NPS Form 10-900
(Rev. 8-86)

OMB No. 1024-0018

United States Department of the Interior
National Park Service

NATIONAL REGISTER OF HISTORIC PLACES
REGISTRATION FORM

1. Name of Property

historic name: Scott, Charles Smith, Memorial Observatory

other name/site number: Park College Observatory

2. Location

street & number: 8700 River Park Drive

not for publication: n/a

city/town: Parkville vicinity: n/a

state: MO county: Platte code: 165 zip code: 64152

3. Classification

Ownership of Property: Private

Category of Property: Building

Number of Resources within Property:

Contributing	Noncontributing	
1	____	buildings
____	____	sites
____	____	structures
____	____	objects
1	____	Total

Number of contributing resources previously listed in the National Register: n/a

Name of related multiple property listing: n/a

4. State/Federal Agency Certification

As the designated authority under the National Historic Preservation Act of 1986, as amended, I hereby certify that this _x_ nomination ____ request for determination of eligibility meets the documentation standards for registering properties in the National Register of Historic Places and meets the procedural and professional requirements set forth in 36 CFR Part 60. In my opinion, the property _X_ meets ____ does not meet the National Register Criteria.
___ See continuation sheet.

Signature of certifying official G. Tracy Mehan, III, Director — Date 4/11/92

Department of Natural Resources and State Historic Preservation Officer
State or Federal agency and bureau

In my opinion, the property ____ meets ____ does not meet the National Register criteria.
___ See continuation sheet.

Signature of commenting or other official — Date

State or Federal agency and bureau

5. National Park Service Certification

I, hereby certify that this property is:

____ entered in the National Register ____ ____
___ See continuation sheet.
____ determined eligible for the National Register ____ ____
___ See continuation sheet.
____ determined not eligible for the National Register ____ ____
____ removed from the National Register ____ ____

____ other (explain): ____

____ ____ ____
Signature of Keeper — Date of Action

6. Function or Use

Historic: EDUCATION — Sub: research facility

Current : "Work in Progress" — Sub:

7. Description

Architectural Classification:

NO STYLE

Other Description: Modified T Plan Observatory

Materials: foundation Limestone roof Copper
walls Limestone other Wood

Describe present and historic physical appearance. _X_ **See continuation sheet.**

8. Statement of Significance

Certifying official has considered the significance of this property in relation to other properties: Statewide.

Applicable National Register Criteria: A,C,.

Criteria Considerations (Exceptions) : n/a

Areas of Significance: Architecture
Education
Science

Period(s) of Significance: 1896-1941

Significant Dates: 1896

Significant Person(s): n/a

Cultural Affiliation: n/a

Architect/Builder: Mattoon, A.M./Breen, Charles Patrick

State significance of property, and justify criteria, criteria considerations, and areas and periods of significance noted above.
_X_ **See continuation sheet.**

9. Major Bibliographical References

_X_ See continuation sheet.

Previous documentation on file (NPS):

_ preliminary determination of individual listing (36 CFR 67) has been requested.
_ previously listed in the National Register
_ previously determined eligible by the National Register
_ designated a National Historic Landmark
_ recorded by Historic American Buildings Survey # _____
_ recorded by Historic American Engineering Record # _____

Primary Location of Additional Data:

_ State historic preservation office
_ Other state agency
_ Federal agency
_ Local government
_ University
_ Other -- Specify Repository: Fishburn Archives, Park College Campus

10. Geographical Data

Acreage of Property: 4.13

UTM References:

	Zone	Easting	Northing		Zone	Easting	Northing
A	15	354970	4338985	B	__	_____	_____
C	__	_____	_____	D	__	_____	_____

_x_ See continuation sheet.

Verbal Boundary Description: _x_ See continuation sheet.

Boundary Justification: _x_ See continuation sheet.

11. Form Prepared By

Name/Title: Sarah F. Schwenk, Historic Preservation Consultant

Organization: _____ Date: 12/20/91

Street & Number: 720 Procter Place Telephone: 816-254-3955

City or Town: Independence State: MO ZIP: 64052

SUMMARY PARAGRAPH

The Charles Smith Scott Memorial Observatory is a variation of the T plan observatory building style[1] designed as a teaching facility. In its present condition, the building's historical integrity is intact due to its location, setting, design and workmanship which convey feelings of and associations with its time period and areas of significance. Located on a hill at the highest point on the Park College campus in Parkville, Missouri approximately 158 feet above the railroad line on the Missouri River,[2] the main two story domed tower is octagonal in shape with an adjoining one story 13 x 13 foot transit telescope[3] ell/room with a barrel roof. Both are constructed of pitched face, random ashlar limestone, "pointed close" quarried and dressed on the college campus.[4] Above the transit room is a wood frame stairwell enclosure with horizontal lap siding. The octagonal observation tower which houses the equatorial room is 15 feet 8 inches in diameter and rises to a height of 29 feet 4 inches.[5] It is capped by a hand-tooled limestone plate, which carries the dome track, and copper ogee guttering which unites with the limestone plate to form a cornice.[6] The exterior diameter of the wood framed, copper sheathed dome is 15 feet 6 inches and its base begins at 5 feet 4 inches above the second floor equatorial room floor. The operable, sliding viewing slot has a clear opening of 2 feet 6 inches. The original three foot wide wrought-iron exterior balcony runs the outer circumference of the building at the second story floor level. It features a wrought iron lattice balustrade and is supported by decorative iron brackets which are bolted through the masonry wall.[7] The transit room has a vaulted copper sheathed roof with two hinged shuttered roof viewing ports operated by weights and pulleys which extend across the width of the roof and are situated directly above two shuttered side viewing ports.

---

[1]Butowsky, p. 179; Donnally, p. 95.

[2]See Appendix 1; Map Park College Campus, Park College Catalogue 1903-1904

[3]An instrument for timing the exact instant a star or other objects cross the local meridian.

[4]"Specifications for observatory" (n.d. circa 1895); Ramsey, p. 37; Park College Record, March, 1899, p. 1.

[5]Dickenson.

[6]An equatorial room is a room designed specifically to house a mounted equatorial telescope in which one axis is parallel to the earth's axis, so that a motion of the telescope about the axis can compensate for the earth's rotation. Track system purchased from Riverside Iron Works per invoice 2 November 1896, H. B. McAfee File.

[7]"Specifications;" McAfee File: Bid Letters from James Smith, The Riverside Iron Works to H. B. McAfee. 7 August 1895, 7 October 1895; Invoice 24 September 1896.

Design Elements

The configuration of the tower and transit room, enclosed framed stairwell, and window and door openings creates 18 bays. There are eight windows in the building. The two ground floor windows in the tower feature segmented stone arches, as does the entry door; the three second floor tower windows and two windows located at the rear of the transit wing feature straight lintels of segmented limestone. All other surrounds are plain stone, lug sill type. With the exception of the upper story tower windows which were replaced with angled wood louvers, the windows are the original double hung sashes with "four lights...two over two..."[8] The observatory has one, main entry transom door with an ashlar and concrete stoop (added sometime between 1900 and 1915) and one, second floor door opening from the enclosed stairway onto the exterior balcony. The south facade bay adjacent to the front entrance features a rectangular stone noting the builder and date of building construction carved in smooth limestone with a sculptured molding frame of carved limestone.

Arrangement of Interior Spaces

The octagonal tower features a first floor entrance hall below the equatorial telescope room. The entrance hall is centered around a massive plastered limestone column built in 1899[9] to support the 8-inch refractor telescope mounted in the equatorial room. To assure maximum stability for the telescope, the pier extends down to bedrock and is not attached to the original building in any way. A wooden semi-circular enclosed stairway on the north wall connects the ground floor entry hall and the second floor equatorial room. Opposite the main entrance (and behind the pillar) is the interior door leading to the ground floor transit room wing in which is centered a 3 foot 6 inch x 2 foot pier for mounting the transit telescope.[10] The second floor tower equatorial room centers around an equatorial telescope mount (27 x 36 inch base) attached to the central pier. Stairway access is located in the frame stairwell enclosure with a landing access door to the outside balcony.

Structural System

Load bearing walls are of limestone. Original specifications required two iron beams placed in the masonry wall just under the second floor of the tower to support a large telescope.[11] Later drawings (n.d.) do not indicate their presence, nor do visual examinations. Specifications and drawings do indicate two by ten inch pine floor joists with 16 inch centers. As noted above, a limestone pillar was later added to support the large telescope and is an indication that this method of structural support was implemented after

---

[8]"Specifications;" Observatory Photo File.

[9]Anthony Dey Letters: Mary L. Dey to H.M. McAfee, 16 March 1899; Record. March, 1899, p. 1.

[10]See Appendix 3, Floor Plan; Appendix 4, Historical Interior Photographs.

[11]"Specifications."

the drafting of the specifications.[12] The dome is constructed of a base of lumber cut on the circle of the dome and spiked together; dome rafters of two pieces of one inch lumber dressed and framed together and covered on the topside with yellow pine ceiling and a sheathing on the top of the ceiling of pine boards covered with copper.[13]

Alterations or Changes

Little significant or irreversible alteration has occurred. Three window sashes on the second floor of the tower were replaced with louvers in the 1960s. The exterior doors have been replaced and the transom of the main entrance door covered. (n.d.) The side viewing ports of the transit room were nailed shut in the 1980s to deter vandalism. Iron security bars were installed in January 1990. The most significant alteration which cannot be dated at this time was the lowering of the first floor ceiling and enclosure of space to create a room on the southwest portion of the tower sometime after 1905.[14] Exterior materials visible from the downstairs reception hall are wood framing and plywood. The interior of the dome is covered between the ribs with particle board. Visual examination shows the original wooden structural elements under the composition board are intact. The stone walls are plastered and feature the original beaded "car siding" wainscotting. All interior woodwork is painted; the original specifications and photographs show the woodwork to be of natural finish.[15]

Historical Integrity of Building

There is presently some leakage from the dome roof and upper masonry walls. Daylight can be seen where the dome meets the track. In order to realign the track and make it operable, tuck pointing and realigning stones is necessary on the top course of limestone to counteract settling due to shifting caused by joint strength deterioration. Areas over the second floor tower windows are the most damaged. Limestone has been removed and layers of wooden shims installed to level the track. With the exception of these areas and alterations noted above, all original structural elements are intact. Interior wainscotting and plaster are deteriorating due to moisture. Repairs needed to correct weaknesses in stair treads/supports and flooring is minimal. Permanent fixtures/equipment have been impacted by vandalism. Of the original equipment, only the viewing chair, sidereal clock and equatorial telescope, (lens and other attachments missing) remain in the college's possession.

---

[12]Stillwell Letters. Letter from J.S. Stillwell to H. B. McAfee, 10 July 1895, give some idea as to the date of the "Specifications" and planning chronology. The letter shows the donor's receipt of specifications indicating the balcony to be of wood. The non-dated written "Specifications for Observatory" also indicate a wooden balcony. Several modifications to those "specifications," including an iron balcony were apparently made before construction began in 1896, leading to dating the "Specifications" at 1895.

[13]"Specifications." Note: The copper sheathing is another departure from the specifications of "...the best old style tin...painted with two coats of the best roof paint."

[14]Photo Documentation, c. 1905. Observatory Photo File. See appendix 4.

[15]"Specifications;" See Appendix 4.

Setting

The original elements of the setting have remained undisturbed with the exception of the installation in the 1960s of a railroad tie stairway path leading from the southwest portion of the lower road. Because of the observatory's continued intermittent use throughout the 20th century, development that would impact clarity of observations was avoided. (ie. radiant heat, smoke, etc.) As a result, the open space of the historic setting is intact. Natural features and plant materials remain undisturbed. There is little evidence of erosion. The original vehicular path to the site has been regraded and covered with native rock to allow access for stabilization and restoration. A security gate has been installed out the building's view.[16]

[16]See Appendices 1 and 2.

SUMMARY PARAGRAPH

The Charles Smith Scott Memorial Observatory, located on the Park College Campus in Parkville, Platte County, Missouri, is significant under Criterion A in the areas of EDUCATION and SCIENCE and Criterion C in the area of ARCHITECTURE. In the area of architecture, it is significant in its siting, design and method of construction as a rare surviving example in the region and the state of the adaptation of observatory design for an institutional setting. The choice of materials and utilitarian decorative treatment is representative of common approaches to observatory design in the era. The observatory also reflects the evolution of architectural concerns and engineering requirements in observatory planning which culminated in the late nineteenth century as a result of the construction of ever larger telescopes. The masonry work reflects the craftsmanship of a master mason in its dressing and jointing and is representative of the work of the contractor noted for his work at Park College and in the region.[1] The site was selected for its astronomical advantages to the campus proper and its design and plan were dictated by its use as a teaching facility which housed equipment specific to the educational program.[2] In the area of education, the property is significant as a tangible example of the nineteenth century reform movement in the United States to incorporate the sciences and instruction by the scientific method into the college curriculum, as well as the reconciliation of science and religion in liberal sectarian institutions. One of only three "regular permanent observatories[3] erected in the state in the nineteenth century, the observatory serves as a unique example in the state of Missouri of the study of astronomy utilizing a free standing facility specifically designed and equipped for academic instruction. In the area of science, the property is significant as a "state of the art" facility designed in consultation with leading national authorities in astronomy to house the latest equipment necessary for instruction in astronomy. The sophistication of the instrumentation and design was demonstrated in 1898 when the two year old observatory was selected by Harvard University to participate in a national program of meteor observation. Its period of significance, 1896-1941, reflects the building's continuous use as a teaching facility as part of the college's prescribed curriculum.[4]

---

[1]Donnally, p. 61; Paxton, p. 174.

[2]Arthur M. Mattoon Letters.

[3]Melham, p. 4. Note: Melham's definition distinguishes between buildings adapted to house equipment and buildings which "...should have piers for the mounting of instruments, roof shutters or a revolving dome so that observations can be made from inside the building, and the construction of the building should be such that it lasts a considerable number of years." Sterns, p. 152, and compilation by consultant of Sterns' listing of 19th and early 20th century free-standing educational astronomical observatories.

[4]Although a Kansas City Star article dated 12 January 1969, indicates the observatory was used intermittently after 1928, an examination of the annual catalogues for 1896-1955 verifies continuous use for astronomy course work through the mid-1950s. During World War II the facility was used as part of the Navy V-12 program course work in navigation and nautical astronomy [Letter: Wesley R. Tilden to Carolyn McHenry, 6 February 1991] and is listed

HISTORICAL CONTEXT

The Charles Smith Scott Astronomical Observatory serves as a physical example and representative resource which reflects certain themes in the history of the state and the region and is significant because of its unique relationship and impact on the historical development of the region. The property's significance must be understood in the context of certain national historic events and trends. Among these contexts the most significant are: the evolution of observatory building styles/plans and culmination of a distinctive designs due to technological changes in the late 19th century and the evolution of the incorporation of science and scientific method into education, in particular sectarian institutions, in the latter half of the 19th century.

Architectural Design of Astronomical Observatories

Astronomical observatories built in the late 19th and early 20th centuries owe their form to an evolutionary process which began in the 17th century. At this time the size of the newly developed reflecting telescope[5] dictated a need for a room from which observations could be made in all directions without having to transport instruments from one part of an observation area to another. As a result, the free standing tower observatory that housed instruments but also served as an instrument itself appeared.

In the early 18th century, the use of the octagon tower and dome became an important part of observatory design. By the latter part of the century, the concern for stability of buildings and instruments became an engineering and architectural element in determining design.[6] Designs also began to reflect efforts to insulate against overheating and resulting interior condensation using insulation and/or placing heated buildings (lodgings, laboratories, libraries and classrooms) away from the observatory proper to remove distortions due to heat waves and smoke.[7] The emergence, in the early 19th century, of the large single rotunda for the primary telescope demonstrated that, in the design of observatories, "form followed function." The great turning rotunda which could present a vertical opening in front of each mounted instrument in the direction of the star to the observer became standard.

Throughout the 19th century advances in the making of lenses and mirrors placed the telescope in the dominant role among astronomical instruments. The design of observatories centered primarily upon housing for telescopes, a

---

by Sterns as in use in 1947. Building maintenance records in 1969 indicate the facility is not in use and in need of repairs. In 1972 the equatorial telescope was returned to working condition and the college physics department in 1974 offered some courses for students and amateur astronomers. During the Apollo Soyuz space mission, the college participated in concurrent observations with American astronauts of selected variable stars.

[5]A telescope in which the main optical component is a concave mirror.

[6]Donnally, pp. 51-52.

[7]Ibid. pp. 57-59.

focus of attention that had a variety of stylistic consequences. The symmetrical arrangement of a central dome and tower for the largest telescope flanked by wings containing other smaller instruments with specific functions became one of the most frequently used plans. One variation, the "Berlin Plan" of the observatory at the University of Leipzig (c. 1861) featured a principal dome at the end of the building rather than the center.[8] Some teaching observatories, including the University of Illinois (c. 1895) and Park College (1896), frequently adopted this plan.[9] The design of the Hopkins observatory at Hudson, Ohio in 1834 set the standard for simple styles, effectively reducing institutional observatory planning to the simplest of forms and treatments.[10] Ornamentation and design motifs were simple and classical. The gothic, Egyptian and other manifestations of the romantic, eclectic periods were generally avoided. By the 1850s broad simple surfaces of dressed stone or masonry sheathed in brick with domes and central piers were the most dramatic features of teaching observatories.[11]

Several developments in instruments took place in the third quarter of the 19th century which changed the nature of astronomical investigations from merely recording positions of the stars. At the same time, the largest telescopes reached their greatest size. The establishment of the firm of Warner and Swasey in 1881 assured the convenient availability of accurate mountings for optical parts in the United States. As a result, architectural design in observatory planning combined with the engineering requirements dictated by the size and type of the principal telescope to determine the character of the entire observatory institution.[12] As early as 1880 construction of the larger refractor telescopes[13] coincided with the appearance of observatories having specialized buildings for specialized equipment situated on elevated sites with the principle dome building as the dominant, imposing design element.[14]

Architectural Design and Construction of the Charles Smith Scott Observatory

The design of the Charles Smith Scott Observatory reflects this evolution in observatory building styles and property types. The two-story octagon tower with a rotating dome housing the principal telescope supported by a central pier and situated at the end of the building with a square, one story building ell containing other instruments is representative, albeit a simple, functional one, of observatory design of the late 19th century. The incorporation of design elements such as a central front entrance and

---

[8]Ibid. p. 95.

[9]Butowsky, p. 179.

[10]Donnally, pp. 61, 74.

[11]Ibid. p.84; Butowsky, pp. 38-39.

[12]Donnally, p. 95; Butowsky, pp 23-25, 41.

[13]A telescope in which the principal optical component is a lens or system of lenses.

[14]Donnally, pp.108-109.

reception area under a second story equatorial room, and auxiliary teaching/research facilities located in other buildings situated below grade is distinctive of the period.[15] The use of cut and dressed masonry reflected engineering efforts to minimize movement and vibration, and was typical of building materials and design treatments for observatories of the era. The planning, from a site chosen for its astronomical advantages on the highest elevation of the campus proper, to the choice of equipment purchased specifically for the educational program and a design which reflected preselected equipment resulted in a facility designed as a state of the art teaching observatory.[16]

The driving force behind the building plan and selection of equipment was mathematics and astronomy professor Arthur M. Mattoon who taught at Park College from 1892 to 1912.[17] In 1894 the college received from the estate of Charles Smith Scott a 4 1/2-inch telescope. Sometime before 1896, Scott's nephew and executor of his estate, Anthony Dey, visited the campus and expressed a desire to build an observatory and furnish all the equipment needed. Arrangements for "...the construction of a building of sufficient size to accommodate all the apparatus adapted to a high grade of astronomical study..." began.[18] Dey and the business manager of Park College, Howard B. McAfee, joined Mattoon in the active research and planning of the facility.

From the beginning of the venture the parties committed themselves to developing the best design and equipment appropriate to the college's current and future needs. McAfee visited the new observatory at the University of Ohio. In a letter written after that visit, Dey concurs with McAfee's intent of "adopting the latest and best improvements in constructing this building..."[19] During the same period, Professor Mattoon corresponded with the leading astronomers of the period and made numerous trips around the nation to inspect other observatories, their equipment and teaching programs. Among those visited on the extended tour were Professors Hale, Barnard, Burham at the University of Chicago; Hough at Northwestern University; Lord at Ohio

---

[15]Donnally, pp. 18, 84-95; Butowsky, pp. 4, 39, 25, 144-145, 170-171, 176,179, 330

[16]See Appendix 5. for listing of equipment purchases by U.S. colleges.

[17]Mattoon Letters: Letter of resignation to Trustees of Park College from A. M. Mattoon. 12 April 1912. Park College Alumiad Vol. 39. p. 1.

[18]Park College Record, September, 1894; Park College Stylus, November 1895; Dickenson.

[19]Stillwell Letters. J.W. Stillwell to H. B. McAfee, 30 July 1895; Dey Letters: Anthony Dey to H.B. McAfee, 15 January 1896. It is interesting to note in this correspondence that the effort to build the "latest" even extended to such recent innovations as a canvas cover for the dome. Dey writes, "The canvas covered dome is a novel idea to me but I have just been talking with a friend who has had considerable experience in the use of canvas, and he thinks that if care is taken to procure the best quality of cloth and put it on the way you mention that it will serve as good a purpose instead of painting tin for preserving." An early photograph taken just after completion of the building shows a canvas covering on the dome.

State University; Keeler at Allegheny Observatory; Harkness and Hill at Washington Observatory; Dolittle at the University of Pennsylvania; Gurley at Marietta Observatory and Swasey of Warner & Swasey Observatory.[20]

As a result of Mattoon's recommendations based on these consultations, Dey agreed to furnish "...at this time" a combined transit and zenith 3-inch telescope, a Reiffler sidereal clock, a chronograph and "some few books of reference." The Park College Stylus reported in the fall of 1896 that with the exception of the clock, the instruments "...are now being made by messrs. Warner & Swasey of Cleveland Ohio with the optical parts by Brashear of Allegheny, Penns..." The article notes that the firm of Warner & Swasey made the mountings for the Lick and Yerkes telescopes. The clock, ordered from the Reiffler Company of Munich, was popular with leading U. S. astronomers Mattoon consulted who had viewed the clock at the Columbian Exposition in 1893.[21]

The construction of the observatory came under the active supervision of stone mason, Charles Patrick Breen. Born in Weston, Missouri in 1857, Breen began his apprenticeship at the age of 14 under his father, an Irish immigrant. In 1886, upon receiving employment at the nearby Quindaro Waterworks, C.P. Breen moved to Parkville. That same year, H. B. McAfee recruited him to oversee the construction of the McCormick Chapel and then Mackay Hall.[22] Breen remained in charge of building construction for the next 25 years, directing the construction of 13 major buildings and numerous auxiliary structures. He also built the waterworks and sewer system of Parkville. The majority of the buildings on the campus were built of native limestone quarried and dressed on site under Breen's supervision. The quality and quantity of Breen's work dominates the architecture of the campus today. The imprint of his work is easily identifiable throughout the town of Parkville.[23]

By December of 1896 construction of the observatory reached the stage for installing the new equipment, but the equipment did not reach Park College until July 1897. During this time college officials finalized arrangements for Dey to provide a large 8-inch refractor telescope with full equipment. This required the construction of the central pier and other modifications which Breen completed in March 1899 in time for the arrival of the refractor. In December of that year, Mattoon supervised arrangements to bring electricity to the observatory.[24]

---

[20]Mattoon Letters. E.E. Barnard to A. M. Mattoon, 1 May 1896; Park College Record. August, 1896, p. 16.

[21]Dickenson.

[22]Currently listed on the National Register of Historic Places.

[23]Breen File: Letter from Emmett Breen to Mr. Sanders. n.d.; Paxton, p. 174; Aker, p. 8; "Platte County, A Special Edition of the Weston Chronicle."

[24]Dey Letters: Dey/Byers correspondence, December 1896-July 1897; Mary L. Dey to H.M. McAfee, 16 March 1899; Record. No. 13, 1899; McAfee File: Mattoon to McAfee, 21 December 1899.

The degree of sophistication and quality of the observatory and its equipment is evident when compared to other facilities in the United States.[25] The efforts of George Ellery Hale, designer of the Yerkes Observatory at the University of Chicago, to seek in 1897 a transit telescope similar to the one at Park College[26] and the appointment by Harvard Observatory of the Scott Observatory to serve as an auxiliary in observing the November, 1898 meteors serve as additional confirmation of the status of the observatory.[27] The management of the astronomy program was of evident merit. Professor Mattoon's work at Park College resulted in his election to three of the leading astronomical societies in the United States including the Astronomical Society of the Pacific at Lick Observatory. In 1903, he took a sabbatical to study in England under famed astronomers Sir Robert Ball and Professor Arthur Hinks at Cambridge University. At this time he also met with the leading astronomers in Europe including Schiaparelli who claimed to discovered the "canals" on Mars.[28]

Other Missouri Observatories

The Smith Observatory was the last of three such facilities built in Missouri in the 19th century. The earliest record of the observatory at St. Louis University mentions the "new building" on the campus in 1854. This three story, rectangular structure featured two tower projections with rotating domes flanked by a glass skylight for daguerreotype photography. One tower housed a telescope with a 9-foot focal distance imported from France. The other housed an equatorial telescope. In 1888 the college moved to a mid-town campus and no reference to the old observatory or a new one is made in subsequent college publications.[29] In its design the St. Louis observatory reflected the standard plans of the late 18th and early 19th century before the size of the principal telescope and its housing became the dominant feature of observatory design. The equipment, likewise, did not reflect the technological advances of the latter part of the century.

The Morrison Astronomical Observatory built in 1875 at the Pritchett Institute in Glasgow, Missouri did reflect changes in 19th century technology. Designed specifically for a 12 1/4-inch refractor telescope with a focal length of 17 feet made by Alvan Clark and Sons, the observatory featured one central hemispherical dome. Other equipment included a 6-inch Meridian Circle imported from London. Unlike Park college, the Morrison Observatory was not designed or equipped specifically for teaching. Although it featured a single dome structure to house the primary telescope, the design was

---

[25] See Appendix 5. Warner & Swasey Equipment List.

[26] Mildred Shapley Matthews to Lafe Williams, 15 August 1968, 24 August 1968, in regard to research project on annotating the letters of George Ellery Hale.

[27] Dickenson; Mattoon Letters: Pickering to Mattoon, 7 July 1898, 23 December 1898. Mattoon Papers: Mattoon to Pickering, 14 November 1898.

[28] Park College Alumiad. Vol. 39. No. 1.

[29] The Catalogue of the Officers and Students of the St. Louis University, Missouri. 1854-55. Interview, 16 December 1991 with Randy McGuire, Archivist St. Louis University.

somewhat dated. Dr. Prichett modelled his plan after the observatory at Harvard University where he studied in the 1850s. The size of the telescope exceeded what was then considered adequate for teaching college level course in astronomy[30] and was more suitable for an active research and observation program in conjunction with other observatories. While students used the facility as part of their course work, its primary use was, indeed, an active research program conducted by Dr. Pritchett and his two sons. In addition to research, the observatory provided a time service to Kansas City, St. Louis and the Chicago and Alton Railroad in the early 1880s. Soon after Pritchett's resignation in 1905, the observatory ceased to be used.[31]

Three facilities were built in the state in the early decades of the 20th century. Washington University erected an observatory in 1905. It is no longer standing. In 1950, the equipment from this observatory was moved to another building (c. 1934) which had no specific design elements for an observatory. The University of Missouri at Columbia established Laws Observatory in 1902. The facility is no longer standing. The Locksley Observatory, (c. 1916) at Loretto College in Webster Groves was a simple observation booth housing a 12-inch reflecting telescope.[32]

The Role of Science in the 19th Century College Curriculum

During the 19th century, the tremendous expansion of knowledge, a growing and mobile public, a shift of population to urban areas and the proportionately high percentage of young adults stimulated tremendous growth in the number of private and public colleges in the United States. The development of these colleges began a process of distinguishing between the functions of a broad liberal education and the more specialized functions of professional and vocational education. During the first half of the century, American colleges provided a narrow curriculum which relied heavily on courses in classical studies.[33] The demands of an increasing number of middle class students for professional training conflicted with the interests of the "educated classes" from America's wealthiest strata of society who expected of colleges only a broad exposure to the classics.[34] At the same time, educational reformers criticized the lack of effort by heads of colleges and universities to incorporate the physical sciences in undergraduate education.[35]

---

[30]Mattoon Letters. E. E. Barnard to A.M. Mattoon, 1 May 1899. It is also of interest to note that in the correspondence, Barnard advocates an exterior balcony to accommodate the overflow of large classes engaged in observation of specific astronomical events. The Morrison Observatory does not include this design accommodation for classroom instruction.

[31]Brown, pp. 1-2.

[32]Interview with Carole Prietto, University Archivist, Washington University, St. Louis Missouri. 17 December 1991; VanRavenswaay, p.390.

[33]Thomas, p. 11.

[34]Thomas, pp. 11,18; Bledstein, p. 294; Perkinson, p. 140.

[35]Huxley, pp. 101, 121-122.

The question of not only what, but how to teach was central to the revolution in 19th century education. The advocates of inclusion of the natural sciences in the college curriculum expressed concern over the lack of knowledge of the laws of the physical world and the relation of cause and effect. They espoused scientific training as a discipline incorporating deductive reasoning in preference to the cultivation of the "power of expression and the sense of literary beauty." Thus one of the most dramatic educational consequences of the introduction of the scientific ideal of professional education was the revolution it precipitated in instructional practices, procedures and facilities.[36]

During the first half of the 19th century, the movement to introduce science into mainstream educational institutions met opposition from businessmen and educators alike. Change occurred slowly and by the 1840s science and modern language courses began to appear on a limited basis in the required curriculum and in some elective courses. When colleges added new sciences they did so randomly; no organized course work or departments existed.[37]

The newly established educational institutions in the rapidly developing state of Missouri integrated the sciences into their curriculum more readily than some of the older, established eastern colleges and universities. The study of astronomy and celestial geography, botany, chemistry and geology became standard upper level offerings in the state's private academies in the 1840s. In 1855 the state established a standard curriculum and educational practices for both public and private institutions. These standards combined science with the classical curriculum and attempted to eliminate teaching by rote memorization and recitation by mandating instructional practices based on scientific method.[38]

By the end of the 1860s the conflict between the defenders of the old classical concept of a liberal education and the protagonists for reform was, for practical purposes, dead. The 1868 inauguration speech of Harvard's newly elected President, Charles Eliot, reflects the educational sentiments of the post war period.

> "The endless controversies whether language, philosophy, mathematics or science supplies the best mental training, whether general education should be chiefly literary or chiefly scientific, have no practical lesson for us today. This University recognizes no real antagonism between literature and science, and consents to no such narrow alternatives as mathematics or the classics, science or metaphysics. We should have them all and at their best."[39]

---

[36]Thomas, pp.24-25; Huxley, pp. 101-119.

[37]Bledstein, pp. 225, 242.

[38]Missouri Historical Review. "The Columbia Female Academy." Vol. 64, No. 2. p. 183; McCandless, pp 195-196.

[39]Perkinson, p. 139.

The population growth and the industrial and economic expansion of the last quarter of the century produced enthusiastic support for all forms of career specialization. Significant changes in institutions of higher education resulted: departmentalism, an organized curriculum of required courses, expansion of the elective system, stricter admission standards, a graded course of study and rigorous examination standards for the awarding of degrees. By the 1890s the role of colleges as compared to large universities solidified into a mission of affording a broad based liberal arts and sciences education for students.[40]

Another consequence of the advent of "professional education" was the stimulus it gave to research as one of the essential roles of institutions of higher education. While the college's primary task was to teach; research made advanced teaching possible. And, as research deepened and broadened the knowledge in all fields, departments within the university and college became larger and more complex. New fields of study came into being: comparative literature, international law, social ethics, meteorology, paleontology, genetics.[41]

The instructional process at most institutions also reflected radical changes. The idea of training professionals placed emphasis on developing skills of observation, of recording, of reasoning; and skills for expressing ideas of significance in a given field or profession. This new approach to teaching meant that students had to engage in activities, not passively absorb information presented to them. Observatories, laboratories, clinics, seminars, conferences, field observations, written reports and elaborate demonstrations soon appeared. With the development of these methods, the physical and material needs of a school sharply increased.[42]

Science vs. Religion: Sectarian Educational Institutions

The development of the curriculum in higher education which evolved during the 19th century reflected changes in religious institutions that had an effect on secular as well as sectarian education. The social transformation resulting from immigration, urbanization and industrialism established Protestantism, with its multiplicity of denominations, as the dominant religious force in the country. The lack of a state church and the philosophy of Jacksonian democracy produced a tendency to secular control of public education and, when controlled by denominational institutions, the introduction of secular subjects into the curriculum.[43]

The 19th century was a culmination of the 17th century age of reason ie., the use of reason and will as tools to greater achievements. The works of men such as Descartes, Locke and Newton represented an approach to learning based on what is learned through natural sciences. The growth of science and through it man's knowledge and mastery of his physical environment attained colossal dimensions in the 19th century. Discoveries in astronomy, biology,

---

[40]Thomas, pp. 42-43.

[41]Perkinson, pp. 144-45.

[42]Ibid. pp. 143.

[43]Latourette, p. 1075

anthropology and geology, and the emergence of the disciplines of psychology, economics and sociology brought about far reaching changes in religious thinking.[44]

By the end of the Civil War, new scientific discoveries appeared to make Christianity untenable to the informed mind. Darwin's theory of evolution rendered obsolete the story of creation. The advances in the sciences of astronomy and geology discredited the chronology of creation as outlined in the margins of the St. James Bible.[45] Darwinism and the application of "Higher Criticism," an effort to reconcile science and religion, became the two primary stimuli for change in religious thought.[46] The conflict between adherents of higher criticism and conservatives, who believed that the realms of the mysterious transcended the limits of science, posed the central religious question of the 19th century. As scholars continued to reconcile science and religion, the differences between fundamentalists and others hardened.[47]

At the same time a social stratification occurred within denominations. Those in the upper income brackets and with higher education tended to be Unitarians, Episcopalians, Presbyterians and Congregationalists who, because of their emphasis on an educated clergy, founded liberal arts colleges.[48] Many of their leaders feared that their members might regard Christianity as untenable and irrelevant because it might appear as contrary to reason. The concern voiced by Congregationalist, Henry Ward Beecher, that the church was being left behind by "the intelligent part of society"[49] evolved into the liberal theology of the era. Followers of these beliefs blended natural laws with the supernatural creating the concept of a single universe created and governed by God, and science as evidence of this.[50] The speech of President William Wallace Payne at the dedication of the Carleton College Observatory in 1886 reflected the new liberal theology.

> "This college believes in science that has Christianity and God in it and is willing to avow that belief...It believes in the methods of modern science for acquiring that kind of truth, but it denies that it is either the nature or effect of such truth to put the almighty Creator out of the material universe, but rather to reveal the harmonies of his sovereign divine will."[51]

---

[44]Ibid., p. 1064; Sweet, p. 491.

[45]Latourette, p. 1070.

[46]Sweet, pp. 492-94.

[47]Latourette, pp. 692-93, 1072.

[48]Ibid., pp. 1261-63.

[49]Hudson, pp. 268-270.

[50]Latourette, pp. 1257, 1275.

[51]A Science Not Earthbound. p. 11.

The reconciliation of astronomy and religion in the late 19th century was not as radical as might be thought. Throughout the centuries western scholars and clerics reconciled new astronomical discoveries with religious beliefs. Astronomy thus became part of the classical college curriculum and continued to be in the early 19th century.

In American colleges the inclusion of astronomy in the curriculum was due to tradition and a wave of observatory building which reached the United States between 1830-1840.[52] The stimulus to build these observatories had its origins, in large part, to utilitarian rather than an educational concerns. Westward migration created a need to complete large scale surveying which required the determination of latitude, longitude, time and azimuth by using astronomical instruments. In addition, astronomy as a theoretical and practical science received impetus in the 1830s by the brilliant display of Leonids and the reappearance of Haley's comet.[53] But it was not until the third quarter of the century when developments in instruments took place which changed the nature of astronomical investigations, that the study of astronomy received emphasis and recognition in the newly evolved scientific curriculum and created a second wave of observatory construction and renovation.[54]

The Study of Astronomy at Park College

Park College was one of numerous colleges which sprang up throughout Missouri in the 19th century. The founding of Park College in 1875 as a liberal arts college affiliated with the Presbyterian Church was typical of the educational history of the state. Missouri's churches played a dominant role in the organizational efforts and financial support for most institutions of higher education. By the second half of the century many of these sectarian colleges, originally established to train ministers, expanded their programs to other fields,[55] reflecting a national trend for colleges and universities, including those affiliated with churches, toward secularism.[56]

The mission established by the founding Board of Trustees of Park College reflects the liberal theology of the late 19th century Presbyterian church. Founded upon the study of the Bible, the original charter stipulated that the "...principles of the college shall be non-sectarian but evangelical, imbued with the spirit of Christian liberty and charity."[57] Professor

---

[52]Prior to 1840 only eleven observatories existed in the United States and most were erected to meet the needs of navigation in the early part of the 18th century. Melham, p. 3, 5.

[53]Ibid., p. 4.

[54]It was not until 1891 that Harvard's physics department revived the study of astronomy. (Perkinson, p. 145) Stern lists 47 known new or remodeled free standing observatories on college campuses between 1875 and 1900.

[55]McCandless, p. 197.

[56]Thomas, 18; Latourette, pp. 1261-63.

[57]"Original Charter of The Board of Trustees of Park College." Printed Copy. n.d.

Mattoon's comments in regard to the teaching of astronomy is indicative of the impact of "higher criticism" on the school's choice of curriculum.

> "Astronomy seems specially capable of being employed in affording vigorous exercise of the higher powers of the mind, while at the same time it brings the student into intimate relation with the Creator in the contemplation of the grandeur of his works. There is an evident fitness in giving this study prominence in an institution of the character of Park College."[58]

The college's trustees proscribed "...a full course of instruction in Science, Literature and Art...," and to instruct "...by practice, training and doing as well as by teaching...."[59] This mission reflected the influence of the German University system on European and American institutions of higher education which became firmly entrenched by the late 19th century.[60] In addition to the utilization of scientific method in instruction, Park College also mirrored the reforms of the era by its establishment of separate departments,[61] strict admission standards, required and elective courses and the awarding of degrees based upon testing.[62] The growing facilities of the college also are representative of the changes wrought by the inclusion of science into the curriculum and the role of colleges and universities in training for professional careers. Park College's 12,000 volume library with its Dewey system of classification, its observatory, biological and chemical laboratories, and museum of natural history, were indicative of the era.[63]

---

[58] Park College Catalogue, 1896-97, p. 34.

[59] "Original Charter of The Board of Trustees of Park College." Printed Copy. n.d.

[60] Perkinson, p.139. Beginning in the mid-19th century, European universities began to emulate the German University model and to evolve into "professional schools, institutions for training experts..."; Huxley, "A Liberal Education..." pp. 106-107. In 1868, Huxley noted the early role dating back to the previous century of German institutions of higher education to incorporate the cultivation of science and the scientific method of inquiry in their university system.

[61] Departments Included: Economics, Mental and Moral Philosophy, Latin Language and Literature, Bible History and Practical Christian Training, Biology, Mathematics and Astronomy, English Literature and Rhetoric, History and German, Greek Languages and Literature, Chemistry and Physics. Catalogue, 1898-99

[62] Ibid.; Catalogue 1905. In the 1890s degrees included an A.B., a Litterarum Baccalaurea for "young ladies," and A.M. and Litt M. (Magister Artuim Litterorum) in post graduate studies. After the turn of the century only one degree, a Bachelor of Arts, is offered which required four years of study with a minimum of 136 hours which included 96 hours required courses.

[63] Catalogue, 1898-99.

Although astronomy had long been a part of the classical college curriculum, its study at Park College and other institutions of higher education in the state was limited. Like most other colleges in the state, the astronomy course work at Park prior to the erection of the observatory consisted only of the use of Young's textbook supplemented by lectures and observations limited by the small number of instruments on hand. Park offered only one fall term course in Astronomy limited to the study of the laws governing motions of bodies in the solar system and "Nebulary Hypothesis." Astronomy equipment included only a 4 1/2-inch equatorial telescope and a transit telescope, restricting projects to work involving right ascension and declination, latitude and longitude, altitude and azimuth, computation of lunar eclipses and conjunction and opposition of planets.[64]

The erection of the observatory and installation of the equipment provided new educational opportunities in the study of astronomy unique in the state and region.[65] The observatory's use as a laboratory and classroom, the placement of the study of astronomy in the curriculum as both a required and elective subject, the program's application to the study of surveying, mathematics, physics, celestial movements, practical astronomy and astrophysics reflected national trends which were new to sectarian and public colleges in the state and in the region.[66]

The expanded course work in astronomy established after 1897 reflects the impact of the observatory. Required courses for male students included surveying their freshman year, two courses in astronomy the junior year and one course in the senior year. Female students took two courses in astronomy their junior year and one in their senior year.[67] The new equipment located in proper housing afforded more detailed and well documented observations. The 8-inch equatorial telescope with ten lenses magnified four hundred and eight diameters. The filar micrometer with electric lighted wires measured minute distances and angles. The heliscope allowed viewing the sun without damaging the eye. The combined transit and zenith telescope featured its own stationary mounting. The sidereal astronomical driving clock and electric chronograph, detected error in the sidereal clock within a tenth of a second.[68] As a result, Park College students enjoyed uncommon opportunities for more sophisticated study and research.

---

[64] Catalogue, 1895-1897.

[65] See Appendix 5, Warner & Swazey Equipment List and Appendix 6, Map of 19th century observatories.

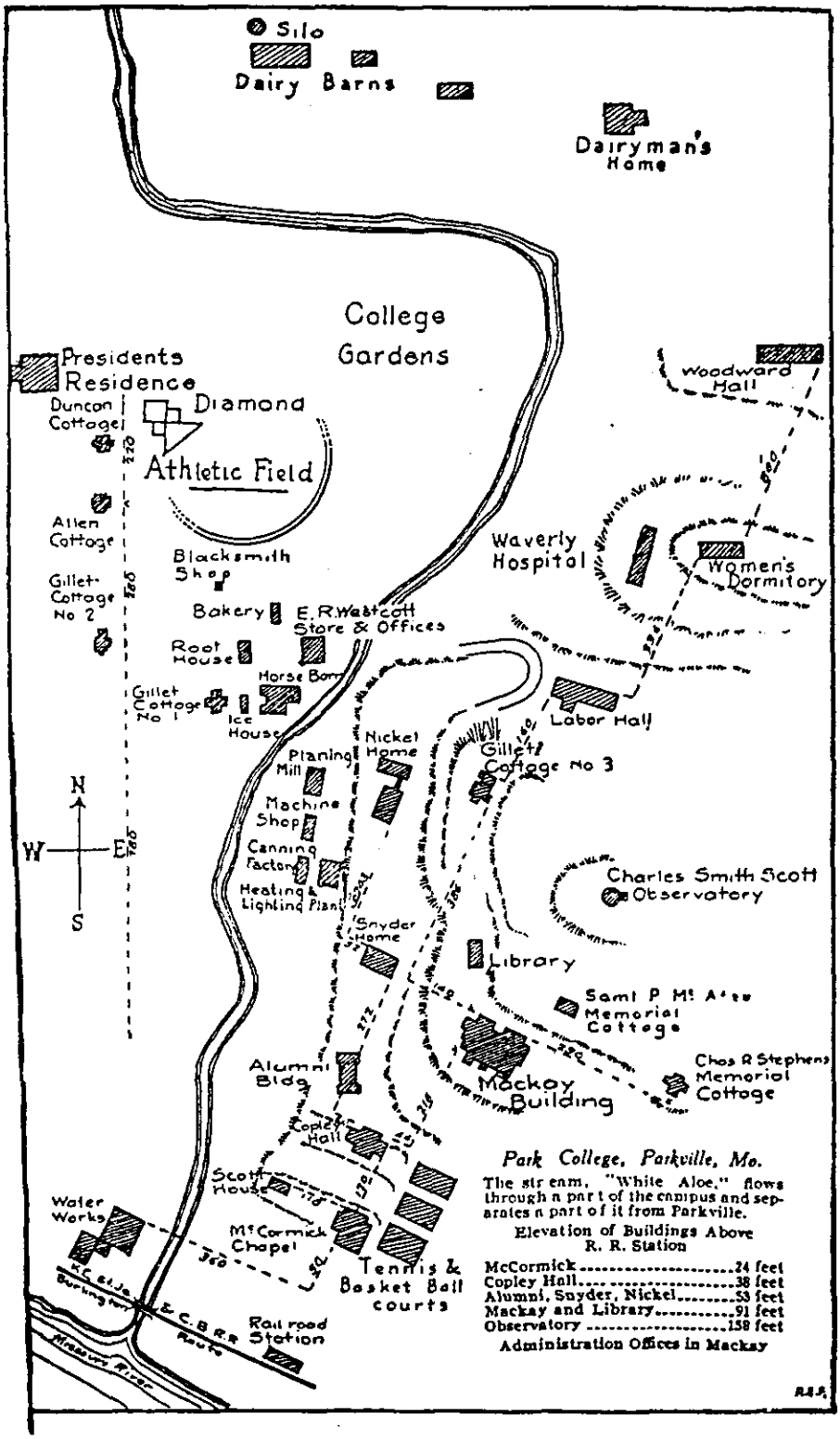
[66] Park College Catalogue Collection 1894-1955.

[67] Catalogue 1898-99, p. 25

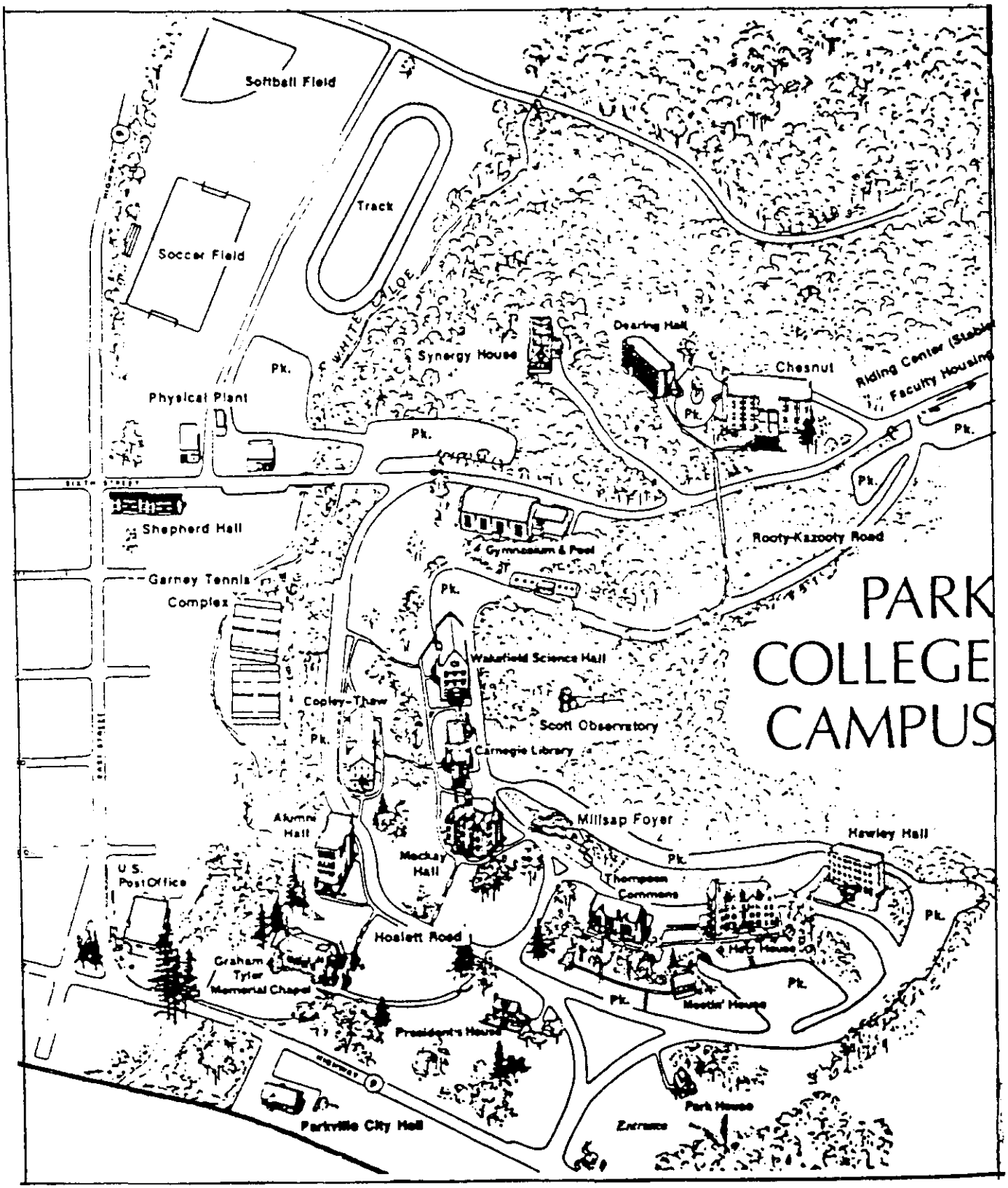
[68] Ibid., p. 1; Catalogue 1910-1911. p. 41

Today, the Charles Smith Scott Memorial Observatory serves as a physical reminder of an unique and exciting era of technological and social change in United States' history. It was then and is now a rare example in the state of the growing role of science and scientific inquiry in education and society. Its architectural form and style is a tangible example of observatory plans which evolved during the 19th century and remained a standard design until the advent of more sophisticated technologies and equipment during the 20th century. Through the Park College Alumni Office, active efforts are already underway in the development of a preservation plan and securing of funding for restoration of the facility.

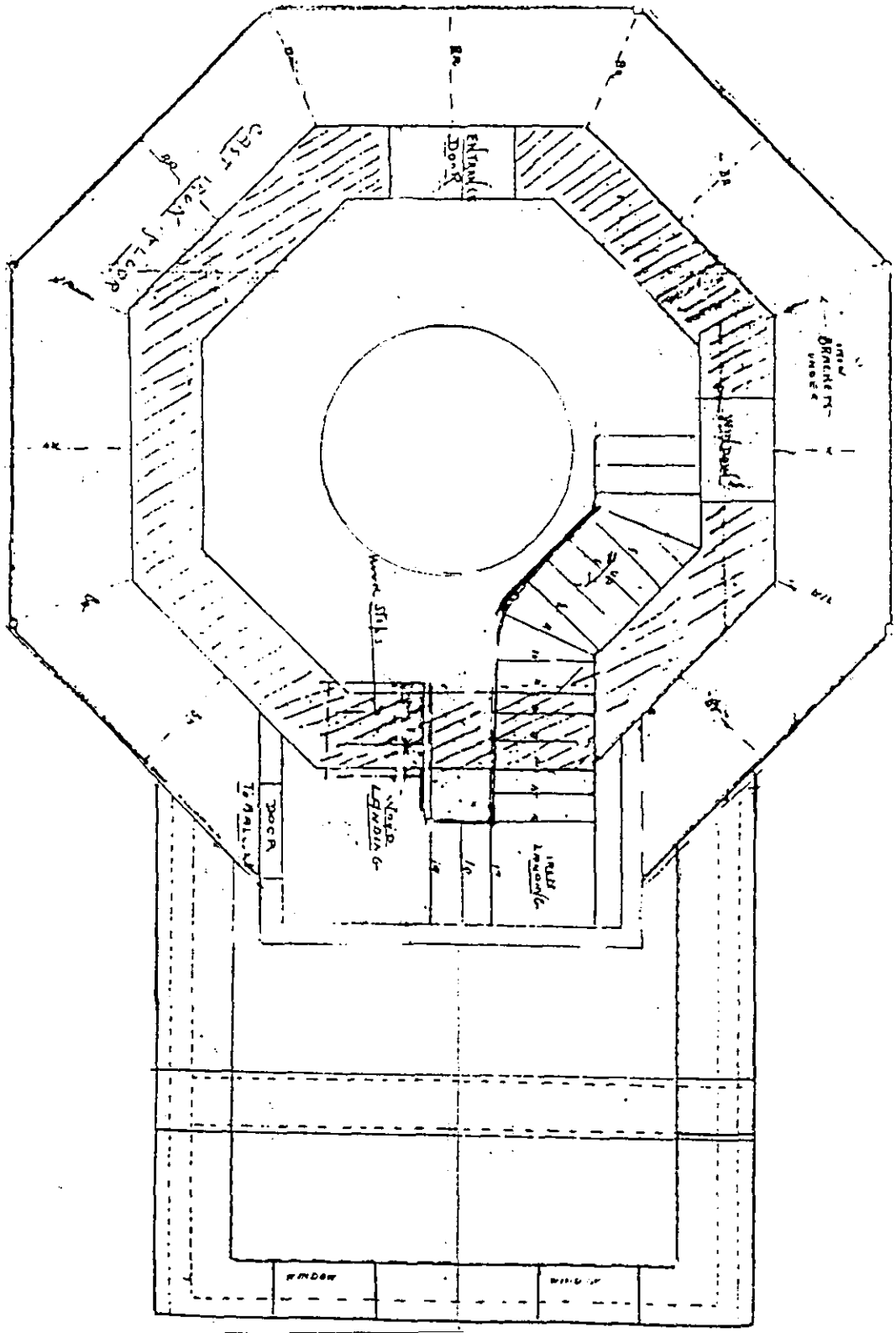
APPENDIX 1. MAP OF PARK COLLEGE C. 1903



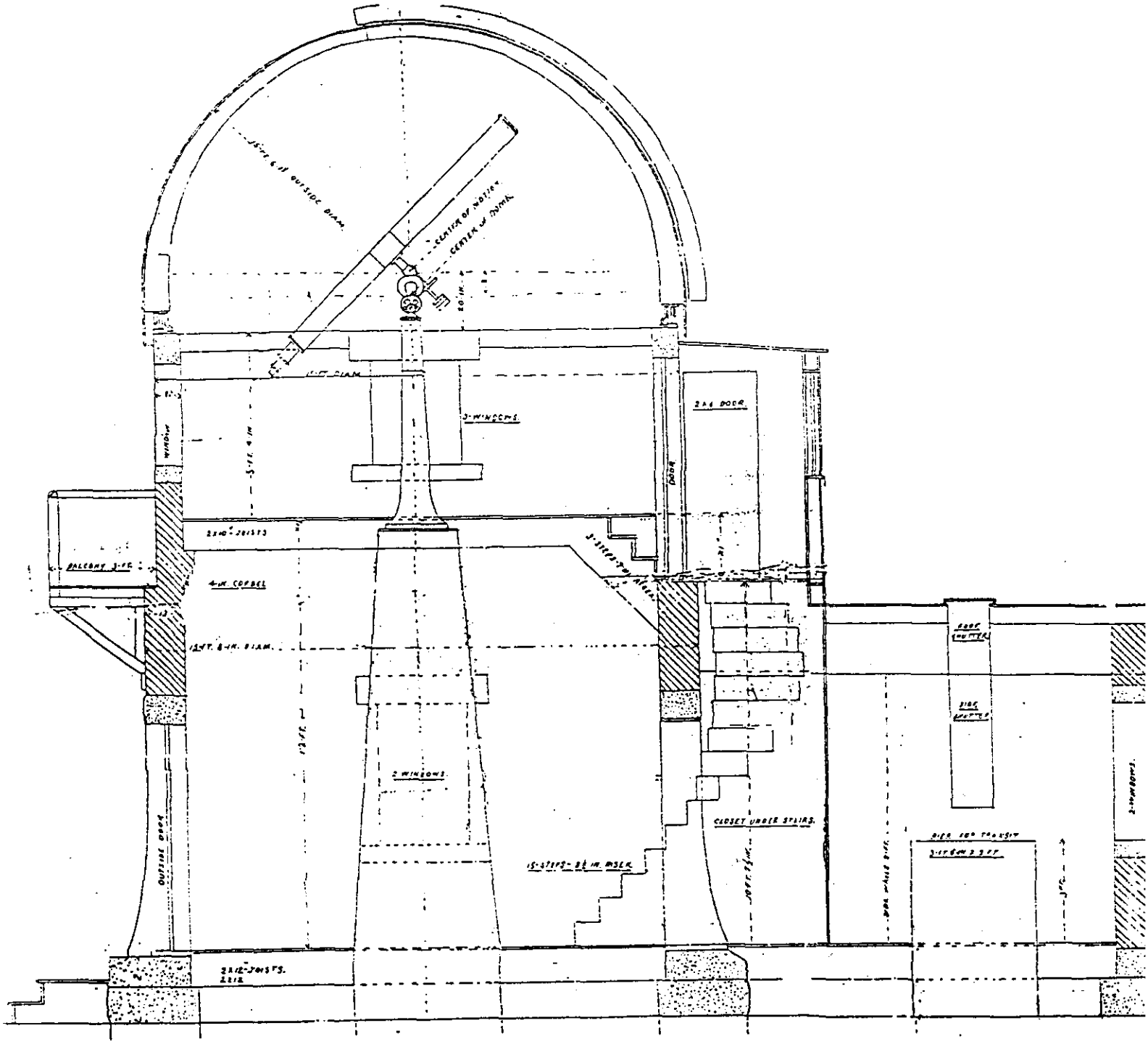
APPENDIX 2. MAP OF PARK COLLEGE C. 1990



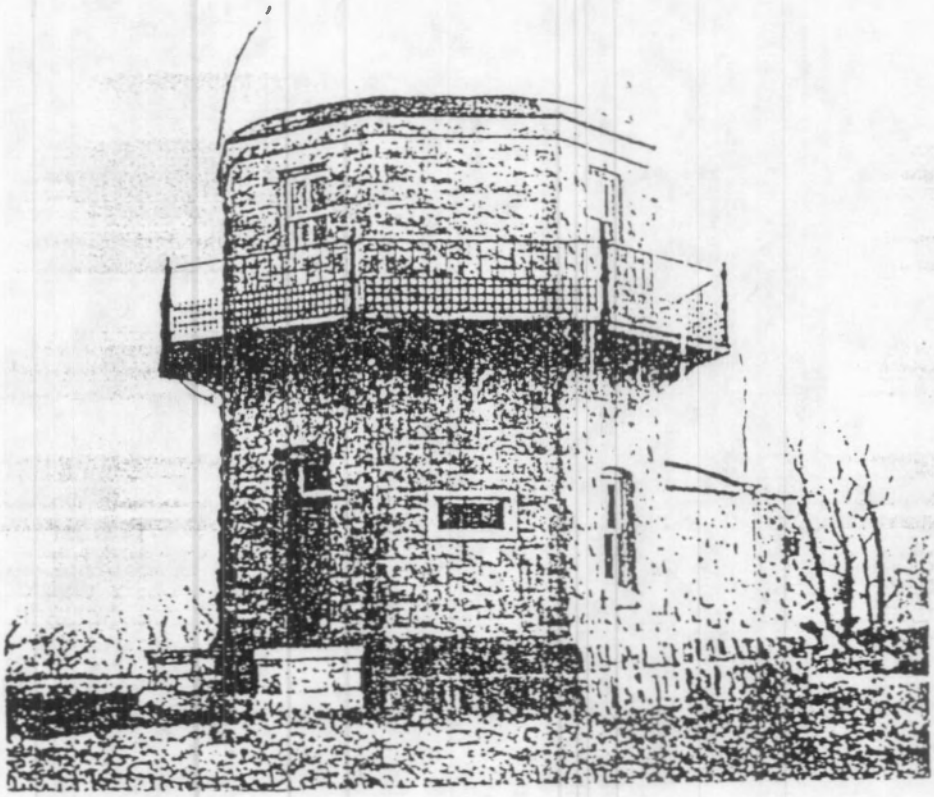
APPENDIX 3. FLOOR PLANS & ELEVATIONS

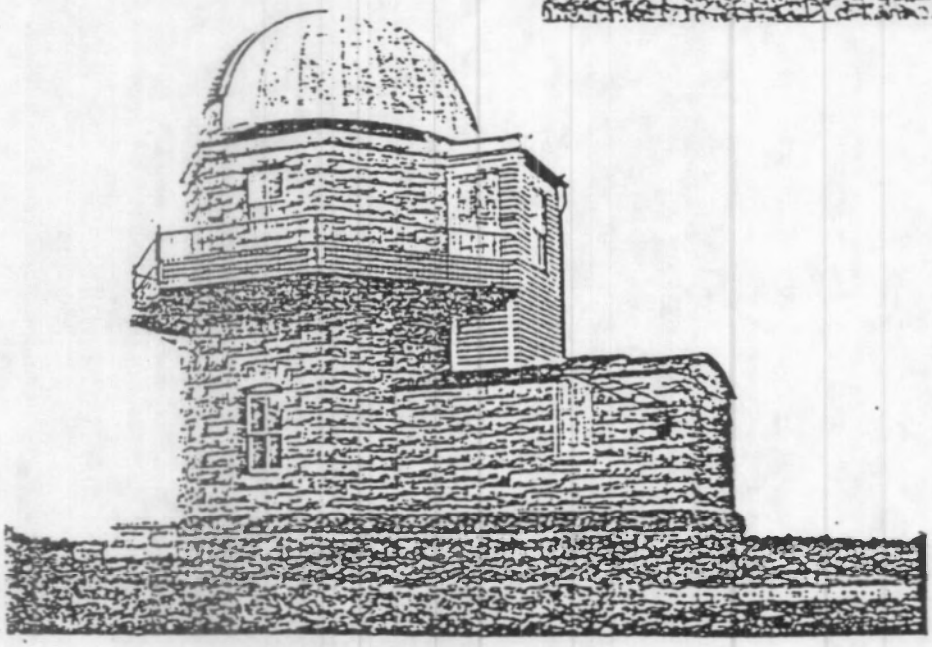


APPENDIX 3. FLOOR PLANS & ELEVATIONS

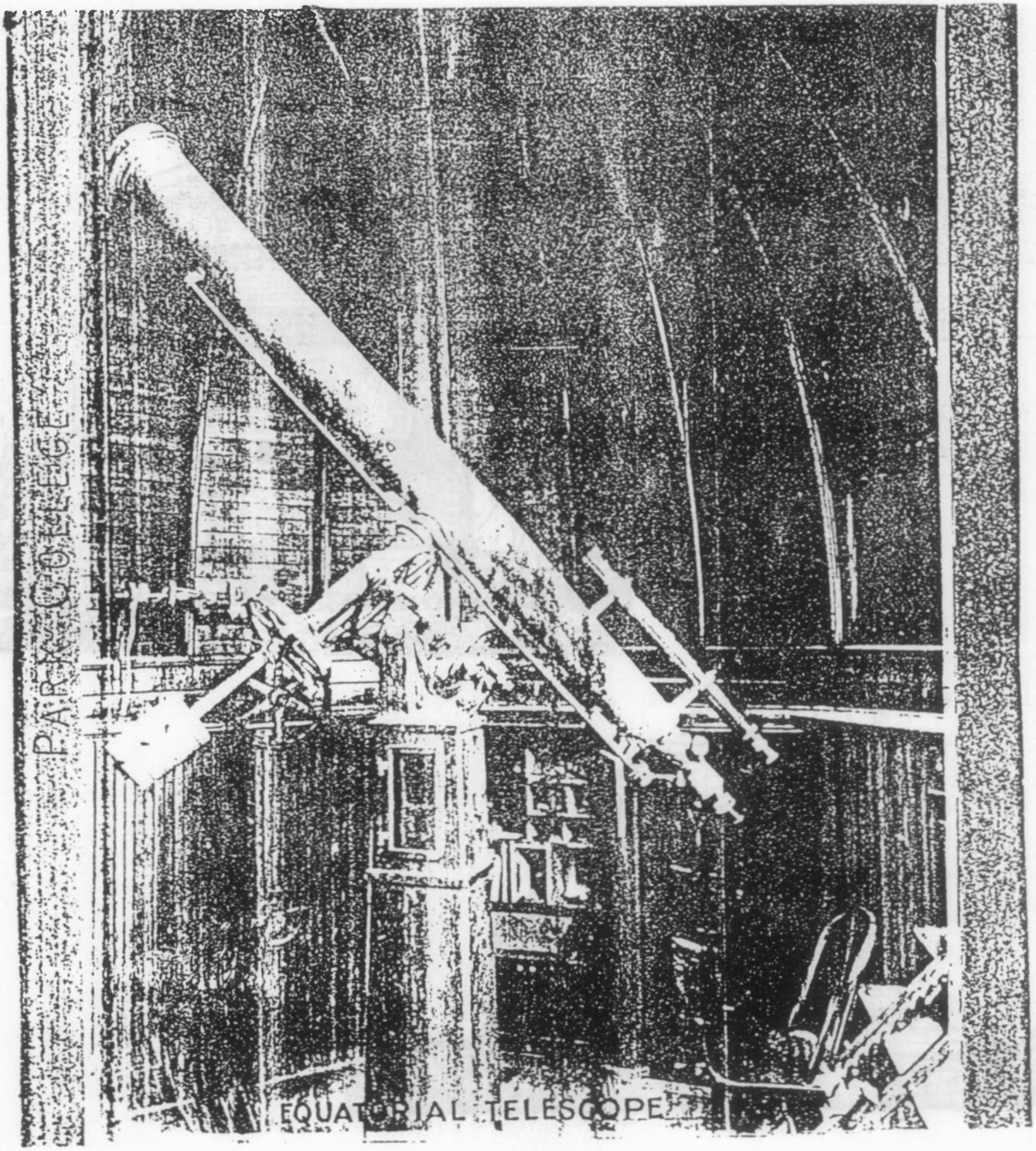


APPENDIX 4. HISTORIC PHOTOGRAPHS
Exterior, c. 1905

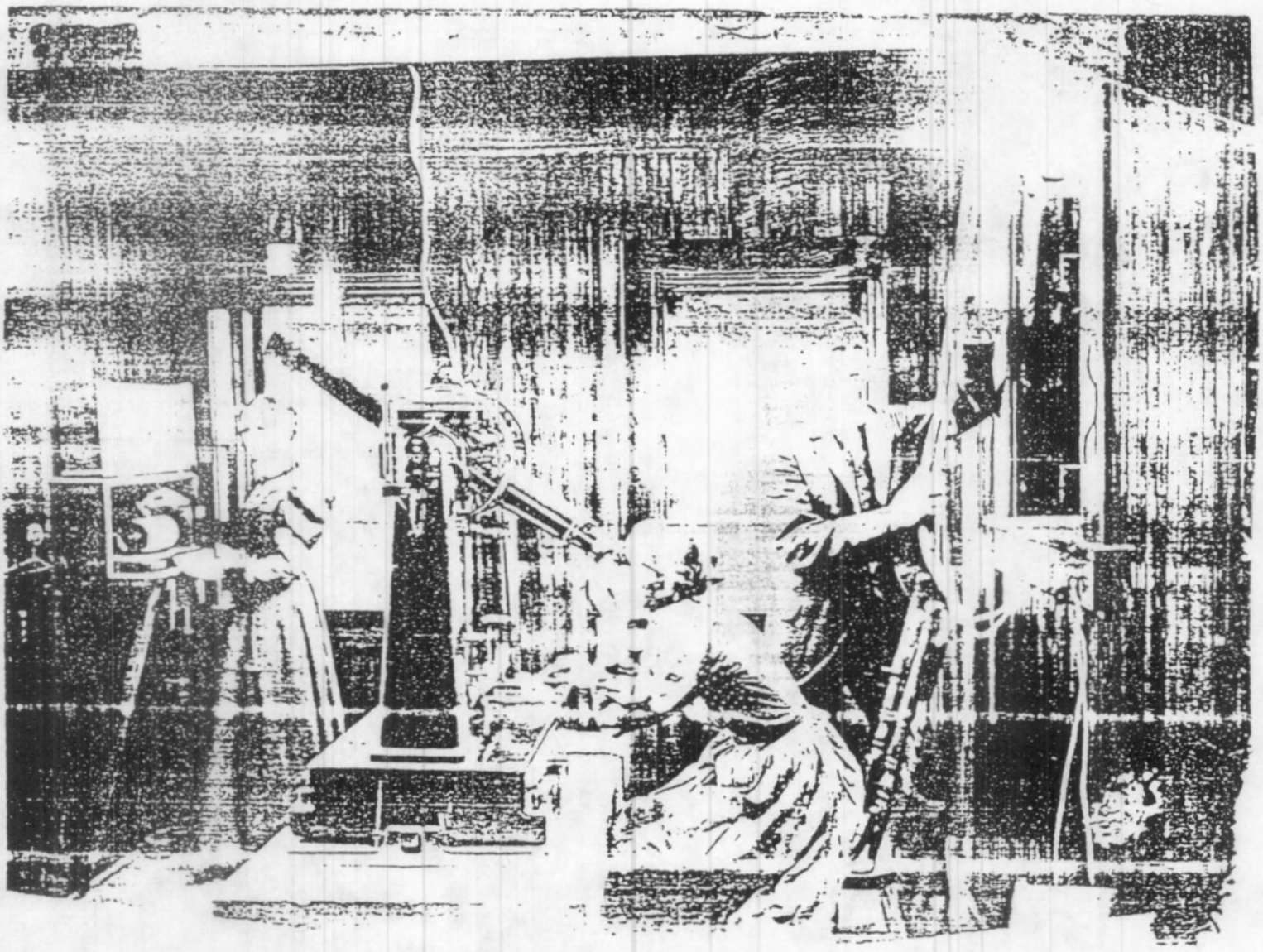




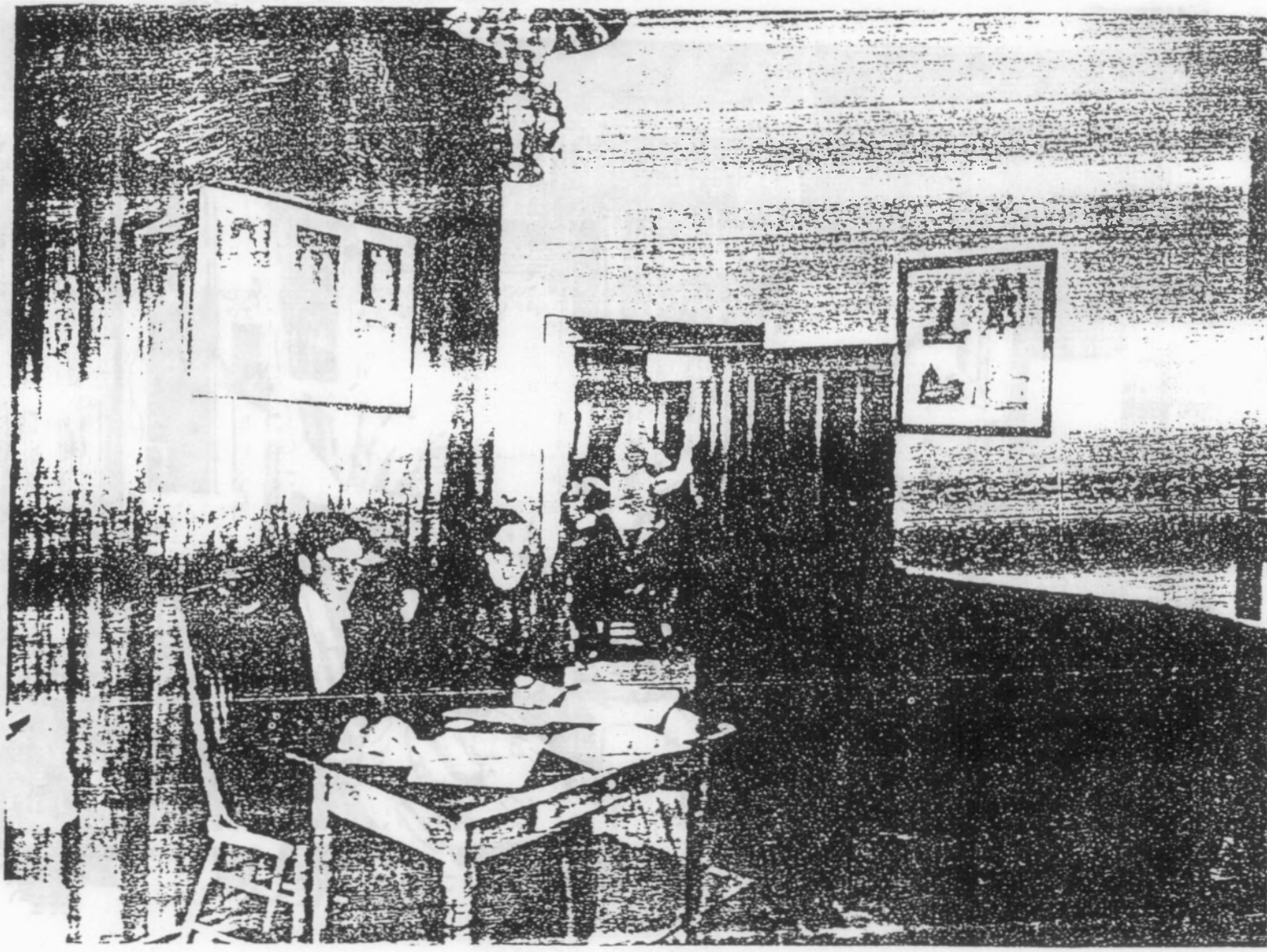
APPENDIX 4. HISTORIC PHOTOGRAPHS
Equatorial Room, c. 1900



APPENDIX 4. HISTORIC PHOTOGRAPHS
Transit Room, c. 1900



APPENDIX 4. HISTORIC PHOTOGRAPHS
Entrance Hall, c. 1900



APPENDIX 5. WARNER & SWASEY EQUIPMENT LIST

EQUATORIAL TELESCOPES

Size	Observatory	Date	Order	File No
72"				
60"	Observatorio Astronomico, Cordoba, Argentine		33965	272
40"	Yerkes Observatory, Williams Bay, Wisconsin	1897	2650	59
36"	Lick Observatory, Mt Hamilton, California	1887	- - -	16
26"	U S Naval Observatory, Washington	1893	2124	51
20"	Chabot Observatory, Oakland, California	1915	80164	264
18½"	Wesleyan University, Middletown, Conn	1915	82917	270
18"	University of Pennsylvania, Philadelphia	1896	4989	77
18"	Northwestern University, Evanston, Illinois	1911	57880	238
16"	Carleton College, Northfield, Minn	1891	- - -	39
15"	Philadelphia High School, Philadelphia	1902	9364	166
15"	Canadian National Observatory, Ottawa	1903	18044	158
13"	Dudley Observatory, Albany, N Y	1893	- - -	56
12"	Yerkes Observatory, Williams Bay, Wisconsin	1891	- - -	43
12"	University of Illinois, Champaign, Illinois	1896	6348	91
12"	Syrian Protestant College, Beirut, Syria	1893	- - -	61
12"	Smith College, Northampton, Mass	1887	- - -	26
12"	Ohio State University, Columbus, Ohio	1895	4997	76
10½"	Western Reserve University, Cleveland	1899	12034	126
10½"	University of Minnesota, Minneapolis	1896	5000	80
10"	VanSmith (Smith Observatory) Geneva, N Y	1888	- - -	32
10"	Indiana University, Bloomington, Indiana	1900	15376	142
10"	Washburn College, Topeka, Kansas	1902	19883	165
9½"	Beloit College, Beloit, Wisconsin	1881	- - -	1
9½"	Hartford High School	1883	- - -	2
9½"	Johns Hopkins University, Baltimore, Maryland	1887	- - -	20
9½"	McKim Observatory, Greencastle, Indiana	1885	- - -	7
9½"	Ohio Wesleyan University, Delaware, Ohio	1876	5029	86
9"	Allegheny College, Meadville, Penna	1901	17335	153
9"	Dennison University, Granville, Ohio	1910	48873	227
9"	A O Granger, Cartersville, Ga	1902	18966	162
9"	Hiram College, Hiram, Ohio	1901	15767	147
8"	Drake University, Des Moines, Iowa	1894	- - -	68
8"	Durfee High School, Fall River, Mass	1897	- - -	22
8"	Philadelphia High School, Philadelphia	1899	9366	132
7½"	Hanover College, Hanover, Indiana	1889	- - -	37
7"	Yankton College, Yankton, S Dak	1894	- - -	70
6½"	C W Hanchett, Hyde Park, Mass	1894	3293	63
6½"	Trinity College, Hartford, Conn	1896	5666	85
6"	Carnegie Institute of Washington, Pasadena	1913	78823	261
6"	College of Shantung, Shantung, China	1902	19623	164
6"	Florida State College, Tallahasse, Florida	1895	18772	8
6"	L La Forge, Alfred, N Y	1894	- - -	71
6"	Lick Observatory, Mt Hamilton, Calif	1886	- - -	14
6"	Robt T Lincoln, Manchester, Vermont	1909	49799	230
6"	Millsaps College, Jackson, Missouri	1901	16204	156
6"	Notre Dame University, Notre Dame, Indiana	1891	- - -	47
* 6"	Park College, Parkville, Missouri	1899	11254	122
6"	Swarthmore College, Swarthmore, Penna	1886	- - -	13
6"	Torrington High School, Torrington, Conn	1899	11255	121
6"	University of Chicago	1898	6840	93

APPENDIX 5. WARNER & SWASEY EQUIPMENT LIST

INSTRUMENTS - MISCELLANEOUS

	Observatory	Date	Order	File No
Rebuilding 12" Equatorial Telescope	Vassar College	1887	- - -	23
Rebuilding 8" Photographic Telescope	Carleton College	1893	- - -	62
✕ Riefler Astronomical Clock	Park College	1897	-7103	94
" Clock with break circuit	Case School of Applied Science	1897	8916	106
8" Brashear Achro. double objective	Philadelphia High School	1899	9368	133
Spectroscope	Canadian National Observatory	1902	18046	159
Striding Level	Smith College, Northampton	1903	24691	178
1-3" Telescopic Sight	Reading Iron Company	1904	29476	192
2-Depression Position Finders	Sussdorf Zaldo & Co	1905	30313	194
2-Azimuth Instruments	" " " "	1905	30312	195
Cast Iron Circle	Solar Observatory	1906	33902	201
1-Sextant	R A Fessenden	1907	41839	209
Divide circle in 12 minute spaces	Wm Ainsworth & Sons	1908	44797	213
Cast Iron Plate	The A Lietz Co	1908	46854	220
1-3" Azimuth Instrument	Republic de Cuba	1911	60796	242
Cast Iron Circle	L Beckman Company	1913	67765	249
Measuring Instrument	Timken Roller Bearing Co	1912	71254	255
2-Azimuth Instruments	Chilean Government	1913	72404	257
3-Battery Commanders' Insts	" "	1913	72405	256
1-Microscope	Cleveland Dental Mfg Co	1914	81394	266
1-Adapter for correcting lenses	Northwestern University	1914	83156	271
600-Prism Binoculars	E R Watts & Son	1914	83986	273
400-Prism Binoculars	" "	1915	84250	274
Light finishing cut for periphery of cast iron circle	Hoefer Mfg Company	1915	84258	275
800-Prism Binoculars	E R Watts & Son	1915	84390	276
600-Prism Binoculars	" "	1915	85959	280
50-Prism Binoculars	Wm Cramp & Son	1915	86283	281
7-Prism Binoculars	University of Michigan	1915	86333	282
250-Swasey Rifle Sights	Canadian Government	1915	86376	283
250-Rifle Sight Brackets	" "	1915	86376	284
200-Prism Binoculars	E R Watts & Son	1915	89221	287
100-Prism Binoculars	" "	1915	89672	289
6-Prism Binoculars	University of Michigan	1915	89918	292
Removal of 20-inch Equatorial Telescope from San Francisco to Oakland	Chabot Observatory	1915 (Invoice)	38966	267
1500-Prism Binoculars	Marburg Brothers	1915	89678	290
1000-Prism Binoculars	" "		90665	293
25-Battery Commanders' Insts	Chilean Government	1916	90810	295
7-Azimuth Instruments	Chilean Government	1916	91033	294

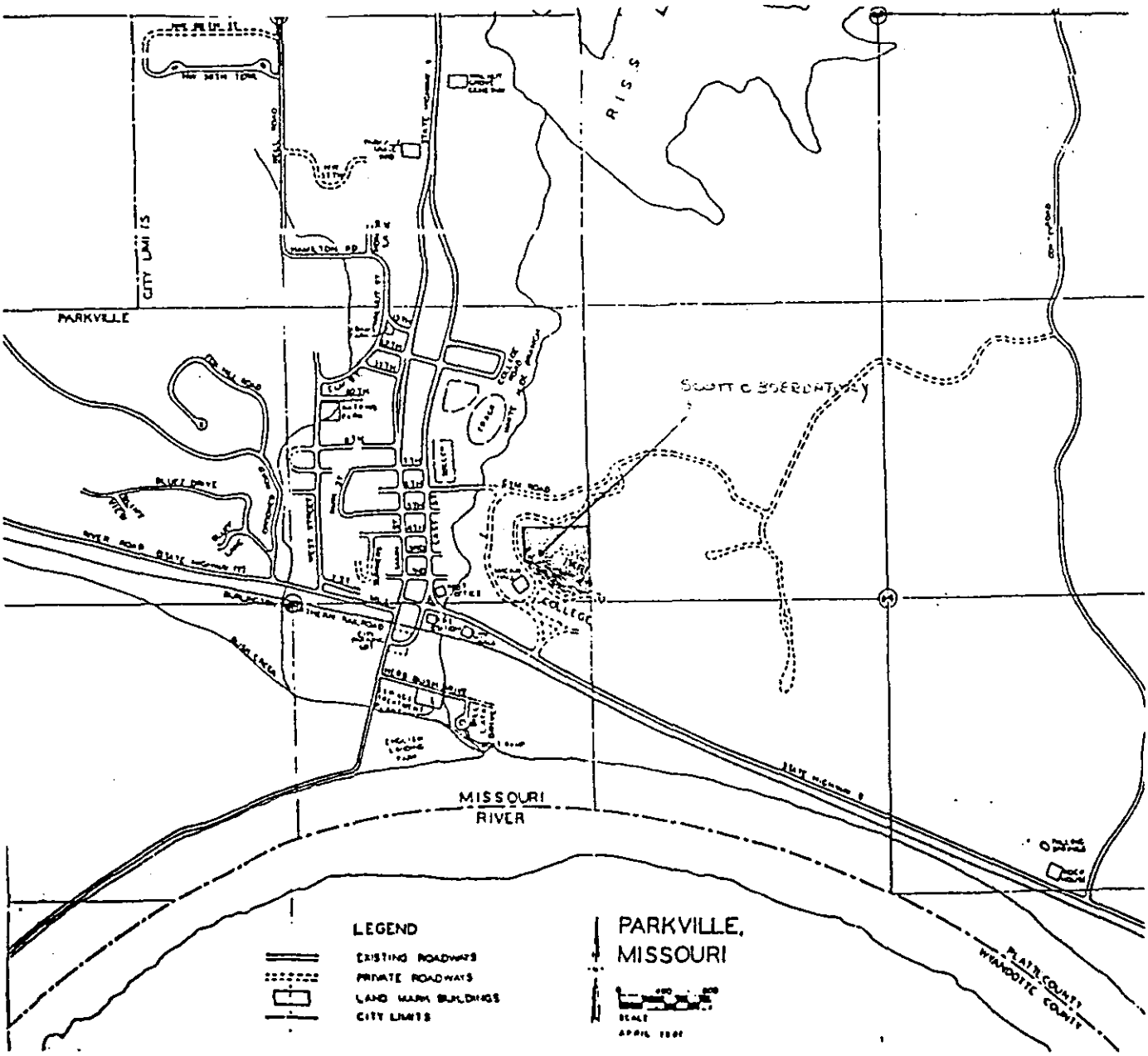
APPENDIX 5. WARNER & SWASEY EQUIPMENT LIST

INSTRUMENTS - ASTRONOMICAL
Including Transits, Meridian Circles, Zenith Telescopes
Alt-azimuths, Almucantors, etc.

Size	Observatory	Date	Order	File No
3" Transit	Swarthmore College	1887	----	18
4" Meridan Circle	Smith Observatory, Geneva	1889	----	21
4" Transit Circle	Smith College, Northampton	1887	----	28
5" Alt-azimuth Instrument	U S Naval Observatory	1897	4350	72
4" Meridan Circle	University of Pennsylvania	1897	4995	81
3" Prism Universal Transit	" " "	1896	4993	82
4" Zenith Telescope	" " "	1896	4991	83
3" Combined Transit and Zenith Telescope	University of Illinois	1897	6349	89
3" " " " "	Park College	1897	7105	96
3" " " " "	Case School of Applied Science	1898	8914	105
6" Meridan Circle	U S Naval Observatory	1897	3063	108
Prismatic Alt-azimuth Telescope	Philadelphia High School	1898	9368	111
Almucantor	Case School of Applied Science	1899	12625	130
Mounting for Transit Circle	Philadelphia High School	1899	9365	131
4½" Zenith Telescope	Sayre Observatory	1904	26213	183
8" Reflecting Zenith Telescope	University of Pennsylvania	1904	25125	184
3" Combined Transit & Zenith Telescope	Lafayette College	1906	37482	205
4" " " "	Ohio Wesleyan University	1908	45760	217
4" " " "	Denmison University	1910	48874	225
3" Transit Instrument	Elgin National Watch Company	1909	42362	229
4" Zenith Telescope	Case School of Applied Science	1912	68463	253
30" Polar Heliostat	Yale University	1914	77139	259
6" Objective in Cell	Millsaps College	1914	81074	265

APPENDIX 6. REGIONAL OBSERVATORIES: 1850-1905

APPENDIX 7. BOUNDARY AREAS



BIBLIOGRAPHY OF SOURCE MATERIAL

Primary Source Material

Breen, Charles P. File. Manuscript Collection. Fishburn Archives, McAfee Library. Park College. Parkville, Missouri.

Dey, Anthony Letters. Manuscript Collection. Fishburn Archives, McAfee Library. Park College. Parkville, Missouri.

Mathews, Mildred Shapley Letters. Administrative File. Alumni Office. Park College, Parkville, Missouri.

Mattoon, Arthur M. Letters. Manuscript Collection. Fishburn Archives, McAfee Library. Park College. Parkville, Missouri.

Mattoon Papers. Letters to Pickering. Harvard University Archives. Cambridge, Massachusetts.

McAfee, Howard M. File. Fishburn Archives, McAfee Library. Park College. Parkville, Missouri.

McAfee, Howard M. Letters. Manuscript Collection. Fishburn Archives, McAfee Library. Park College. Parkville, Missouri.

Observatory Photo File. Fishburn Archives, McAfee Library. Park College. Parkville, Missouri.

"Specifications for Observatory." n.d. Fishburn Archives, McAfee Library. Park College. Parkville, Missouri.

Stillwell, J.S. Letters. Manuscript Collection. Fishburn Archives, McAfee Library. Park College. Parkville, Missouri.

Warner & Swasey Company Documents. Pappenhagen Special Collections, Case Western Reserve University. Cleveland, Ohio.

Secondary Source Material

Aker, Mary B. Southern Platte County. Yesteryears, Today and Tomorrow. Parkville Business and Professional Women's Club. n.d. Genealogy Research Room. Mid-Continent Public Library, North Branch. Independence, Missouri.

_____"A Gift to Restore Old Observatory." Kansas City Star. January 12, 1969. p. 24A.

_____ A Science Not Earthbound. A Brief History of Astronomy at Carleton College. Carleton College. Northfield, Minn. 1988.

Bledstein, Burton. The Culture of Professionalism. The Middle Class and The Development of Higher Education in America. W.W. Norton & Co. Inc. New York. 1976

Brown, David R. "The Story of Morrison Observatory: 100 Years." Central Methodist College. Fayette, Missouri. 1975.

Butowsky, Dr. Harry A. Astronomy and Astrophysics. A National Historic Landmark Theme Study. Department of the Interior. National Park Service. Washington, D. C. 1989.

Dickenson, Ronald. "A Little History of Park's Observatory." n.d. Vertical Reference File. Fishburn Archives, McAfee Library. Park College, Parkville, Missouri.

Donnally, Marian C. A Short History of Observatories. University of Oregon Books. Eugene, Oregon. 1973.

Hudson, Winthrop S. Religion in America. Charles Scribner & Sons. New York. 1981.

Huxley, Thomas H. Science and Education. P.F. Collier & Son. New York. 1902.

Huxley, Thomas H. "A Liberal Education, Where To Find." (1868). Science and Education. D. Appleton & Company. New York. 1896.

BIBLIOGRAPHY CONTINUED.

Latourette, Kenneth Scott. A History of Christianity. Harper and Brothers Publishers. New York. 1953.

McCandless, Perry. A History of Missouri. Vol. II. 1820-1860. University of Missouri Press. Columbia, Missouri. 1972.

Melham, Willis I. Early American Observatories. Williams College, Williamstown, Mass. 1938.

_____"Original Charter of The Board of Trustees of Park College." Printed Copy (n.d.). Historical File F.1. Fishburn Archives, McAfee Library. Park College. Parkville, Missouri.

_____Park College Alumniad, Vol. 39, No. 1. September, 1949. Park College Press. Parkville, Missouri.

_____Park College Cataloque 1894-1895; 1896-1897; 1898-1899; 1903-1904; 1905; 1910-1911. Park College Press. Parkville, Missouri.

_____Park College Record. September, 1894; August, 1896; March, 1899; July, 1903. August, 1812. Park College Press. Parkville, Missouri.

_____Park College Stylus. November, 1895; October, 1898. Park College Press. Parkville, Missouri.

Paxton, William. Annals of Platte County Missouri. Hudson-Kimberly Publishing Company. New York. 1897.

Perkinson, Henry J. Two Hundred Years of American Educational Thought. David McKay Company, Inc. New York. 1976.

_____"Platte County, A Special Edition of the Weston Chronicle." November 15, 1929. Genealogy Research Room. Mid-Continent Library, North Branch. Independence, Missouri.

Sterns, Mable. Directory of Astronomical Observatories in the United States. J.W. Edwards. Ann Arbor, Michigan. 1947.

Sweet, William Warren. The Story of Religion in America. Harper & Brothers. New York. 1980.

_____The Cataloque of the Officers and Students of the St. Louis University, Missouri. 1854-55. St. Louis University Archives, Pius XII Memorial Library. St. Louis, Missouri.

_____"The Columbia Female Academy." Missouri Historical Review. Vol. 64. No. 2. The State Historical Society of Missouri. Columbia, Missouri. January 1970.

Thomas, Russell. The Search For A Common Learning: General Education, 1800-1960. McGraw Hill Book Company. New York. 1962.

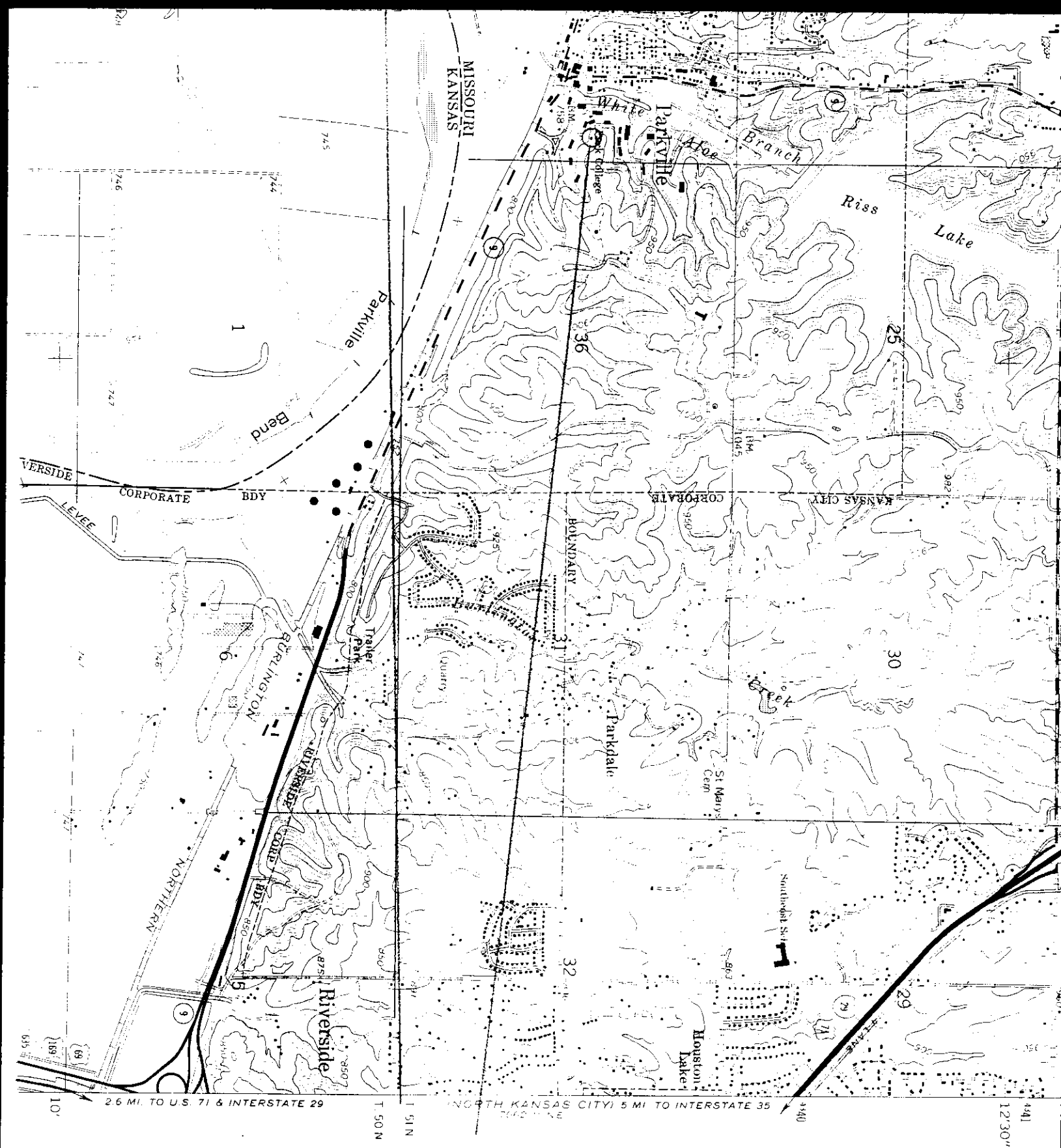
VanRavensway, Charles. Missouri: A Guide to the Show Me State. Missouri Writers Project. Works Project Administration. Duell Sloan & Pearce. 1941.

Verbal Boundary Description:

Beginning at a point 1000 feet due east of the southeast corner of the intersection of Main and 4th Streets, Thence east parallel to Rooty-Kazooty Road 600 feet, Thence south 600 feet to the northern boundary of the parking lot parkway, Thence northwest 600 feet following the northern boundary of the parking lot parkway to a point 100 feet north of the northeast corner of Mackay Hall, Thence north 300 feet to the beginning point.

Boundary Justification:

The Charles Smith Scott Observatory is located in an unplatted area on the campus in open undeveloped space on the highest elevation on the campus proper. The boundaries are all within the legal property description of Park College and reflect topographical features of the property, primarily the elevations that are currently open space within the viewshed of the building. The northern boundary begins at the northeast edge of the parking lot where it merges to become Rooty-Kazooty Road and runs east parallel to this road following the topographical contour at the base of the hill which rises above the roadway. The eastern boundary line was chosen because it followed the same contour and elevation and marks the eastern limits of the viewshed from the top of the observatory. The southern boundary follows the same elevation and contours as does the parking lot parkway the boundary generally runs parallel to. The western boundary, likewise, follows the same elevation contours as well as running parallel to the parking lot. These boundaries delineate the historic appearance of the original setting of the observatory. Just within the boundary lines, a major rise in elevation occurs which visually and physically separates the observatory from roadways and parking areas which rim the boundary areas on the north, south and west.



SCOTT, CHARLES SMITH, MEMORIAL
OBSERVATORY
PARKVILLE, PLATTE COUNTY, MO
15/354970/4338985

N

1. CHARLES SMITH SCOTT MEMORIAL LIBRARY
PARKVILLE, MISSOURI
J. W. SCHWENK,
DECEMBER 10, 1991
PARK COLLEGE, PARKVILLE, MO
VIEW - SOUTH WEST
SEE APPENDIX #2

2 CHARLES SMITH SCOTT MEMORIAL LIBRARY
PARKVILLE, MISSOURI
T.W. SCHWENK
DECEMBER 16, 1991
PARK COLLEGE, PARKVILLE, MO
VIEW - NORTHWEST
SEE ADDENDUM #2

3. CHARLES SMITH SCOTT MEMORIAL OBSERVATORY
PARKVILLE, MISSOURI
J.W. SCHWENN
DECEMBER 16, 1991
PARK COLLEGE, PARKVILLE, MISSOURI
VIEW - NORTH
SEE APPENDIX #2

4, CHARLES SMITH SCOTT MEMORIAL LIBRARY
PARKVILLE, MISSOURI
J.W. SCHUENK
DECEMBER 16, 1991
PARE COLLEGE, PARKVILLE, MO
VIEW - NORTHEAST

5. CHARLES SMITH SCOTT MEMORIAL LIBRARY
PARKVILLE, MISSOURI
J.W. SCHWENK
DECEMBER 16, 1991
PARY COLLEGE, PARKVILLE, MO
VIEW - EAST
SEE PHOTO #2

6, CHARLES SMITH SCOTT MEMORIAL OBSERVATORY
ENTRANCE HALL/PIER INTERIOR
PARKVILLE, MISSOURI
J.W. SCHWENK
JANUARY 28, 1992
MISSOURI DEPT OF NATURAL RESOURCES
DIV. OF HISTORIC PRESERVATION
SOUTH