,588
State Capital Construction	\$100,896,104
State General Fund	\$38,208,844
State Trust Fund	\$113,428,951
Tuition	\$8,405,588
University Initiatives	\$13,670,653
Miscellaneous Revenue	\$3,910,638
Total	\$2,022,708,991

**UH:**

UH identified six resources available to fund the Fitzsimons site: 1) operating income with depreciation expense added back; 2) donations; 3) proceeds from debt issuance; 4) interest income on investments; 5) income on the sale of property; and 6) short-term investments. The following assumptions are applied in order to identify the available resources for the project:

- The projections are based on the 1999 budget. Historical trends and new or expanded programs and services are considered when projecting future levels of available resources.
- By projecting future operating expense levels from budget year 1999, base maintenance of existing programs is inherently included in operating income.
- Inpatient and outpatient projections were prepared by UH management and tested against inpatient use rates and market share and outpatient capture rates in the metro Denver area. The projected market share and patient days are as follows:

Fiscal Year	Patient Days	Average Daily Census	Market Share
1996	74,210	203	7.5%
1997	71,903	197	7.3%
1998	69,111	189	7.1%
1999	70,041	192	7.2%
2004	76,310	209	7.8%
2009	81,032	222	7.7%
2014	86,714	237	7.6%
2017	88,693	243	7.5%

The average length of stay throughout the projection period is held constant at the 1999 budget level of 4.7. Total patient days are a function of the number of discharges and average length of stay.

- Outpatient utilization is based on a projected capture rate calculated as the number of UH outpatient visits divided by the population per thousand. The number of outpatient visits per discharge is estimated to grow from 22 in 1999 to 30 by 2017. The following chart summarizes these variables:

Fiscal Year	Outpatient Visits	Capture Rate	Percent Change	Outpatient Visits Per Discharge
1996	285,643	136.1	10.9%	19.0
1997	309,251	144.3	6.0%	20.3
1998	316,934	144.8	.3%	21.4
1999	329,611	147.8	2.1%	22.1
2004	420,408	172.0	16.4%	25.9
2009	492,099	183.6	6.7%	28.5
2014	543,317	185.0	0.8%	30.0
2017	576,573	185.8	0.4%	30.6

- A rate increase of 2.0 percent per year is assumed throughout the projection period.
- As a result of the increased market penetration in managed care products as well as an aging population, payer mix is shifted each year through fiscal year 2004 and then held constant throughout the remaining projection period. The following chart shows the payer mix in 1999 and 2004 based on discharges:

Payer	Budget 1999 Payer Mix	Fiscal Year 2004 Payer Mix
Medicare	21.0%	25.0%
Medicaid	23.0%	22.0%
Managed Care	20.0%	26.0%
Other	36.0%	27.0%
Total	100.0%	100.0%

Net revenue as a percent of gross charges is as follows:

Fiscal Year	Net Revenue Per Adjusted Discharge	Net Revenue as a Percent of Gross Charges
1996	\$10,626	65.7%
1997	\$9,667	63.6%
1998	\$10,669	67.8%
1999	\$10,915	67.4%
2004	\$11,642	63.7%
2009	\$12,397	61.4%
2014	\$13,266	59.5%
2017	\$13,840	58.5%

- Net revenue is reduced by \$10.9 million per year, the maximum over a phased in period, in response to the impact of the Balanced Budget Act of 1997 on Medicare reimbursement.
- In addition, net revenue is increased approximately \$8 million per year, the maximum over a phased in period, to represent additional disproportionate share funding approved by the Colorado Legislature. This funding will be used for additional marketing related to the project, medically indigent care, additional program investments, duplication costs related to the project, and the Colorado Child Health Program with approximately \$4-5 million available for other programs.
- Charity care and bad debt expense as a percent of gross charges is held constant at the budget 1999 percent of 10.1 and 2.9 respectively.
- The number of full time equivalents (FTE's) per year is based on a ratio of 60 percent variable (with utilization) and 40 percent fixed for clinical and ancillary FTE's. All administrative FTE's are assumed to be 100 percent fixed. As volume continues to rise throughout the projection period, the number of FTE's continues to rise. However, because there is a large fixed component to staffing, the number of FTE's per adjusted occupied bed continues to decrease throughout the projection period. The following chart summarizes the number



of FTE's as well as the number of FTE's per adjusted occupied bed during the projection period:

Fiscal Year	Total FTE's	FTE's Per Adjusted Occupied Bed
1996	2,044	7.0
1997	2,082	7.0
1998	2,105	7.4
1999	2,310	8.0
2004	2,435	7.4
2009	2,568	7.1
2014	2,682	6.8
2017	2,748	6.7

- The average salary per FTE is projected to increase 2.5 percent per year in the projection period based on budget 1999.
- Benefit expense is expected to remain constant at 17.6 percent of salary expense through 2017 based on budget 1999.

The following expenses are specifically identified and projected in the model. The inflation rates used to project future expense levels are derived from historical performance and industry standards. Most of these expenses have a variable component that allows the expense to increase as volume rises. Increases in volume therefore represent an increase in addition to the increase generated by the inflation factor.

- Medical and Non-Medical Supplies expense is expected to increase 2.0 percent per year, with 60 percent variable with volume changes.
- Purchased Services, which consists primarily of audit, consulting, and other non-physician professional fees, is expected to increase 2.5 percent per year, with 20 percent variable with volume.
- Indirect Education Support and Medical Education represents the money spent to support faculty initiatives through University Physicians, Inc. This expense is expected to increase 2.0 percent per year, with 10 percent variable with volume increases.
- Insurance Expense is inflated 2.5 percent per year. Insurance expense is estimated to be 100 percent fixed.

- Other Operating Expenses includes such items as utilities, maintenance, etc. and is expected to increase 2.4 percent per year. This expense is 60 percent variable with changes in volume.
- Routine capital expenditures, excluding spending related to the project, vary each year in the projection period based on budget 1999, historical spending patterns, and project costs.
- Costs associated with duplication of services between two campuses during the transition period average approximately \$600,000 per year (in 1998 dollars) for the Ambulatory Care Complex. These costs are inflated approximately 2.5 percent per year throughout the projection period.
- As a result of a fundraising initiative related to the Ambulatory Care Complex, a one time \$10 million donation is included in both fiscal year 2000 and fiscal year 2001. \$3.8 million of additional donations are included in each succeeding year when project costs are incurred. Total donations approximate \$50 million through the projection period.

Debt assumptions associated with the transition to the Fitzsimons site are as follows:

Project	Debt Proceeds	Interest Rate	Repayment Period
Ambulatory Care Complex	\$28 million	6.5%	30 years
Hospital	\$100 million	6.5%	30 years

- Investment income is estimated at 7.5 percent of the investment balance that includes cash, short-term investments, board-designated assets, and long-term investments.
- Approximately \$100 million of short-term investments is identified to fund project costs.
- Only proceeds from the sale of the following properties are included in the study for UH: Bellaire Building, Department of Health Building, and the Dikeou property. The proceeds are based on the current market value of the properties and not adjusted for projected changes in the market or inflation.

**Assumptions for Allocating Projected Resources**

UCHSC

The UCHSC one-time and incremental projected resources were allocated for: 1) meeting the facility requirement identified for each transition scenario; 2) maintaining the base campus programs; and 3) enhancing existing or creating new programs. It is

important to note that, unlike UH, many of the UCHSC resources are restricted as to their use. In addition, many resources such as existing student fees, tuition, state general fund, and sponsored program direct support, are only considered to be available for maintenance of the base. Other resources, such as the Academic Enrichment Fund, are allocated primarily for program enhancement and new program development. For those resources that are considered to be available for facility requirements, the following general principles are used to distribute the resources to the various types of facilities:

- Projected incremental indirect cost recovery resources for allocation to space requirements primarily come from 50% of the indirect cost recovery policy funds allocated to the units and 100% of the indirect cost recovery policy funds allocated to the Chancellor. For forecasting purposes, it is assumed the UCHSC would leverage these indirect cost recovery funds allocated to space requirements by borrowing for building incremental research space. Any amount of the indirect cost recovery funds allocated to space requirements that is not used for debt service is available for allocation to both research space requirements and facility operating costs for incremental research space. It should be noted that after the transition period, the indirect cost recovery policy will return to the normal distribution except for the amount required to service the debt. To illustrate using the 12-year scenario, if the indirect cost recovery policy funds are \$10 million in year 1 of the transition, 50% or \$5 million would be directed to debt service. Assuming the policy funds are \$20 million in year 12, 50% or \$10 million would be directed to debt service. After year 12, the indirect cost recovery policy funds directed to debt service would remain constant at \$10 million each year until the debt is paid.
- Any debt issued for space occupied by UCHSC clinical operations is allocated to clinical space for the CPH and the School of Dentistry.
- Any debt backed with student fees is allocated to space used for student services such as a student center.
- Any debt issued by auxiliary operations is allocated to space that will be occupied by auxiliaries. For the purposes of allocation, it is assumed that many of the auxiliaries will relocate when the facilities for student services are constructed.
- Projected State resources for controlled maintenance are allocated to controlled maintenance at both sites.
- Projected State appropriations for capital construction are allocated to facility requirements for infrastructure, education, and support space.

- Projected State Trust Fund appropriations are allocated to infrastructure, education, and support facility requirements at the Fitzsimons site.
- Projected Federal appropriations and Academic Enrichment Fund resources available for space requirements are allocated for research, educational, and infrastructure requirements.
- Any projected carry-forward and cash resources that are available for allocation are allocated first to duplication requirements and then to space requirements.
- All other projected resources that are available for space are allocated to education, research, support, UCHSC clinical, and infrastructure requirements.

The following chart summarizes the allocation of projected resources for the UCHSC:

ALLOCATION OF UCHSC PROJECTED INCREMENTAL RESOURCES

Use of Projected Incremental Resources	Amount
UCHSC Base Maintenance	\$ 684,090,132
UCHSC New Programs & Program Enhancements	\$ 385,246,990
UCHSC Projected Resources Allocated for Space Development *	\$ 813,582,008
UCHSC Projected Resources Unallocated for Space Development	\$ 139,789,861
Total	\$ 2,022,708,991

\*Space Development includes construction of facilities, remodel of facilities, infrastructure development, controlled maintenance of new and existing facilities, incremental facility operating costs, duplication costs, and Fitzsimons development costs.

UH

As of the date of this report, the UH Board of Directors is in the process of reviewing the assumptions related to projected resource levels. Because this review is pending, a complete list of assumptions for allocating projected UH resources is not included in this report. However, the following information provides a summary of the allocation methodology:

Projected UH resources are not allocated for UCHSC facility requirements, maintenance of the UCHSC base, or for creating new UCHSC programs or enhancing existing UCHSC programs.

The following chart summarizes the allocation of projected resources for UH:

ALLOCATION OF UH PROJECTED INCREMENTAL RESOURCES

Use of Projected Incremental Resources	Amount*
UH New Programs & Program Enhancements	\$111,719,987
UH Projected Resources Allocated for Space Development	\$783,052,273
UH Projected Resources Unallocated for Space Development	\$0
<b>Total</b>	<b>\$894,772,260</b>

\*The projected resources shown in the chart above are subject to change based on the UH Board of Directors review and recommendations.

**Description of Transition Scenario**

The Campus Executive Master Plan Committee will approve the final transition scenario for the relocation of the UCHSC Campus to the Fitzsimons site in late August 1998. The final transition scenario is an approach that spreads the projected cost of the initial phase of the transition over a twelve-year period. All research space is assumed to be built at the Fitzsimons site, for a total of 800,000 gross square feet of new construction in the first twelve years of the transition. Additional research space of 1,000,000 gross square feet will be built after the initial twelve years of the transition.

The scenario assumes that education space will be built in phases. In the first twelve years, 565,000 gross square feet of education space will be constructed. The second phase includes an additional 90,000 gross square feet of educational space after the initial 12 years of the transition.

The scenario also assumes that the Ambulatory Care Complex is completed by 2001 and that all inpatient hospital beds are constructed at the same time (by the end of Year 11). The scenario also incorporates the on-going maintenance of current facilities and the backfill of space based on the timing of the relocations.

Projected Financial Requirements

The following chart shows the total projected financial requirements for the transition scenario based on the assumptions detailed previously in this report:

PROJECTED FINANCIAL REQUIREMENTS FOR THE TRANSITION SCENARIO

University Hospital	\$ 737,701,372
Health Sciences Center	\$ 812,494,712
Total	\$1,550,196,084

Projected Financial Resources

Resources are generated by both UCHSC and UH. The financial model allocates the projected one-time and incremental resources to facility requirements, maintenance of base programs and enhancing existing or creating new programs. As described previously, projected resources from the UCHSC come from a variety of diverse activities. For UH, resource projections are primarily based on the success of the clinical enterprise. The following chart is a summary of projected resources for both the UH and the UCHSC:

PROJECTED FINANCIAL RESOURCES FOR THE TRANSITION SCENARIO

University Hospital	\$ 783,052,273
Health Sciences Center	\$ 953,371,869
Total	\$1,736,424,142

Margin Analysis

The purpose of preparing the financial plan is to determine the relative financial margin associated with the transition scenario. In addition, the financial model is used to estimate resources available for maintenance of programs and program enhancement or new programs. Details of the margin analysis are presented in elsewhere in this report; however, the following chart provides a high-level overview of the results.

PROJECTED MARGIN FOR THE TRANSITION SCENARIO WITH PROJECT COST CONTINGENCY AND INFLATION

University Hospital	\$ 45,350,901
Health Sciences Center	\$140,877,157
Total Projected Margin	\$186,228,058

For the Health Sciences Center, the Finance Subcommittee recommends, to the extent possible and financially feasible, that any margin accumulated in the actual

transition be used to help mitigate use of 50% of the units' and 100% of the Chancellor's indirect cost recovery policy dedicated to the "space" requirements.

Change from Four-Scenario Study

The financial study of the four transition scenarios identified gaps between the projected space requirements and projected space resources for each scenario that ranged from \$445 million to \$794 million. The following chart summarizes the margin for each scenario:

MARGIN ANALYSIS FOR THE FOUR TRANSITION SCENARIOS

Entity	12-Year Frontload	12-Year Backload	20-Year Frontload	20-Year Backload
University Hospital	\$(161,791,793)	\$(178,224,967)	\$(203,440,789)	\$(217,199,302)
Health Sciences Center	\$(429,949,538)	\$(616,087,092)	\$(241,866,131)	\$(272,466,529)
Total Gap	\$(591,741,331)	\$(794,312,059)	\$(445,306,920)	\$(489,665,831)

Based on direction provided by the University of Colorado Board of Regents, the Master Plan Executive Committee restructured the transition plan to the Fitzsimons. The primary differences between the requirements and resources projections used in the financial analysis of the four transition scenarios and the projections used in the financial plan for the single transition scenario are as follows:

- The construction and development contingency is reduced from ten percent to five percent. The reduction in the contingency is partially offset by inflating the contingency at a compound rate of four percent per year. Inflation was not applied to the contingency in the financial analysis for the four transition scenarios.
- The four scenario financial analysis included an estimate of cost savings due to the reduction of the use of space at the 9th and Colorado Boulevard campus. The single scenario financial plan assumes phase-out only for East Pavilion and the small structures located west of Colorado Boulevard.
- Research space requirements in the twelve-year timeframe are reduced from 1,800,000 gross square feet to 800,000 gross square feet, and the phasing of space development is adjusted.
- Education space requirements in the initial phase of the transition are reduced from 650,000 gross square feet to 565,000 gross square feet, which now includes 35,000 gross square feet for the Student Dental Clinic. In addition, the phasing of the educational space requirements is adjusted.

- The construction of the Alumni and Conference Center and the Communications Center is delayed until after the initial 12-year period of construction is complete.
- The infrastructure requirements are re-engineered to correspond to the re-sizing of the facilities requirements in the single transition scenario.
- The requirement for the facilities support and warehouse facility are reduced by 1,700 gross square feet, and renovation of existing space at the Fitzsimons campus is reduced by 12,172 gross square feet.
- Projected resources from sponsored programs and indirect cost recovery are adjusted to coincide with the updated research space requirements.
- The timing of draws from the State Trust Fund is adjusted to reflect the phasing of the educational space requirements in the single transition scenario.
- One hundred percent of the Chancellor's projected indirect cost recovery policy funds are dedicated to the requirements rather than the previous level of 50 percent. In addition, a Chancellor's special initiative of \$11,500,000 is added as a resource.

The results of these changes are found in the single transition scenario. For the Health Sciences Center, the changes produced a 17 percent margin as detailed in the following chart:

UCHSC DETAILED PROJECTED MARGIN FOR THE SINGLE TRANSITION SCENARIO

Type of Resource	Amount
Donations	\$ 53,100,004
Practice Plans	\$ 24,468,194
Sponsored Program Indirect Cost Recovery	\$ 62,221,663
Other	\$ 1,087,296
Total Projected Margin	\$140,877,157

The vast majority of the projected margin in the Sponsored Program Indirect Cost Recovery category is from the Chancellor's indirect cost recovery policy funds that are accumulated in the latter years of the transition period.

The summary results of the changes found in the single transition scenario for both University Hospital and the Health Sciences Center are shown in the following chart, which illustrates the projected margin differences between the single transition



scenario and one of the four transition scenarios, the 12-Year Frontload. Negative amounts indicate a gap.

UH AND UCHSC COMPARATIVE FINANCIAL PLAN PROJECTED MARGIN

Entity	Single Transition Scenario	12-Year Frontload Scenario
University Hospital	\$ 45,350,901	\$(161,791,793)
Health Sciences Center	\$140,877,157	\$(429,949,538)
Total	\$186,228,058	\$(591,741,331)

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## ACKNOWLEDGMENTS

Development of the University of Colorado Health Sciences Center and University Hospital master plan involved the work, creativity, and dedication of hundreds of faculty, students, staff, and administrators throughout the two institutions. Community representatives, local government officials, elected officials, staff and officers from other CU campuses and the President's Office participated in planning sessions for over one year. A list of these individuals appears in Appendix A.

The members of the University of Colorado Design Review Board have met in special sessions one or more times each month during the planning process, and they have provided invaluable expertise, insight, and direction.

An outstanding team of consultants provided a comprehensive scope of professional services for almost every aspect of the master plan and the planning process:

### Architecture and Planning

- Perkins & Will
- Davis Partnership P.C.
- Centerbrook
- Civitas, Inc.

### Programming

- Chi Systems Division – Superior Consultant Company, Inc.
- GPR Planners Collaborative, Inc.
- Space Diagnostics, Inc.

### Financial

- Ernst and Young

### Engineering

- Integrated Planning & Engineering
- S.A. Miro

### Traffic, Parking, Transportation

- BRW, Inc.

### Materials Handling

- LBH Consulting Group, Inc.

### Cost Estimating

- Hanscomb Associates, Inc.