



VirginiaTech
BIKE PARKING PLAN

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BIKE PARKING PLAN

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BIKE PARKING PLAN

Introduction

One of the most common obstacles for cyclists is the lack of bicycle parking at their destination. Adequate bicycle parking encourages people to ride, presents a more orderly appearance for buildings, prevents damage to trees and street furniture, and keeps bicycles from falling over and blocking the sidewalk. Most importantly, bicycle parking helps legitimize cycling as a viable transportation mode by providing parking opportunities equal to motorized modes. Therefore, it is the university's ultimate desire to utilize the information in the Bicycle Parking Master Plan to determine size and location of additional bicycle parking areas to meet both short-term and long-term parking needs of campus cyclists.

The goals of this master plan are to:

- a. Assess the existing conditions of bicycle parking on campus.
- b. Develop a methodology to determine potential future bike parking needs based upon types of users.
- c. Identify regions of campus which appear to be deficient in bike parking (based upon the methodology).
- d. Establish design standards for bike rack design, and for mass bike parking "hubs".

BIKE PARKING PLAN

Parking Needs of Campus Cyclists

Resident Cyclists

Virginia Tech has approximately 9,000 resident students. The top priority for these users is long-term bike parking at their residence. Resident halls require bike parking space for overnight storage and protection from inclement weather, and therefore, sheltered bike parking is most suitable for these users. Resident cyclists also have a need for short-term parking as they frequently bike to and from class and extra-curricular activities on campus.

Commuter Student Cyclists

Virginia Tech has approximately 20,000 commuter students who live off campus. The vast majority reside in Blacksburg and are in bike commuting distance. The top priority for these users is short-term bike parking adjacent to their classrooms & labs and also near the student centers and dining facilities. This user group's average duration on campus is approximately 4-5 hours. There is also a need for long-term covered bike parking for protection against inclement weather. The possibility exists to address this need in the two parking garages, in a future Multi-Modal Transit Facility, or by covering racks near academic buildings as funding becomes available.

Faculty & Staff Cyclists

Virginia Tech has approximately 8,000 faculty and staff who live off campus. Of the 3,500 faculty, the majority reside in Blacksburg and are therefore in bike commuting distance. The vast majority of staff, approximately 4,500, reside outside of Blacksburg and have greater difficulty commuting by bike. The top priority for these users is short-term bike parking adjacent to their offices. This user group's average duration on campus is 8-9 hours. There is also a need for long-term sheltered bike parking for those who are unable or unwilling to park their bike in their office or building for protection against inclement weather. The possibility exists to address this need in the two parking garages, in a future Multi-Modal Transit Facility, or by covering racks near academic and administrative buildings as funding becomes available.

BIKE PARKING PLAN

Existing Conditions

According to university GIS records, which were last updated at the onset of this project in fall 2012, there are 2,209 bicycle racks on campus. Each rack accommodates two bicycles, creating a total of 4,418 bicycle parking spaces. There are three different rack styles on campus: the inverted u-rack, the staple rack, and the triangle rack. The rack found most frequently is the staple rack, which was the campus standard prior to replacing it with the inverted u-rack in 2008. 65% (1,438) of the total racks are staple racks, while 28% (617) of the racks have been updated to inverted u-racks, and 7% (154) are triangle racks. Many of the staple racks are severely damaged. 29% (651) of the total racks are reported to be in poor condition and are in need of replacement. In terms of rack locations, racks have been distributed widely throughout campus and are installed within 50-100 feet from the main entrances of buildings. However, due to the increase in cycling on campus in recent years, there has been a greater demand for additional bicycle parking, especially short-term parking in high-trafficked academic quads and long-term parking in the residential areas. As a result, cyclists locking their bike to trees, railings, and lampposts has become a serious issue.



Staple Racks at Randolph Hall in need of repair



Damaged Staple Racks in the Upper Quad



Staple Racks in the Upper Quad

All staple racks are secured with concrete. After much use, racks become loose and new concrete must be poured. This method of installation requires constant maintenance, and as a result, racks are not always repaired properly.



Crowded Bicycle Parking at Squires Student Center

Many of the high traffic areas lack adequate parking. Racks are often crowded at student activity centers and dining halls.



Due to the lack of bicycle parking on the south side of Pamplin Hall, cyclists lock their bikes to the chain rails along sidewalks.



Although there is ample bike parking nearby, cyclists choose to park their bikes closer to the entrance of Burchard Hall by locking them along railings.



Inverted u-racks were recently installed at Owens Dining Hall to replace damaged staple racks.

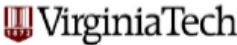
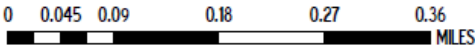


Covered Parking at Patton Hall.



BICYCLE RACK LOCATIONS & TYPES

- NEW STANDARD
- OLD-STANDARD
- ▲ NON-APBP



UNIVERSITY BICYCLE PARKING PLAN, 2013
DATA SOURCE: VIRGINIA TECH GIS DATABASE
CREATED BY: KATHRYN ZERINGUE, 7.8.13

BIKE PARKING PLAN

Bike Parking Standard Guidance

A review of national bicycle parking guidelines was conducted to identify best practices to be considered for the university's bicycle parking plan. The national guidelines under review were those developed by the Association of Pedestrian and Bicycle Professionals (APBP) and the US Green Building Council's Leadership in Energy and Environmental Design program (LEED). APBP published comprehensive Bicycle Parking Guidelines in 2002 and 2009. These guidelines have been cited and included in bicycle master plans throughout North America. LEED has been created to act as the preeminent sustainability measurement for building design and construction. Bicycle parking standards for buildings were incorporated into its program in 2009. The bicycle parking guidelines developed by APBP and LEED include detailed short-term and long-term bicycle parking requirements, specify the recommended number of bicycle spaces by building function and land use, and provide site planning and rack design requirements.

Guidelines	LEED	APBP
ORGANIZATION MISSION	LEED (Leadership in Energy and Environmental Design) is a voluntary, consensus-based, market-driven program created by the US Green Building Council that provides third-party verification of green buildings. From individual buildings and homes to entire neighborhoods and communities, LEED is transforming the way the built environments are designed, constructed, and operated. Comprehensive and flexible, LEED addresses the entire lifecycle of a building.	The APBP (Association of Pedestrian and Bicycle Professionals) is the only professional membership organization for the discipline of pedestrian and bicycle transportation. APBP members include leaders in engineering, planning, landscape architecture, safety, public health, Safe Routes to School, and promotion. The association also welcomes academics, students, and professional advocates. APBP members are dedicated to making bicycling and walking a viable transportation option in the US, Canada, and around the world. APBP members work for federal, state, regional and local governments, consulting firms, manufacturing companies, universities and research institutions, non-profit organizations, and the media.
INTENT OF BICYCLE PARKING STANDARDS	LEED has published bicycle parking standards in the LEED New Construction v.2.2 Green Building Rating System. The organization's intent to include bicycle parking in its rating system is to reduce pollution and land development impacts from auto use. The LEED bicycle parking standards are also intended to give additional opportunities to obtain green building credits. Those complying with the bicycle parking standards receive one Alternative Transportation credit (SSc4.2) in the Sustainable Sites category.	APBP published <i>Bicycle Parking Guidelines</i> in 2002 and an expanded, updated edition in 2009 to serve as a tool for sustainable transportation. APBP states that bicycle parking is a critical strategy for promoting bicycling for transportation and recreation. Convenient, easily used, and secure bicycle parking encourages people to replace some of their car trips with bicycle trips and helps legitimize cycling as a transportation mode by providing parking opportunities equal to motorized modes. APBP encourages communities and professionals to use this document to make informed decisions about planning excellent spaces and facilities to park bicycles.

<p>SITE PLANNING</p>	<p>LEED requires that bicycle parking be placed within 200 yards (600 feet) of a building entrance.</p>	<p>ABPB requires that bicycle parking be placed within 50 feet, preferably, or no more than 120 feet (a 30-second walk) from the building entrance; otherwise cyclists may lock to other street furniture or trees. Bicycle parking should also be visible from the destination to reassure cyclists about the security of the rack, located in a high-traffic area with passive surveillance or eyes on the street, located within the 'desire line' from adjacent bikeways-the path that cyclists are most likely to travel, and weather protected when possible. APBP also provides requirements for a rack area or "bicycle parking lot" where more than one rack is installed. Aisles separate the racks. The aisle is measured from tip to tip of bike tires across the space between racks. The minimum separation between aisles should be 48 inches. This provides enough space for one person to walk one bike. In high traffic areas where many users park or retrieve bikes at the same time, such as a college classroom, the recommended minimum aisle width is 72 inches. 72 inches (six feet) of depth should be allowed for each row of parked bicycles. Conventional upright bicycles are just less than 72 inches long and can easily be accommodated in that space.</p>
<p>BUILDING OCCUPANCY TO PARKING SPACE RATIO</p>	<p>Commercial/Institutional Buildings: There must be secure bike racks for 5% or more of all building occupants measured at peak use. Residential Buildings: Covered bicycle racks/storage facilities must be provided for 15% of peak occupants.</p>	<p>College and Universities: 1 space for each 10 students of planned capacity. Office: 1 space for each 20,000 square feet of floor area. Retail: 1 space for each 2,000 square feet of floor area. Civic/Library: 1 space for 8,000 square feet of floor area. Assembly (Stadium): Spaces for 5% of maximum expected daily attendance. Minimum requirement is 2 spaces for each of these building uses.</p>
<p>RACK RECOMMENDATIONS</p>	<p>No recommendations.</p>	<p>A successful bicycle rack design provides proper support so that the user can lock and unlock their bicycle and load and remove cargo without the bicycle flopping over due to the front wheel turning. Above all, bicycle racks must provide a way to lock the bike with a U-lock because cable locks and chains are easily cut. APBP recommends selecting a bicycle rack that supports the bicycle in at least two places to prevent the bike from falling over, allows locking of the frame and one or both wheels with a U-lock, is securely anchored to the ground, allows front-in and back-in parking, and resists cutting, rusting, and bending or deformation. The following racks meet all of the design criteria: inverted u-rack, inverted u-rack series, and the post and ring rack.</p>

<p>LONG TERM PARKING</p>	<p>Residential Buildings: Covered bicycle racks/storage facilities must be provided for 15% of peak occupants.</p>	<p>While short term parking is designed for convenience and ease of use, long term parking is designed for security and weather protection. Long term parking should have easy access via effective guide signage, controlled access such as leased or on-demand lockers and keycard/code access garage cage or bicycle room, higher security from controlled access to cages rooms and lockers, safeguards for users such as effective lighting and visible surveillance cameras or security guards, weather protection such as a free standing shelter or indoor cage or room, and lockers and showers for longer commutes or inclement climates.</p>
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BIKE PARKING PLAN

Bike Parking Methodology & Data

In their Bicycle Parking Guideline, APBP defines how to program and distribute bicycle parking for a large building with several user groups. In some cases a small cluster of buildings may share a set of desire lines and may be able to be analyzed as a single large building. Virginia Tech utilizes APBP guidelines by dividing campus into 49 districts to collectively address the parking needs of a cluster of buildings in each district.

Shown below is the VT methodology for calculating the projected number of bike loops (which will hold 2 bikes each) by building use/type. This is an integration of both APBP and LEED standards. Following the methodology is an example of how to calculate the bike loop numbers.

Virginia Tech Bicycle Parking Methodology:

User Groups = Office Stations, Class/Lab Stations, Residential Stations, Dining Seats

Persons = Number of persons in the user group

% Bicycle = % of # persons in the user group expected to arrive by bicycle:

Office Stations: 5% of peak occupancy (PO) users (peak occupancy: 75%)

Class/Lab Stations: 10%

Residential Stations: 20%

Dining Seats: 10%

Bicycles = Number of bicycles for this user group (= # persons x % bicycle)

Required Loops = Number of needed non-enclosed inverted u-racks (= # bicycles / 2)

Existing Loops = Number of non-enclosed inverted u-racks already installed at the site

Note: Bike racks covers are only required for long-term residential parking (campus residential halls), but are encouraged for all high use areas. For residential bike parking: covered bicycle racks/storage facilities must be provided for 15% of peak occupants.

Example table:

University Building Bicycle Parking:

USER GROUP	#PERSONS	%BICYCLES	#BICYCLES	#SHORT TERM LOOPS	#EXISTING LOOPS	DIFFERENTIAL
Office Stations	100	5% PO	4	2		
Class/Lab Stations	100	10%	10	5		
Residential Stations	100	20%	20	10		
Dining Seats	100	10%	10	5		
TOTAL	400		44	22	20	-2

STATION DATA

Shown below are the station and loop data for the six major zones and their respective districts (which total 49). This section also identifies any shortfalls in the number of loops and/or any excess capacity based upon current conditions and existing number of loops.

Upper Quad Zone

DISTRICT 1

North End Bicycle Parking:

USER GROUP	#PERSONS	%BICYCLES	#BICYCLES	#REQUIRED LOOPS	#EXISTING LOOPS	DIFFERENTIAL
Office Stations	300	5% PO	11	5.5	6	+0.5

District Totals: Required Loops: 5.5 / Existing Loops: 6 / Excess: 0.5

DISTRICT 2

Surge Space Building Bicycle Parking:

USER GROUP	#PERSONS	%BICYCLES	#BICYCLES	#REQUIRED LOOPS	#EXISTING LOOPS	DIFFERENTIAL
Office Stations	41	5% PO	2	1		
Class/Lab Stations	1,114	10%	111	55.5		
TOTAL	1,155		113	56.5	44	-12.5

District Totals: Required Loops: 62 / Existing Loops: 50 / Shortage: 12

DISTRICT 4

Military Building Bicycle Parking:

USER GROUP	#PERSONS	%BICYCLES	#BICYCLES	#REQUIRED LOOPS	#EXISTING LOOPS	DIFFERENTIAL
Office Stations	39	5% PO	2	1		
Class/Lab Stations	160	10%	16	8		
TOTAL	199		18	9	6	-3

Power House Bicycle Parking:

USER GROUP	#PERSONS	%BICYCLES	#BICYCLES	#REQUIRED LOOPS	#EXISTING LOOPS	DIFFERENTIAL
Office Stations	11	5% PO	1	0.5	0	-0.5

District Totals: Required Loops: 9.5 / Existing Loops: 6 / Shortage: 3.5

DISTRICT 5

Femoyer Hall Bicycle Parking:

USER GROUP	#PERSONS	%BICYCLES	#BICYCLES	#REQUIRED LOOPS	#EXISTING LOOPS	DIFFERENTIAL
Office Stations	152	5% PO	6	3		
Class/Lab Stations	63	10%	6	3		
TOTAL	215		12	6	10	-4

Art & Design Learning Center Bicycle Parking:

USER GROUP	#PERSONS	%BICYCLES	#BICYCLES	#REQUIRED LOOPS	#EXISTING LOOPS	DIFFERENTIAL
Office Stations	7	5% PO	1	0.5		
Class/Lab Stations	124	10%	12	6		
TOTAL	131		13	6.5	0	-6.5

Thomas Hall Bicycle Parking:

USER GROUP	#PERSONS	%BICYCLES	#BICYCLES	#REQUIRED LOOPS	#EXISTING LOOPS	DIFFERENTIAL
Residential Stations	234	20%	47	23.5	28	+4.5

Major Williams Hall Bicycle Parking:

USER GROUP	#PERSONS	%BICYCLES	#BICYCLES	#REQUIRED LOOPS	#EXISTING LOOPS	DIFFERENTIAL
Office Stations	197	5% PO	7	3.5		
Class/Lab Stations	339	10%	34	17		
TOTAL	536		41	20.5	15	-5.5

Liberal Arts Building Bicycle Parking:

USER GROUP	#PERSONS	%BICYCLES	#BICYCLES	#REQUIRED LOOPS	#EXISTING LOOPS	DIFFERENTIAL
Office Stations	33	5% PO	1	0.5		
Class/Lab Stations	121	10%	12	6		
TOTAL	154		13	6.5	0	-6.5

College of Sciences Building Bicycle Parking:

USER GROUP	#PERSONS	%BICYCLES	#BICYCLES	#REQUIRED LOOPS	#EXISTING LOOPS	DIFFERENTIAL
Office Stations	18	5% PO	1	0.5		
Class/Lab Stations	40	10%	4	2		
TOTAL	58		5	2.5	0	-2.5

Shanks Hall Bicycle Parking:

USER GROUP	#PERSONS	%BICYCLES	#BICYCLES	#REQUIRED LOOPS	#EXISTING LOOPS	DIFFERENTIAL
Office Stations	144	5% PO	5	2.5		
Class/Lab Stations	195	10%	20	10		
TOTAL	339		25	12.5	19	-6.5

Monteith Hall Bicycle Parking:

USER GROUP	#PERSONS	%BICYCLES	#BICYCLES	#REQUIRED LOOPS	#EXISTING LOOPS	DIFFERENTIAL
Residential Stations	210	20%	42	21	0	-21

District Totals: Required Loops: 99 / Existing Loops: 72 / Shortage: 27

DISTRICT 6

Moss Center for the Arts Building Bicycle Parking:

USER GROUP	#PERSONS	%BICYCLES	#BICYCLES	#REQUIRED LOOPS	#EXISTING LOOPS	DIFFERENTIAL
Office Stations	60	5% PO	2	1	3	+2

District Totals: Required Loops: 1 / Existing Loops: 3 / Excess: 2

DISTRICT 7

Brodie Hall Bicycle Parking:

USER GROUP	#PERSONS	%BICYCLES	#BICYCLES	#REQUIRED LOOPS	#EXISTING LOOPS	DIFFERENTIAL
Residential Stations	322	20%	64	32	7	-25

Lane Hall Bicycle Parking:

USER GROUP	#PERSONS	%BICYCLES	#BICYCLES	#REQUIRED LOOPS	#EXISTING LOOPS	DIFFERENTIAL
Office Stations	95	5% PO	4	2		
Class/Lab Stations	60	10%	9	4.5		
TOTAL	155		13	6.5	7	+0.5

Rasche Hall Bicycle Parking:

USER GROUP	#PERSONS	%BICYCLES	#BICYCLES	#REQUIRED LOOPS	#EXISTING LOOPS	DIFFERENTIAL
Residential Stations	303	20%	61	30.5	5	-25.5

District Totals: Required Loops: 69 / Existing Loops: 19 / Shortage: 50

DISTRICT 8

Torgersen Hall Bicycle Parking:

USER GROUP	#PERSONS	%BICYCLES	#BICYCLES	#REQUIRED LOOPS	#EXISTING LOOPS	DIFFERENTIAL
Office Stations	234	5% PO	9	4.5		
Class/Lab Stations	938	10%	94	47		
TOTAL	1,172		103	51.5	81	+29.5

District Totals: Required Loops: 51.5 / Existing Loops: 81 / Excess: 29.5

Downtown Campus ZoneDISTRICT 9

Henderson Hall Bicycle Parking:

USER GROUP	#PERSONS	%BICYCLES	#BICYCLES	#REQUIRED LOOPS	#EXISTING LOOPS	DIFFERENTIAL
Office Stations	43	5% PO	2	1		
Class/Lab Stations	313	10%	31	15.5		
TOTAL	356		33	16.5	14	-2.5

Theater 101 Bicycle Parking:

USER GROUP	#PERSONS	%BICYCLES	#BICYCLES	#REQUIRED LOOPS	#EXISTING LOOPS	DIFFERENTIAL
Office Stations	80	5% PO	3	1.5	11	+9.5

District Totals: Required Loops: 18 / Existing Loops: 25 / Excess: 7

DISTRICT 10

Squires Student Center Bicycle Parking:

USER GROUP	#PERSONS	%BICYCLES	#BICYCLES	#REQUIRED LOOPS	#EXISTING LOOPS	DIFFERENTIAL
Office Stations	85	5% PO	3	1.5		
Class/Lab Stations	1606	10%	161	80.5		
Dining Seats	246	10%	25	12.5		
TOTAL	1937		189	94.5	53	-41.5

Newman Library & University Bookstore Bicycle Parking:

USER GROUP	#PERSONS	%BICYCLES	#BICYCLES	#REQUIRED LOOPS	#EXISTING LOOPS	DIFFERENTIAL
Office Stations	93	5% PO	4	2		
Class/Lab Stations	834	10%	83	42		
TOTAL	927		87	44	57	+13

Graduate Life Center Bicycle Parking:

USER GROUP	#PERSONS	%BICYCLES	#BICYCLES	#REQUIRED LOOPS	#EXISTING LOOPS	DIFFERENTIAL
Office Stations	71	5% PO	3	1.5		
Class/Lab Stations	951	10%	95	47.5		
Dinning Seats	350	10%	35	17.5		
Residential Stations	218	20%	44	22		
TOTAL	1590		177	88.5	20	-68.5

District Totals: Required Loops: 227 / Existing Loops: 130 / Shortage: 97

DISTRICT 11

Architecture Annex Bicycle Parking:

USER GROUP	#PERSONS	%BICYCLES	#BICYCLES	#REQUIRED LOOPS	#EXISTING LOOPS	DIFFERENTIAL
Office Stations	34	5% PO	1	0.5		
Class/Lab Stations	242	10%	24	12		
TOTAL	276		25	12.5	13	+0.5

Media Annex Bicycle Parking:

USER GROUP	#PERSONS	%BICYCLES	#BICYCLES	#REQUIRED LOOPS	#EXISTING LOOPS	DIFFERENTIAL
Office Stations	19	5% PO	1	0.5	0	-0.5

Media Building Bicycle Parking:

USER GROUP	#PERSONS	%BICYCLES	#BICYCLES	#REQUIRED LOOPS	#EXISTING LOOPS	DIFFERENTIAL
Office Stations	39	5% PO	2	1	0	-1

Visual Arts Building Bicycle Parking:

USER GROUP	#PERSONS	%BICYCLES	#BICYCLES	#REQUIRED LOOPS	#EXISTING LOOPS	DIFFERENTIAL
Office Stations	15	5% PO	1	0.5		
Class/Lab Stations	60	10%	6	3		
TOTAL	75		7	3.5	2	-1.5

District Totals: Required Loops: 17.5 / Existing Loops: 15 / Shortage: 2.5

North Drillfield ZoneDISTRICT 13

Perry Street Parking Garage Bicycle Parking:

USER GROUP	#PERSONS	%BICYCLES	#BICYCLES	#REQUIRED LOOPS	#EXISTING LOOPS	DIFFERENTIAL
Office Stations	5	5% PO	1	1	3	+2

District Totals: Required Loops: 1 / Existing Loops: 3 / Excess: 2

DISTRICT 14

Durham Hall Bicycle Parking:

USER GROUP	#PERSONS	%BICYCLES	#BICYCLES	#REQUIRED LOOPS	#EXISTING LOOPS	DIFFERENTIAL
Office Stations	253	5% PO	9	4.5		
Class/Lab Stations	399	10%	40	20		
TOTAL	652		49	24.5	15	-9.5

Whittemore Hall Bicycle Parking:

USER GROUP	#PERSONS	%BICYCLES	#BICYCLES	#REQUIRED LOOPS	#EXISTING LOOPS	DIFFERENTIAL
Office Stations	268	5% PO	10	5		
Class/Lab Stations	1,176	10%	118	59		
TOTAL	1,444		128	64	28	-36

District Totals: Required Loops: 88 / Existing Loops: 43 / Shortage: 45

DISTRICT 15

ICTAS Hall Bicycle Parking:

USER GROUP	#PERSONS	%BICYCLES	#BICYCLES	#REQUIRED LOOPS	#EXISTING LOOPS	DIFFERENTIAL
Office Stations	124	5% PO	7	3.5		
Class/Lab Stations	134	10%	13	6.5		
TOTAL	258		20	10	6	-4

Lavery Hall Bicycle Parking:

USER GROUP	#PERSONS	%BICYCLES	#BICYCLES	#REQUIRED LOOPS	#EXISTING LOOPS	DIFFERENTIAL
Office Stations	11	5% PO	1	1		
Class/Lab Stations	396	10%	40	20		
Dining Seats	833	10%	83	41.5		
TOTAL	1240			62.5	31	-31.5

Randolph Hall Bicycle Parking:

USER GROUP	#PERSONS	%BICYCLES	#BICYCLES	#REQUIRED LOOPS	#EXISTING LOOPS	DIFFERENTIAL
Office Stations	228	5% PO	9	4.5		
Class/Lab Stations	1,493	10%	149	74.5		
TOTAL	1,721		158	79	52	-27

Hancock Hall Bicycle Parking:

USER GROUP	#PERSONS	%BICYCLES	#BICYCLES	#REQUIRED LOOPS	#EXISTING LOOPS	DIFFERENTIAL
Office Stations	24	5% PO	1	0.5		
Class/Lab Stations	625	10%	63	31.5		
TOTAL	649		64	32	5	-27

District Totals: Required Loops: 183.5 / Existing Loops: 94 / Shortage: 89.5

DISTRICT 16

McBryde Hall Bicycle Parking:

USER GROUP	#PERSONS	%BICYCLES	#BICYCLES	#REQUIRED LOOPS	#EXISTING LOOPS	DIFFERENTIAL
Office Stations	321	5% PO	12	6		
Class/Lab Stations	2,451	10%	245	122.5		
TOTAL	2,771		257	128.5	64	-64.5

Holden Hall Bicycle Parking:

USER GROUP	#PERSONS	%BICYCLES	#BICYCLES	#REQUIRED LOOPS	#EXISTING LOOPS	DIFFERENTIAL
Office Stations	86	5% PO	3	1.5		
Class/Lab Stations	539	10%	54	27		
TOTAL	625		57	28.5	21	-7.5

Norris Hall Bicycle Parking:

USER GROUP	#PERSONS	%BICYCLES	#BICYCLES	#REQUIRED LOOPS	#EXISTING LOOPS	DIFFERENTIAL
Office Stations	97	5% PO	4	2		
Class/Lab Stations	340	10%	34	17		
TOTAL	437		38	19	18	-1

Patton Hall Bicycle Parking:

USER GROUP	#PERSONS	%BICYCLES	#BICYCLES	#REQUIRED LOOPS	#EXISTING LOOPS	DIFFERENTIAL
Office Stations	177	5% PO	7	3.5		
Class/Lab Stations	463	10%	46	23		
TOTAL	640		53	26.5	23	-3.5

District Totals: Required Loops: 202.5 / Existing Loops: 126 / Shortage: 76.5

DISTRICT 17

Bishop Favrao Hall Bicycle Parking:

USER GROUP	#PERSONS	%BICYCLES	#BICYCLES	#REQUIRED LOOPS	#EXISTING LOOPS	DIFFERENTIAL
Office Stations	15	5% PO	1	0.5		
Class/Lab Stations	342	10%	34	17		
TOTAL	357		35	17.5	8	-9.5

District Totals: Required Loops: 17.5 / Existing Loops: 8 / Shortage: 9.5

DISTRICT 18

Burruss Hall Bicycle Parking:

USER GROUP	#PERSONS	%BICYCLES	#BICYCLES	#REQUIRED LOOPS	#EXISTING LOOPS	DIFFERENTIAL
Office Stations	73	5% PO	3	1.5		
Class/Lab Stations	287	10%	29	14.5		
TOTAL	360		32	16	54	+38

Johnson Student Center Bicycle Parking:

USER GROUP	#PERSONS	%BICYCLES	#BICYCLES	#REQUIRED LOOPS	#EXISTING LOOPS	DIFFERENTIAL
Office Stations	2	5% PO	1	0.5		
Class/Lab Stations	199	10%	20	10		
TOTAL	202		21	10.5	19	+8.5

Burchard Hall Bicycle Parking:

USER GROUP	#PERSONS	%BICYCLES	#BICYCLES	#REQUIRED LOOPS	#EXISTING LOOPS	DIFFERENTIAL
Office Stations	21	5% PO	1	0.5		
Class/Lab Stations	375	10%	38	19		
TOTAL	396		39	19.5	15	-4.5

Cowgill Hall Bicycle Parking:

USER GROUP	#PERSONS	%BICYCLES	#BICYCLES	#REQUIRED LOOPS	#EXISTING LOOPS	DIFFERENTIAL
Office Stations	58	5% PO	2	1		
Class/Lab Stations	782	10%	78	39		
TOTAL	840		80	40	25	-15

District Totals: Required Loops: 86 / Existing Loops: 113 / Excess: 27

DISTRICT 20

Derring Hall Bicycle Parking:

USER GROUP	#PERSONS	%BICYCLES	#BICYCLES	#REQUIRED LOOPS	#EXISTING LOOPS	DIFFERENTIAL
Office Stations	274	5% PO	10	5		
Class/Lab Stations	1010	10%	101	50.5		
TOTAL	1284		111	55.5	40	-15.5

Hahn Hall North Wing Bicycle Parking:

USER GROUP	#PERSONS	%BICYCLES	#BICYCLES	#REQUIRED LOOPS	#EXISTING LOOPS	DIFFERENTIAL
Office Stations	7	5% PO	1	1		
Class/Lab Stations	1040	10%	104	52		
TOTAL	1047		105	53	16	-37

Robeson Hall & Hahn Hall South Wing Bicycle Parking:

USER GROUP	#PERSONS	%BICYCLES	#BICYCLES	#REQUIRED LOOPS	#EXISTING LOOPS	DIFFERENTIAL
Office Stations	254	5% PO	10	5		
Class/Lab Stations	619	10%	62	31		
TOTAL	873		72	36	20	-16

Pamplin Hall Bicycle Parking:

USER GROUP	#PERSONS	%BICYCLES	#BICYCLES	#REQUIRED LOOPS	#EXISTING LOOPS	DIFFERENTIAL
Office Stations	390	5% PO	15	7.5		
Class/Lab Stations	1118	10%	112	56		
TOTAL	1508		127	63.5	28	-35.5

District Totals: Required Loops: 208 / Existing Loops: 104 / Shortage: 104

DISTRICT 21

Williams Hall Bicycle Parking:

USER GROUP	#PERSONS	%BICYCLES	#BICYCLES	#REQUIRED LOOPS	#EXISTING LOOPS	DIFFERENTIAL
Office Stations	79	5% PO	3	1.5		
Class/Lab Stations	314	10%	31	15.5		
TOTAL	393		34	17	23	+6

Davidson Hall Bicycle Parking:

USER GROUP	#PERSONS	%BICYCLES	#BICYCLES	#REQUIRED LOOPS	#EXISTING LOOPS	DIFFERENTIAL
Class/Lab Stations	901	10%	90	45	18	-27

District Totals: Required Loops: 62 / Existing Loops: 41 / Shortage: 21

South Drillfield Zone

DISTRICT 23

Eggleston Hall Bicycle Parking:

USER GROUP	#PERSONS	%BICYCLES	#BICYCLES	#REQUIRED LOOPS	#EXISTING LOOPS	DIFFERENTIAL
Residential Stations	424	20%	85	42.5		
Office Stations	62	5% PO	2	1		
Class/Lab Stations	75	10%	8	4		
TOTAL	561		95	47.5	59	+11.5

Owens Hall Bicycle Parking:

USER GROUP	#PERSONS	%BICYCLES	#BICYCLES	#REQUIRED LOOPS	#EXISTING LOOPS	DIFFERENTIAL
Office Stations	114	5% PO	4	2		
Dinning Seats	700	10%	70	35		
TOTAL	814		74	37	38	+1

District Totals: Required Loops: 84.5 / Existing Loops: 97 / Excess: 12.5

DISTRICT 24

Vawter Hall Bicycle Parking:

USER GROUP	#PERSONS	%BICYCLES	#BICYCLES	#REQUIRED LOOPS	#EXISTING LOOPS	DIFFERENTIAL
Residential Stations	336	20%	67	33.5	30	-3.5

Newman Hall Bicycle Parking:

USER GROUP	#PERSONS	%BICYCLES	#BICYCLES	#REQUIRED LOOPS	#EXISTING LOOPS	DIFFERENTIAL
Residential Stations	280	20%	56	28	27	-1

Barringer Hall Bicycle Parking:

USER GROUP	#PERSONS	%BICYCLES	#BICYCLES	#REQUIRED LOOPS	#EXISTING LOOPS	DIFFERENTIAL
Residential Stations	228	20%	46	23	23	0

Miles Hall Bicycle Parking:

USER GROUP	#PERSONS	%BICYCLES	#BICYCLES	#REQUIRED LOOPS	#EXISTING LOOPS	DIFFERENTIAL
Residential Stations	230	20%	46	23	14	-9

Johnson Hall Bicycle Parking:

USER GROUP	#PERSONS	%BICYCLES	#BICYCLES	#REQUIRED LOOPS	#EXISTING LOOPS	DIFFERENTIAL
Residential Stations	186	20%	37	18.5	17	-1.5

District Totals: Required Loops: 126 / Existing Loops: 111 / Shortage: 15

DISTRICT 25

War Memorial Gym Bicycle Parking:

USER GROUP	#PERSONS	%BICYCLES	#BICYCLES	#REQUIRED LOOPS	#EXISTING LOOPS	DIFFERENTIAL
Office Stations	120	5% PO	5	2.5		
Class/Lab Stations	335	10%	34	17		
Daily Attendance	779	10%	78	39		
TOTAL	1,234		117	58.5	20	-38.5

District Totals: Required Loops: 19.5 / Existing Loops: 20 / Shortage: 38.5

DISTRICT 26

Payne Hall Bicycle Parking:

USER GROUP	#PERSONS	%BICYCLES	#BICYCLES	#REQUIRED LOOPS	#EXISTING LOOPS	DIFFERENTIAL
Residential Stations	294	20%	59	29.5	22	-7.5

New Resident Hall Bicycle Parking:

USER GROUP	#PERSONS	%BICYCLES	#BICYCLES	#REQUIRED LOOPS	#EXISTING LOOPS	DIFFERENTIAL
Residential Stations	246	20%	49	24.5	29	+4.5

Peddrew-Yates Hall Bicycle Parking:

USER GROUP	#PERSONS	%BICYCLES	#BICYCLES	#REQUIRED LOOPS	#EXISTING LOOPS	DIFFERENTIAL
Residential Stations	247	20%	49	24.5	33	+8.5

Pritchard Hall Bicycle Parking:

USER GROUP	#PERSONS	%BICYCLES	#BICYCLES	#REQUIRED LOOPS	#EXISTING LOOPS	DIFFERENTIAL
Residential Stations	1,060	20%	212	106	28	-78

O'Shaughnessy Hall Bicycle Parking:

USER GROUP	#PERSONS	%BICYCLES	#BICYCLES	#REQUIRED LOOPS	#EXISTING LOOPS	DIFFERENTIAL
Residential Stations	359	20%	72	36	26	-10

Lee Hall Bicycle Parking:

USER GROUP	#PERSONS	%BICYCLES	#BICYCLES	#REQUIRED LOOPS	#EXISTING LOOPS	DIFFERENTIAL
Residential Stations	850	20%	170	85	40	-45

District Totals: Required Loops: 305.5 / Existing Loops: 178 / Shortage: 127.5

DISTRICT 27

Campbell Hall Bicycle Parking:

USER GROUP	#PERSONS	%BICYCLES	#BICYCLES	#REQUIRED LOOPS	#EXISTING LOOPS	DIFFERENTIAL
Residential Stations	322	20%	64	32	23	-9

Slusher Hall Bicycle Parking:

USER GROUP	#PERSONS	%BICYCLES	#BICYCLES	#REQUIRED LOOPS	#EXISTING LOOPS	DIFFERENTIAL
Residential Stations	668	20%	134	67	43	-24

District Totals: Required Loops: 99 / Existing Loops: 66 / Shortage: 33

DISTRICT 28

Dietrick Hall Bicycle Parking:

USER GROUP	#PERSONS	%BICYCLES	#BICYCLES	#REQUIRED LOOPS	#EXISTING LOOPS	DIFFERENTIAL
Office Stations	20	5% PO	1	0.5		
Dining Seats	1,381	10%	138	69		
TOTAL	1,401		139	69.5	25	-44.5

District Totals: Required Loops: 69.5 / Existing Loops: 25 / Shortage: 44.5

DISTRICT 29

Ambler-Johnson Hall Bicycle Parking:

USER GROUP	#PERSONS	%BICYCLES	#BICYCLES	#REQUIRED LOOPS	#EXISTING LOOPS	DIFFERENTIAL
Residential Stations	1,255	20%	251	125.5	80	-45.5

Cochrane Hall Bicycle Parking:

USER GROUP	#PERSONS	%BICYCLES	#BICYCLES	#REQUIRED LOOPS	#EXISTING LOOPS	DIFFERENTIAL
Residential Stations	428	20%	86	43		
Dinning Seats	425	10%	43	21.5		
TOTAL	853		129	64.5	49	-15.5

District Totals: Required Loops: 190 / Existing Loops: 129 / Shortage: 61

DISTRICT 30

Price Hall Bicycle Parking:

USER GROUP	#PERSONS	%BICYCLES	#BICYCLES	#REQUIRED LOOPS	#EXISTING LOOPS	DIFFERENTIAL
Class/Lab Stations	252	10%	25	12.5		
Office Stations	181	5%PO	7	3.5		
TOTAL	433		32	16	7	-9

Sandy Hall Bicycle Parking:

USER GROUP	#PERSONS	%BICYCLES	#BICYCLES	#REQUIRED LOOPS	#EXISTING LOOPS	DIFFERENTIAL
Class/Lab Stations	60	10%	6	5		
Office Stations	39	5%PO	1	0.5		
TOTAL	99		7	5.5	12	+6.5

Hutcheson Hall Bicycle Parking:

USER GROUP	#PERSONS	%BICYCLES	#BICYCLES	#REQUIRED LOOPS	#EXISTING LOOPS	DIFFERENTIAL
Class/Lab Stations	391	10%	39	19.5		
Office Stations	229	5%PO	9	4.5		
TOTAL	620		48	24	32	+8

Smyth Hall Bicycle Parking:

USER GROUP	#PERSONS	%BICYCLES	#BICYCLES	#REQUIRED LOOPS	#EXISTING LOOPS	DIFFERENTIAL
Class/Lab Stations	424	10%	42	21		
Office Stations	162	5%PO	6	3		
TOTAL	586		48	24	11	-13

Seitz Hall Bicycle Parking:

USER GROUP	#PERSONS	%BICYCLES	#BICYCLES	#REQUIRED LOOPS	#EXISTING LOOPS	DIFFERENTIAL
Class/Lab Stations	398	10%	40	20		
Office Stations	81	5%PO	3	1.5		
TOTAL	472		43	21.5	5	-16.5

Agnew Hall Bicycle Parking:

USER GROUP	#PERSONS	%BICYCLES	#BICYCLES	#REQUIRED LOOPS	#EXISTING LOOPS	DIFFERENTIAL
Office Stations	28	5%PO	1	0.5	5	+4.5

Saunders Hall Bicycle Parking:

USER GROUP	#PERSONS	%BICYCLES	#BICYCLES	#REQUIRED LOOPS	#EXISTING LOOPS	DIFFERENTIAL
Class/Lab Stations	321	10%	32	16		
Office Stations	51	5%PO	2	1		
TOTAL	372		34	17	4	-13

District Totals: Required Loops: 108.5 / Existing Loops: 76 / Shortage: 32.5

DISTRICT 31

Fralin Biotechnology Center Bicycle Parking:

USER GROUP	#PERSONS	%BICYCLES	#BICYCLES	#REQUIRED LOOPS	#EXISTING LOOPS	DIFFERENTIAL
Class/Lab Stations	284	10%	28	14		
Office Stations	23	5%PO	1	0.5		
TOTAL	307		29	14.5	14	-0.5

Latham Hall Bicycle Parking:

USER GROUP	#PERSONS	%BICYCLES	#BICYCLES	#REQUIRED LOOPS	#EXISTING LOOPS	DIFFERENTIAL
Office Stations	43	5%PO	2	1	11	+10

Cheatham Hall Bicycle Parking:

USER GROUP	#PERSONS	%BICYCLES	#BICYCLES	#REQUIRED LOOPS	#EXISTING LOOPS	DIFFERENTIAL
Class/Lab Stations	451	10%	45	22.5		
Office Stations	290	5%PO	11	5.5		
TOTAL	741		56	28	21	-7

Engel Hall Bicycle Parking:

USER GROUP	#PERSONS	%BICYCLES	#BICYCLES	#REQUIRED LOOPS	#EXISTING LOOPS	DIFFERENTIAL
Class/Lab Stations	385	10%	39	19.5		
Office Stations	27	5%PO	1	0.5		
TOTAL	412		40	20	7	-13

District Totals: Required Loops: 63.5 / Existing Loops: 53 / Shortage: 10.5

DISTRICT 32

Harper Hall Bicycle Parking:

USER GROUP	#PERSONS	%BICYCLES	#BICYCLES	#REQUIRED LOOPS	#EXISTING LOOPS	DIFFERENTIAL
Residential Stations	276	20%	55	27.5	27	-0.5

Student Services Building Bicycle Parking:

USER GROUP	#PERSONS	%BICYCLES	#BICYCLES	#REQUIRED LOOPS	#EXISTING LOOPS	DIFFERENTIAL
Office Stations	147	5% PO	6	3	32	+29

New Hall West Bicycle Parking:

USER GROUP	#PERSONS	%BICYCLES	#BICYCLES	#REQUIRED LOOPS	#EXISTING LOOPS	DIFFERENTIAL
Residential Stations	419	20%	84	42		
Office Stations	78	5%PO	29	14.5		
TOTAL	497		113	56.5	20	-36.5

Smith Career Center Bicycle Parking:

USER GROUP	#PERSONS	%BICYCLES	#BICYCLES	#REQUIRED LOOPS	#EXISTING LOOPS	DIFFERENTIAL
Office Stations	141	5% PO	5	2.5	14	+11.5

District Totals: Required Loops: 89.5 / Existing Loops: 93 / Excess: 3.5

West Campus Zone

DISTRICT 33

Inn at Virginia Tech & Skelton Conference Center Bicycle Parking:

USER GROUP	#PERSONS	%BICYCLES	#BICYCLES	#REQUIRED LOOPS	#EXISTING LOOPS	DIFFERENTIAL
Office Stations	52	5%PO	2	1	12	+11

District Totals: Required Loops: 1 / Existing Loops: 12 / Excess: 11

DISTRICT 34

Oak Lane Building A. Bicycle Parking:

USER GROUP	#PERSONS	%BICYCLES	#BICYCLES	#REQUIRED LOOPS	#EXISTING LOOPS	DIFFERENTIAL
Residential Stations	36	20%	7	4	7	+3

Oak Lane Building B. Bicycle Parking:

USER GROUP	#PERSONS	%BICYCLES	#BICYCLES	#REQUIRED LOOPS	#EXISTING LOOPS	DIFFERENTIAL
Residential Stations	36	20%	7	4	7	+3

Oak Lane Building C. Bicycle Parking:

USER GROUP	#PERSONS	%BICYCLES	#BICYCLES	#REQUIRED LOOPS	#EXISTING LOOPS	DIFFERENTIAL
Residential Stations	36	20%	7	4	7	+3

Oak Lane Building D. Bicycle Parking:

USER GROUP	#PERSONS	%BICYCLES	#BICYCLES	#REQUIRED LOOPS	#EXISTING LOOPS	DIFFERENTIAL
Residential Stations	36	20%	7	4	7	+3

Oak Lane Building E. Bicycle Parking:

USER GROUP	#PERSONS	%BICYCLES	#BICYCLES	#REQUIRED LOOPS	#EXISTING LOOPS	DIFFERENTIAL
Residential Stations	36	20%	7	4	0	-4

Oak Lane Building F. Bicycle Parking:

USER GROUP	#PERSONS	%BICYCLES	#BICYCLES	#REQUIRED LOOPS	#EXISTING LOOPS	DIFFERENTIAL
Residential Stations	36	20%	7	4	0	-4

Oak Lane Building G. Bicycle Parking:

USER GROUP	#PERSONS	%BICYCLES	#BICYCLES	#REQUIRED LOOPS	#EXISTING LOOPS	DIFFERENTIAL
Residential Stations	36	20%	7	4	7	+3

Oak Lane Building H. Bicycle Parking:

USER GROUP	#PERSONS	%BICYCLES	#BICYCLES	#REQUIRED LOOPS	#EXISTING LOOPS	DIFFERENTIAL
Residential Stations	36	20%	7	4	0	-4

Oak Lane Building I. Bicycle Parking:

USER GROUP	#PERSONS	%BICYCLES	#BICYCLES	#REQUIRED LOOPS	#EXISTING LOOPS	DIFFERENTIAL
Residential Stations	36	20%	7	4	0	-4

Oak Lane Building J. Bicycle Parking:

USER GROUP	#PERSONS	%BICYCLES	#BICYCLES	#REQUIRED LOOPS	#EXISTING LOOPS	DIFFERENTIAL
Residential Stations	36	20%	7	4	0	-4

Oak Lane Building K.L. Bicycle Parking:

USER GROUP	#PERSONS	%BICYCLES	#BICYCLES	#REQUIRED LOOPS	#EXISTING LOOPS	DIFFERENTIAL
Residential Stations	64	20%	13	7	16	+9

Oak Lane Building M.N. Bicycle Parking:

USER GROUP	#PERSONS	%BICYCLES	#BICYCLES	#REQUIRED LOOPS	#EXISTING LOOPS	DIFFERENTIAL
Residential Stations	64	20%	13	7	16	+9

Oak Lane Building O.P. Bicycle Parking:

USER GROUP	#PERSONS	%BICYCLES	#BICYCLES	#REQUIRED LOOPS	#EXISTING LOOPS	DIFFERENTIAL
Residential Stations	64	20%	13	7	16	+9

Oak Lane Building Q.R. Bicycle Parking:

USER GROUP	#PERSONS	%BICYCLES	#BICYCLES	#REQUIRED LOOPS	#EXISTING LOOPS	DIFFERENTIAL
Residential Stations	64	20%	13	7	16	+9

Sigma Phi Epsilon Fraternity Bicycle Parking:

USER GROUP	#PERSONS	%BICYCLES	#BICYCLES	#REQUIRED LOOPS	#EXISTING LOOPS	DIFFERENTIAL
Residential Stations	36	20%	7	4	0	-4

District Totals: Required Loops: 72 / Existing Loops: 99 / Excess: 27

DISTRICT 35

Wright House Bicycle Parking:

USER GROUP	#PERSONS	%BICYCLES	#BICYCLES	#REQUIRED LOOPS	#EXISTING LOOPS	DIFFERENTIAL
Office Stations	8	5% PO	1	0.5		
Class Stations	25	10%	3	1.5		
TOTAL	33		2	2	9	+7

District Totals: Required Loops: 2 / Existing Loops: 9 / Excess: 7

DISTRICT 37

Biosciences Building Bicycle Parking:

USER GROUP	#PERSONS	%BICYCLES	#BICYCLES	#REQUIRED LOOPS	#EXISTING LOOPS	DIFFERENTIAL
Office Stations	0	5%PO	0	0	10	0

District Totals: Required Loops: 0 / Existing Loops: 10

DISTRICT 39

Wallace Hall Bicycle Parking:

USER GROUP	#PERSONS	%BICYCLES	#BICYCLES	#REQUIRED LOOPS	#EXISTING LOOPS	DIFFERENTIAL
Class Stations	757	10%	76	38		
Office Stations	137	5%PO	5	2.5		
TOTAL	894		81	40.5	10	-30.5

Hilcrest Hall Bicycle Parking:

USER GROUP	#PERSONS	%BICYCLES	#BICYCLES	#REQUIRED LOOPS	#EXISTING LOOPS	DIFFERENTIAL
Residential Stations	112	20%	22	11		
Class Stations	106	10%	11	5.5		
Office Stations	39	5%PO	1	0.5		
TOTAL	257		34	17	10	-7

Wallace Annex Hall Bicycle Parking:

USER GROUP	#PERSONS	%BICYCLES	#BICYCLES	#REQUIRED LOOPS	#EXISTING LOOPS	DIFFERENTIAL
Class Stations	14	10%	1	0.5		
Office Stations	4	5%PO	1	0.5		
TOTAL	18		2	1	0	-1

District Totals: Required Loops: 58.5 / Existing Loops: 20 / Shortage: 38.5

DISTRICT 40

ICTAS II Hall Bicycle Parking:

USER GROUP	#PERSONS	%BICYCLES	#BICYCLES	#REQUIRED LOOPS	#EXISTING LOOPS	DIFFERENTIAL
Office Stations	62	5%PO	2	1	10	+9

Bioinformatics Hall Bicycle Parking:

USER GROUP	#PERSONS	%BICYCLES	#BICYCLES	#REQUIRED LOOPS	#EXISTING LOOPS	DIFFERENTIAL
Office Stations	230	5%PO	9	4.5	10	+5.5

District Totals: Required Loops: 5.5 / Existing Loops: 20 / Excess: 14.5

DISTRICT 41

Litton-Reaves Hall Bicycle Parking:

USER GROUP	#PERSONS	%BICYCLES	#BICYCLES	#REQUIRED LOOPS	#EXISTING LOOPS	DIFFERENTIAL
Class Stations	1,076	10%	108	54		
Office Stations	158	5%PO	6	3		
TOTAL	1,234		114	57	32	-25

Life Sciences I Facility Bicycle Parking:

USER GROUP	#PERSONS	%BICYCLES	#BICYCLES	#REQUIRED LOOPS	#EXISTING LOOPS	DIFFERENTIAL
Class Stations	40	10%	4	2		
Office Stations	27	5%PO	1	0.5		
TOTAL	67		5	2.5	4	+1.5

District Totals: Required Loops: 59.5 / Existing Loops: 36 / Shortage: 23.5

DISTRICT 42

Vet-Med Building Bicycle Parking:

USER GROUP	#PERSONS	%BICYCLES	#BICYCLES	#REQUIRED LOOPS	#EXISTING LOOPS	DIFFERENTIAL
Class Stations	651	10%	65	32.5		
Office Stations	210	5%PO	8	4		
TOTAL	861		73	36.5	22	-14.5

District Totals: Required Loops: 36.5 / Existing Loops: 22 / Shortage: 14.5

DISTRICT 43

Food Science & Technology Building Bicycle Parking:

USER GROUP	#PERSONS	%BICYCLES	#BICYCLES	#REQUIRED LOOPS	#EXISTING LOOPS	DIFFERENTIAL
Class Stations	144	10%	14	7		
Office Stations	38	5%PO	1	0.5		
TOTAL	182		15	7.5	4	-3.5

Greenhouses Bicycle Parking:

USER GROUP	#PERSONS	%BICYCLES	#BICYCLES	#REQUIRED LOOPS	#EXISTING LOOPS	DIFFERENTIAL
Class Stations	60	10%	6	3	7	+4

District Totals: Required Loops: 10.5 / Existing Loops: 11 / Excess: 0.5

Athletic ZoneDISTRICT 44

McComas Hall Bicycle Parking:

USER GROUP	#PERSONS	%BICYCLES	#BICYCLES	#REQUIRED LOOPS	#EXISTING LOOPS	DIFFERENTIAL
Class Stations	90	10%	9	4.5		
Office Stations	75	5%PO	3	1.5		
Daily Attendance	2,645	10%	265	132.5		
TOTAL	2,810		277	138.5	63	-75.5

District Totals: Required Loops: 138.5 / Existing Loops: 63 / Shortage: 75.5

DISTRICT 45

Cassell Coliseum Bicycle Parking:

USER GROUP	#PERSONS	%BICYCLES	#BICYCLES	#REQUIRED LOOPS	#EXISTING LOOPS	DIFFERENTIAL
Office Stations	93	5%PO	3	1.5	0	-1.5

Merryman Athletic Facility Bicycle Parking:

USER GROUP	#PERSONS	%BICYCLES	#BICYCLES	#REQUIRED LOOPS	#EXISTING LOOPS	DIFFERENTIAL
Office Stations	18	5%PO	1	0.5	19	+18.5

Hahn-Hurst Basketball Facility Bicycle Parking:

USER GROUP	#PERSONS	%BICYCLES	#BICYCLES	#REQUIRED LOOPS	#EXISTING LOOPS	DIFFERENTIAL
Office Stations	17	5%PO	1	0.5	5	+4.5

Cranwell International Center Bicycle Parking:

USER GROUP	#PERSONS	%BICYCLES	#BICYCLES	#REQUIRED LOOPS	#EXISTING LOOPS	DIFFERENTIAL
Class Stations	70	10%	7	3.5		
Office Stations	10	5%PO	1	0.5		
TOTAL	80		8	4	7	+3

District Totals: Required Loops: 6.5 / Existing Loops: 31 / Excess: 24.5

DISTRICT 47

Lane Stadium Bicycle Parking:

USER GROUP	#PERSONS	%BICYCLES	#BICYCLES	#REQUIRED LOOPS	#EXISTING LOOPS	DIFFERENTIAL
Class Stations	100	10%	10	5		
Office Stations	32	5%PO	1	0.5		
TOTAL	132		11	5.5	8	+2.5

District Totals: Required Loops: 5.5 / Existing Loops: 8 / Excess: 2.5

DISTRICT 48

Southgate Center Bicycle Parking:

USER GROUP	#PERSONS	%BICYCLES	#BICYCLES	#REQUIRED LOOPS	#EXISTING LOOPS	DIFFERENTIAL
Office Stations	240	5%PO	9	4.5	5	+0.5

Sterrett Center Bicycle Parking:

USER GROUP	#PERSONS	%BICYCLES	#BICYCLES	#REQUIRED LOOPS	#EXISTING LOOPS	DIFFERENTIAL
Office Stations	135	5%PO	5	2.5	0	-2.5

Grounds Building Bicycle Parking:

USER GROUP	#PERSONS	%BICYCLES	#BICYCLES	#REQUIRED LOOPS	#EXISTING LOOPS	DIFFERENTIAL
Office Stations	30	5%PO	1	0.5	0	-0.5

District Totals: Required Loops: 7.5 / Existing Loops: 5 / Shortage: 2.5

DISTRICT 49

Parking Services Office Bicycle Parking:

USER GROUP	#PERSONS	%BICYCLES	#BICYCLES	#REQUIRED LOOPS	#EXISTING LOOPS	DIFFERENTIAL
Office Stations	19	5%PO	1	1	4	+3

Environmental, Health & Safety Building Bicycle Parking:

USER GROUP	#PERSONS	%BICYCLES	#BICYCLES	#REQUIRED LOOPS	#EXISTING LOOPS	DIFFERENTIAL
Office Stations	29	5%PO	1	1	3	+2

Indoor Tennis Courts Bicycle Parking:

USER GROUP	#PERSONS	%BICYCLES	#BICYCLES	#REQUIRED LOOPS	#EXISTING LOOPS	DIFFERENTIAL
Office Stations	5	5%PO	1	1	5	+4

District Totals: Required Loops: 3 / Existing Loops: 12 / Excess: 9

LONG TERM BICYCLE PARKING

The following districts require long-term bicycle parking for the residential buildings located within the districts. The university currently follows the LEED standard for sheltered bicycle parking near residential halls. As residential buildings are remodeled or newly constructed or when funding is available, sheltered bicycle parking will be provided for 15% of peak occupants.

- District 5: Monteith Hall
- District 7: Brodie Hall, Rasche Hall
- District 10: Graduate Life Center
- District 23: Eggleston Hall
- District 24: Vawter Hall, Newman Hall, Barringer Hall, Johnson Hall, Miles Hall
- District 26: Payne Hall, New Resident Hall, Peddrew-Yates Hall, Pritchard Hall, O'Shaughnessy Hall, Lee Hall
- District 27: Cambell Hall, Slusher Hall
- District 29: Ambler-Johnson Hall, Cochrane Hall
- District 32: Harper Hall, New Hall West
- District 34: Oak Lane Buildings: A, B, C, D, E, F, G, H, I, J, KL, MN, OP, QR, Sigma Phi Epsilon
- District 39: Hilcrest Hall

STATION DATA

DISTRICT 5

Monteith Hall Bicycle Parking:

USER GROUP	#PERSONS	%SHELTERED BICYCLES	#BICYCLES	#REQUIRED SHELTERED LOOPS	#EXISTING SHELTERED LOOPS	DIFFERENTIAL
Residential Stations	210	15%	32	16	0	-16

District Totals: Required Loops: 16 / Existing Loops: 0 / Shortage: 16

DISTRICT 7

Brodie Hall Bicycle Parking:

USER GROUP	#PERSONS	%SHELTERED BICYCLES	#BICYCLES	#REQUIRED SHELTERED LOOPS	#EXISTING SHELTERED LOOPS	DIFFERENTIAL
Residential Stations	547	15%	82	41	0	-41

Rasche Hall Bicycle Parking:

USER GROUP	#PERSONS	%SHELTERED BICYCLES	#BICYCLES	#REQUIRED SHELTERED LOOPS	#EXISTING SHELTERED LOOPS	DIFFERENTIAL
Residential Stations	548	15%	82	41	0	-41

District Totals: Required Loops: 82 / Existing Loops: 0 / Shortage: -82

DISTRICT 10

Graduate Life Center Bicycle Parking:

USER GROUP	#PERSONS	%SHELTERED BICYCLES	#BICYCLES	#REQUIRED SHELTERED LOOPS	#EXISTING SHELTERED LOOPS	DIFFERENTIAL
Residential Stations	218	15%	33	17	0	-17

District Totals: Required Loops: 17 / Existing Loops: 0 / Shortage: -17

DISTRICT 23

Eggleston Hall Bicycle Parking:

USER GROUP	#PERSONS	%SHELTERED BICYCLES	#BICYCLES	#REQUIRED SHELTERED LOOPS	#EXISTING SHELTERED LOOPS	DIFFERENTIAL
Residential Stations	424	15%	64	32	0	-32

District Totals: Required Loops: 32 / Existing Loops: 0 / Shortage: -32

DISTRICT 24

Vawter Hall Bicycle Parking:

USER GROUP	#PERSONS	%SHELTERED BICYCLES	#BICYCLES	#REQUIRED SHELTERED LOOPS	#EXISTING SHELTERED LOOPS	DIFFERENTIAL
Residential Stations	336	15%	50	25	0	-25

Newman Hall Bicycle Parking:

USER GROUP	#PERSONS	%SHELTERED BICYCLES	#BICYCLES	#REQUIRED SHELTERED LOOPS	#EXISTING SHELTERED LOOPS	DIFFERENTIAL
Residential Stations	280	15%	42	21	0	-21

Barringer Hall Bicycle Parking:

USER GROUP	#PERSONS	%SHELTERED BICYCLES	#BICYCLES	#REQUIRED SHELTERED LOOPS	#EXISTING SHELTERED LOOPS	DIFFERENTIAL
Residential Stations	228	15%	34	17	0	-17

Miles Hall Bicycle Parking:

USER GROUP	#PERSONS	%SHELTERED BICYCLES	#BICYCLES	#REQUIRED SHELTERED LOOPS	#EXISTING SHELTERED LOOPS	DIFFERENTIAL
Residential Stations	230	15%	35	18	0	-18

Johnson Hall Bicycle Parking:

USER GROUP	#PERSONS	%SHELTERED BICYCLES	#BICYCLES	#REQUIRED SHELTERED LOOPS	#EXISTING SHELTERED LOOPS	DIFFERENTIAL
Residential Stations	186	15%	28	14	0	-14

District Totals: Required Loops: 95 / Existing Loops: 0 / Shortage: -95

DISTRICT 26

Payne Hall Bicycle Parking:

USER GROUP	#PERSONS	%SHELTERED BICYCLES	#BICYCLES	#REQUIRED SHELTERED LOOPS	#EXISTING SHELTERED LOOPS	DIFFERENTIAL
Residential Stations	294	15%	44	22	0	-22

New Resident Hall Bicycle Parking:

USER GROUP	#PERSONS	%SHELTERED BICYCLES	#BICYCLES	#REQUIRED SHELTERED LOOPS	#EXISTING SHELTERED LOOPS	DIFFERENTIAL
Residential Stations	246	15%	37	19	0	-19

Peddrew-Yates Hall Bicycle Parking:

USER GROUP	#PERSONS	%SHELTERED BICYCLES	#BICYCLES	#REQUIRED SHELTERED LOOPS	#EXISTING SHELTERED LOOPS	DIFFERENTIAL
Residential Stations	247	15%	37	19	0	-19

Pritchard Hall Bicycle Parking:

USER GROUP	#PERSONS	%SHELTERED BICYCLES	#BICYCLES	#REQUIRED SHELTERED LOOPS	#EXISTING SHELTERED LOOPS	DIFFERENTIAL
Residential Stations	1,060	15%	159	80	0	-80

O'Shaughnessy Hall Bicycle Parking:

USER GROUP	#PERSONS	%SHELTERED BICYCLES	#BICYCLES	#REQUIRED SHELTERED LOOPS	#EXISTING SHELTERED LOOPS	DIFFERENTIAL
Residential Stations	359	15%	54	27	7	-20

Lee Hall Bicycle Parking:

USER GROUP	#PERSONS	%SHELTERED BICYCLES	#BICYCLES	#REQUIRED SHELTERED LOOPS	#EXISTING SHELTERED LOOPS	DIFFERENTIAL
Residential Stations	850	15%	128	64	0	-64

District Totals: Required Loops: 224 / Existing Loops: 7 / Shortage: -217

DISTRICT 27

Campbell Hall Bicycle Parking:

USER GROUP	#PERSONS	%SHELTERED BICYCLES	#BICYCLES	#REQUIRED SHELTERED LOOPS	#EXISTING SHELTERED LOOPS	DIFFERENTIAL
Residential Stations	322	15%	48	24	0	-24

Slusher Hall Bicycle Parking:

USER GROUP	#PERSONS	%SHELTERED BICYCLES	#BICYCLES	#REQUIRED SHELTERED LOOPS	#EXISTING SHELTERED LOOPS	DIFFERENTIAL
Residential Stations	668	15%	100	50	0	-50

District Totals: Required Loops: 74 / Existing Loops: 0 / Shortage: -74

DISTRICT 29

Ambler-Johnson Hall Bicycle Parking:

USER GROUP	#PERSONS	%SHELTERED BICYCLES	#BICYCLES	#REQUIRED SHELTERED LOOPS	#EXISTING SHELTERED LOOPS	DIFFERENTIAL
Residential Stations	1,255	15%	188	94	49	-45

Cochrane Hall Bicycle Parking:

USER GROUP	#PERSONS	%SHELTERED BICYCLES	#BICYCLES	#REQUIRED SHELTERED LOOPS	#EXISTING SHELTERED LOOPS	DIFFERENTIAL
Residential Stations	428	15%	64	32	10	-22

District Totals: Required Loops: 126 / Existing Loops: 59 / Shortage: -67

DISTRICT 32

Harper Hall Bicycle Parking:

USER GROUP	#PERSONS	%SHELTERED BICYCLES	#BICYCLES	#REQUIRED SHELTERED LOOPS	#EXISTING SHELTERED LOOPS	DIFFERENTIAL
Residential Stations	276	15%	41	21	0	-21

New Hall West Bicycle Parking:

USER GROUP	#PERSONS	%SHELTERED BICYCLES	#BICYCLES	#REQUIRED SHELTERED LOOPS	#EXISTING SHELTERED LOOPS	DIFFERENTIAL
Residential Stations	419	15%	63	32	0	-32

District Totals: Required Loops: 53 / Existing Loops: 0 / Shortage: -53

DISTRICT 34

Oak Lane Building A. Bicycle Parking:

USER GROUP	#PERSONS	%SHELTERED BICYCLES	#BICYCLES	#REQUIRED SHELTERED LOOPS	#EXISTING SHELTERED LOOPS	DIFFERENTIAL
Residential Stations	36	15%	5	3	0	-3

Oak Lane Building B. Bicycle Parking:

USER GROUP	#PERSONS	%SHELTERED BICYCLES	#BICYCLES	#REQUIRED SHELTERED LOOPS	#EXISTING SHELTERED LOOPS	DIFFERENTIAL
Residential Stations	36	15%	5	3	0	-3

Oak Lane Building C. Bicycle Parking:

USER GROUP	#PERSONS	%SHELTERED BICYCLES	#BICYCLES	#REQUIRED SHELTERED LOOPS	#EXISTING SHELTERED LOOPS	DIFFERENTIAL
Residential Stations	36	15%	5	3	0	-3

Oak Lane Building D. Bicycle Parking:

USER GROUP	#PERSONS	%SHELTERED BICYCLES	#BICYCLES	#REQUIRED SHELTERED LOOPS	#EXISTING SHELTERED LOOPS	DIFFERENTIAL
Residential Stations	36	15%	5	3	0	-3

Oak Lane Building E. Bicycle Parking:

USER GROUP	#PERSONS	%SHELTERED BICYCLES	#BICYCLES	#REQUIRED SHELTERED LOOPS	#EXISTING SHELTERED LOOPS	DIFFERENTIAL
Residential Stations	36	15%	5	3	0	-3

Oak Lane Building F. Bicycle Parking:

USER GROUP	#PERSONS	%SHELTERED BICYCLES	#BICYCLES	#REQUIRED SHELTERED LOOPS	#EXISTING SHELTERED LOOPS	DIFFERENTIAL
Residential Stations	36	15%	5	3	0	-3

Oak Lane Building G. Bicycle Parking:

USER GROUP	#PERSONS	%SHELTERED BICYCLES	#BICYCLES	#REQUIRED SHELTERED LOOPS	#EXISTING SHELTERED LOOPS	DIFFERENTIAL
Residential Stations	36	15%	5	3	0	-3

Oak Lane Building H. Bicycle Parking:

USER GROUP	#PERSONS	%SHELTERED BICYCLES	#BICYCLES	#REQUIRED SHELTERED LOOPS	#EXISTING SHELTERED LOOPS	DIFFERENTIAL
Residential Stations	36	15%	5	3	0	-3

Oak Lane Building I. Bicycle Parking:

USER GROUP	#PERSONS	%SHELTERED BICYCLES	#BICYCLES	#REQUIRED SHELTERED LOOPS	#EXISTING SHELTERED LOOPS	DIFFERENTIAL
Residential Stations	36	15%	5	3	0	-3

Oak Lane Building J. Bicycle Parking:

USER GROUP	#PERSONS	%SHELTERED BICYCLES	#BICYCLES	#REQUIRED SHELTERED LOOPS	#EXISTING SHELTERED LOOPS	DIFFERENTIAL
Residential Stations	36	15%	5	3	0	-3

Oak Lane Building K.L. Bicycle Parking:

USER GROUP	#PERSONS	%SHELTERED BICYCLES	#BICYCLES	#REQUIRED SHELTERED LOOPS	#EXISTING SHELTERED LOOPS	DIFFERENTIAL
Residential Stations	64	15%	10	5	0	-5

Oak Lane Building M.N. Bicycle Parking:

USER GROUP	#PERSONS	%SHELTERED BICYCLES	#BICYCLES	#REQUIRED SHELTERED LOOPS	#EXISTING SHELTERED LOOPS	DIFFERENTIAL
Residential Stations	64	15%	10	5	0	-5

Oak Lane Building O.P. Bicycle Parking:

USER GROUP	#PERSONS	%SHELTERED BICYCLES	#BICYCLES	#REQUIRED SHELTERED LOOPS	#EXISTING SHELTERED LOOPS	DIFFERENTIAL
Residential Stations	64	15%	10	5	0	-5

Oak Lane Building Q.R. Bicycle Parking:

USER GROUP	#PERSONS	%SHELTERED BICYCLES	#BICYCLES	#REQUIRED SHELTERED LOOPS	#EXISTING SHELTERED LOOPS	DIFFERENTIAL
Residential Stations	64	15%	10	5	0	-5

Oak Lane Building: Sigma Phi Epsilon Bicycle Parking:

USER GROUP	#PERSONS	%SHELTERED BICYCLES	#BICYCLES	#REQUIRED SHELTERED LOOPS	#EXISTING SHELTERED LOOPS	DIFFERENTIAL
Residential Stations	36	15%	5	3	0	-3

District Totals: Required Loops: 53 / Existing Loops: 0 / Shortage: -53

DISTRICT39

Hillcrest Hall Bicycle Parking:

USER GROUP	#PERSONS	%SHELTERED BICYCLES	#BICYCLES	#REQUIRED SHELTERED LOOPS	#EXISTING SHELTERED LOOPS	DIFFERENTIAL
Residential Stations	112	15%	17	9	0	-9

District Totals: Required Loops: 9 / Existing Loops: 0 / Shortage: -9

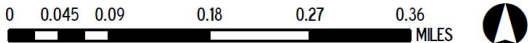
BIKE PARKING PLAN

District Maps

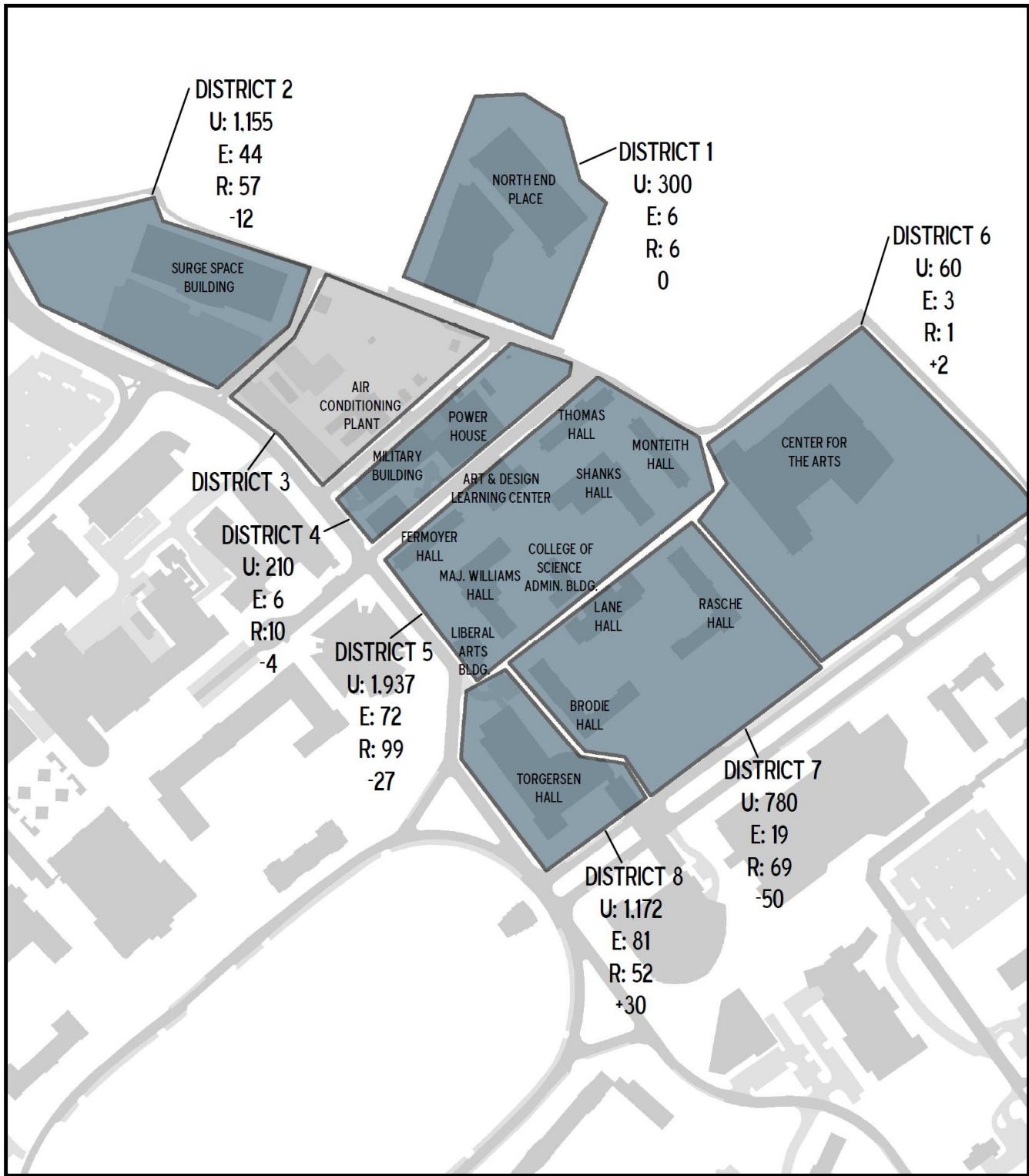


BICYCLE PARKING DISTRICTS

- UPPER QUAD ZONE
- DOWNTOWN CAMPUS ZONE
- NORTH DRILLFIELD ZONE
- WEST CAMPUS ZONE
- SOUTH DRILLFIELD ZONE
- ATHLETIC ZONE

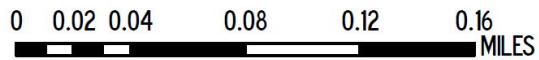


UNIVERSITY BICYCLE PARKING PLAN, 2013
 DATA SOURCE: VIRGINIA TECH GIS DATABASE
 CREATED BY: KATHRYN ZERINGUE, 7.11.13

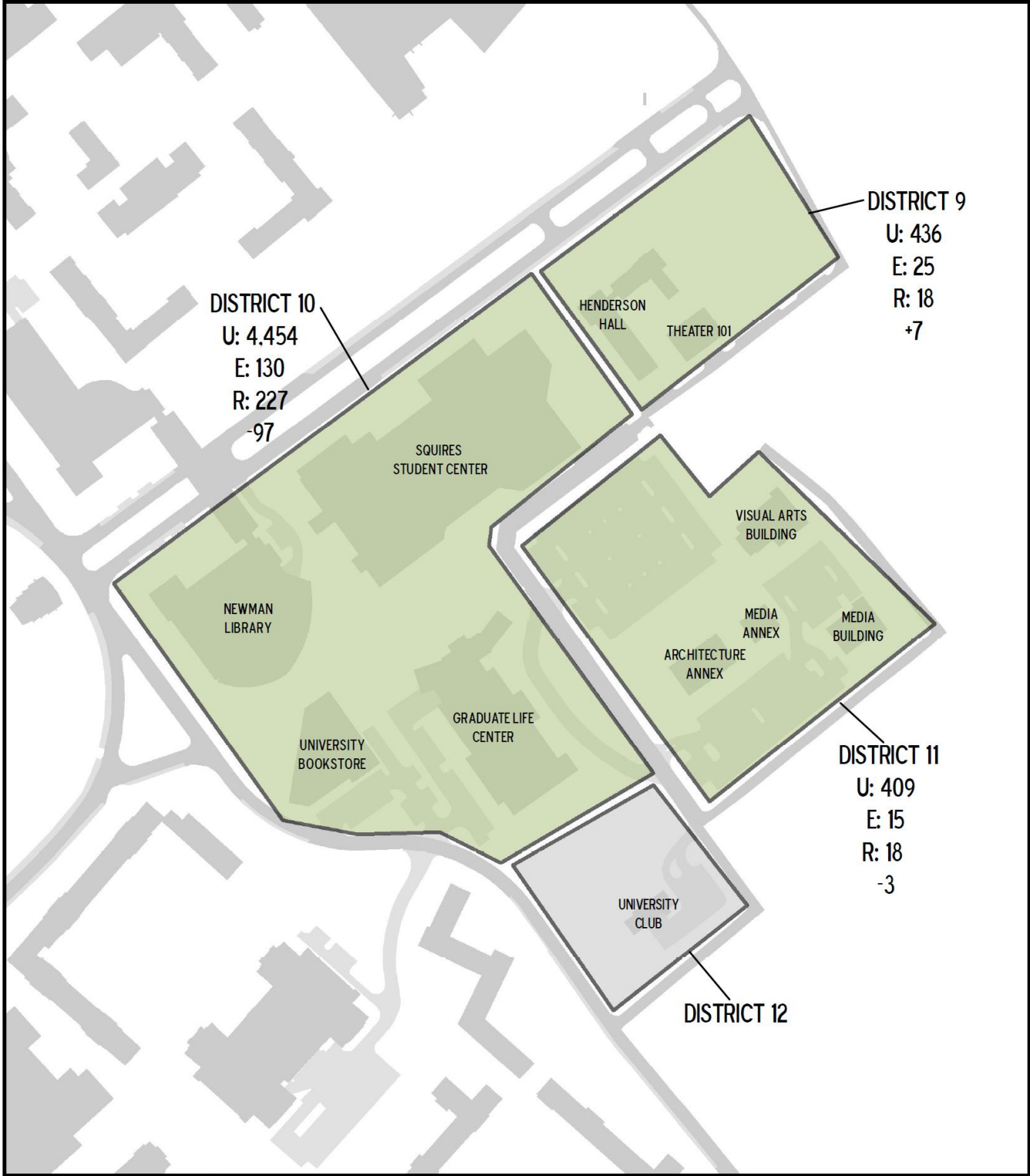


UPPER QUAD DISTRICTS BICYCLE PARKING

U: POTENTIAL USERS (5,614)
 E: EXISTING LOOPS (231)
 R: REQUIRED LOOPS (294)
 +/-#: LOOP EXCESS/SHORTAGE (-63)

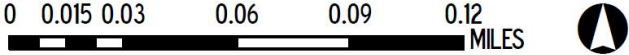


UNIVERSITY BICYCLE PARKING PLAN, 2013
 DATA SOURCE: VIRGINIA TECH GIS DATABASE
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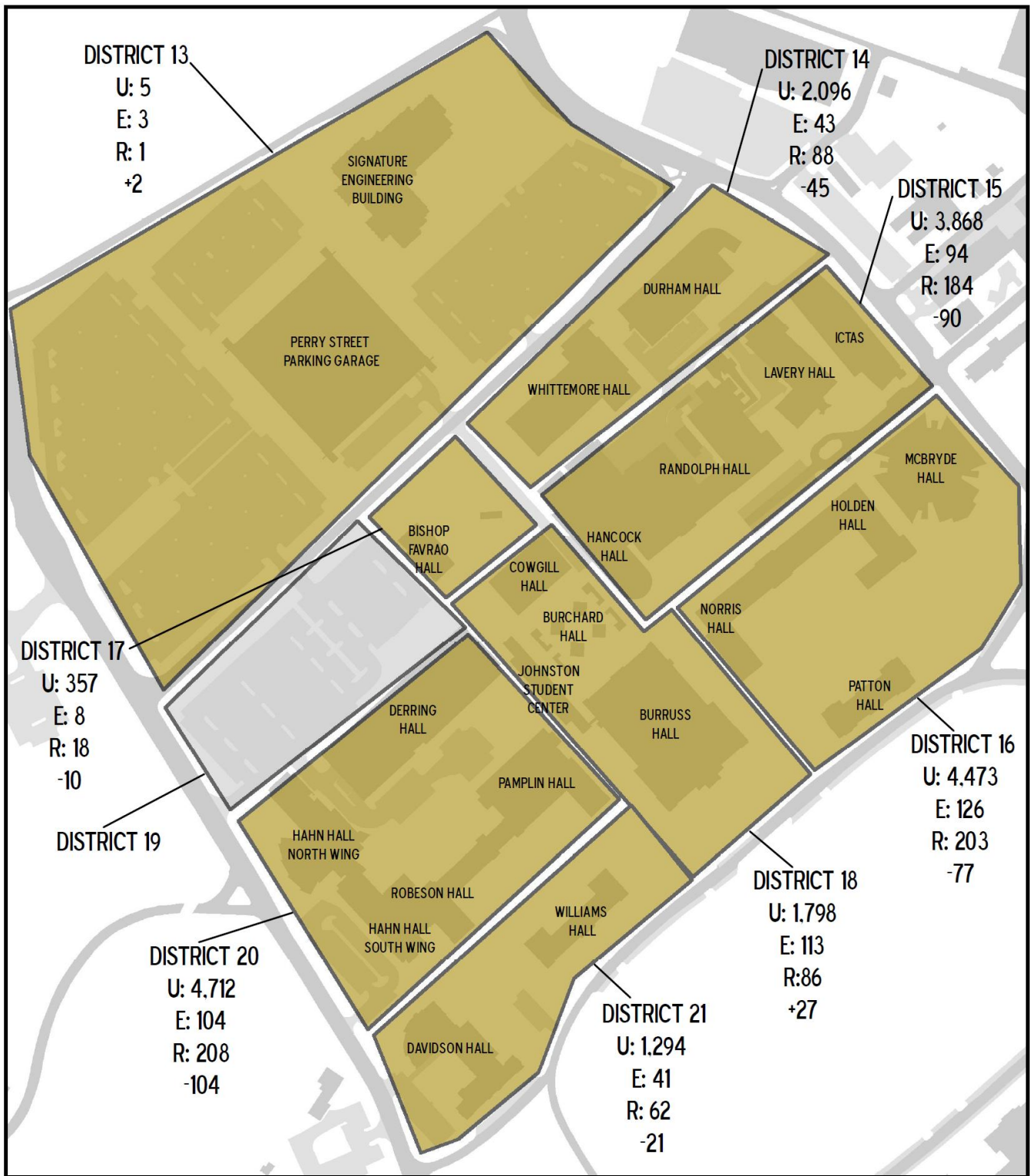


DOWNTOWN CAMPUS DISTRICTS BICYCLE PARKING

U: POTENTIAL USERS (5,299)
 E: EXISTING LOOPS (170)
 R: REQUIRED LOOPS (263)
 +/- #: LOOP EXCESS/SHORTAGE (-93)

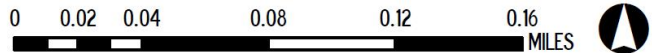


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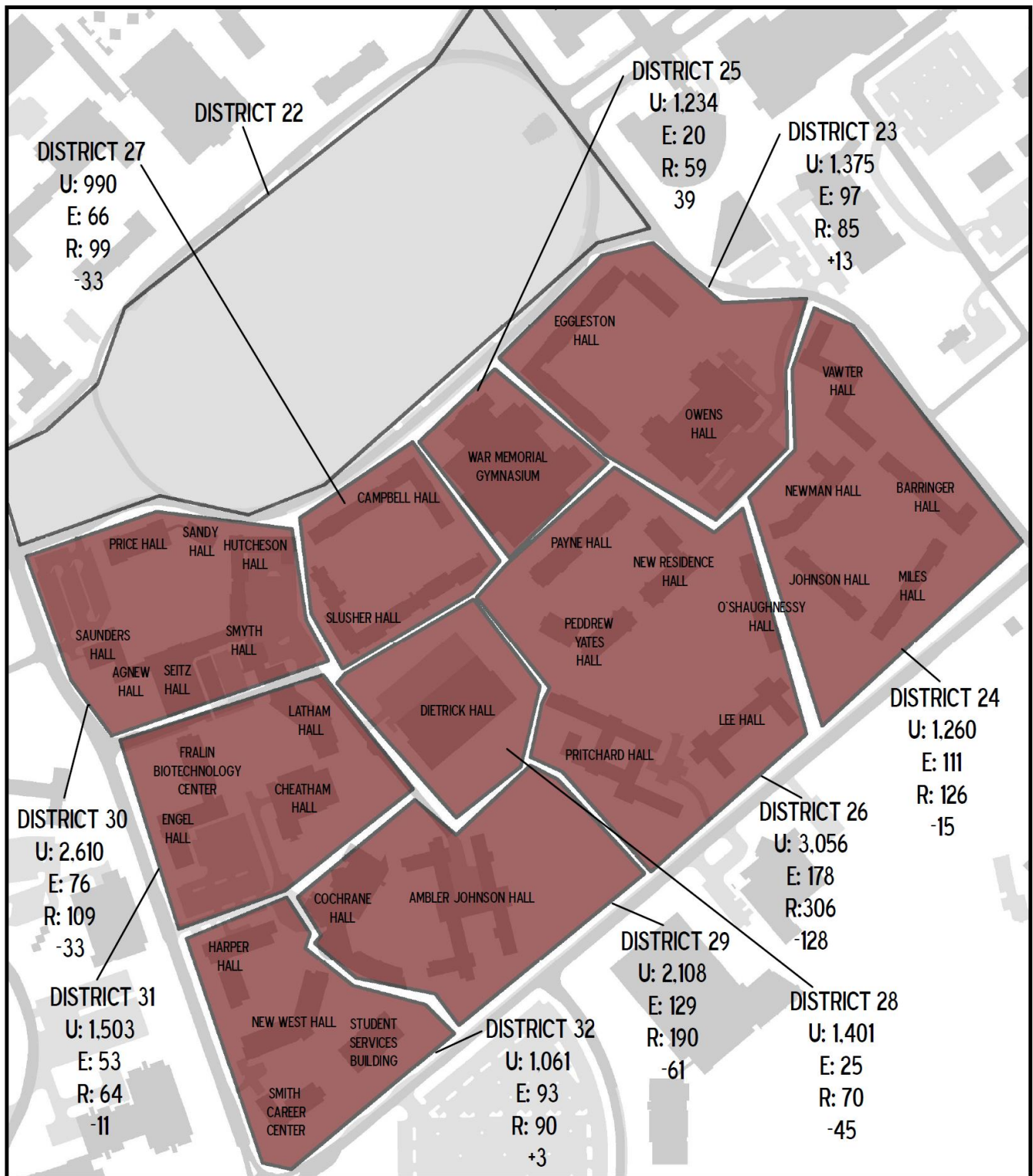


NORTH DRILLFIELD DISTRICTS BICYCLE PARKING

U: POTENTIAL USERS (18,603)
 E: EXISTING LOOPS (532)
 R: REQUIRED LOOPS (850)
 +/- #: LOOP EXCESS/SHORTAGE (-318)



UNIVERSITY BICYCLE PARKING PLAN, 2013
 DATA SOURCE: VIRGINIA TECH GIS DATABASE
 CREATED BY: KATHRYN ZERINGUE, 7.1.13

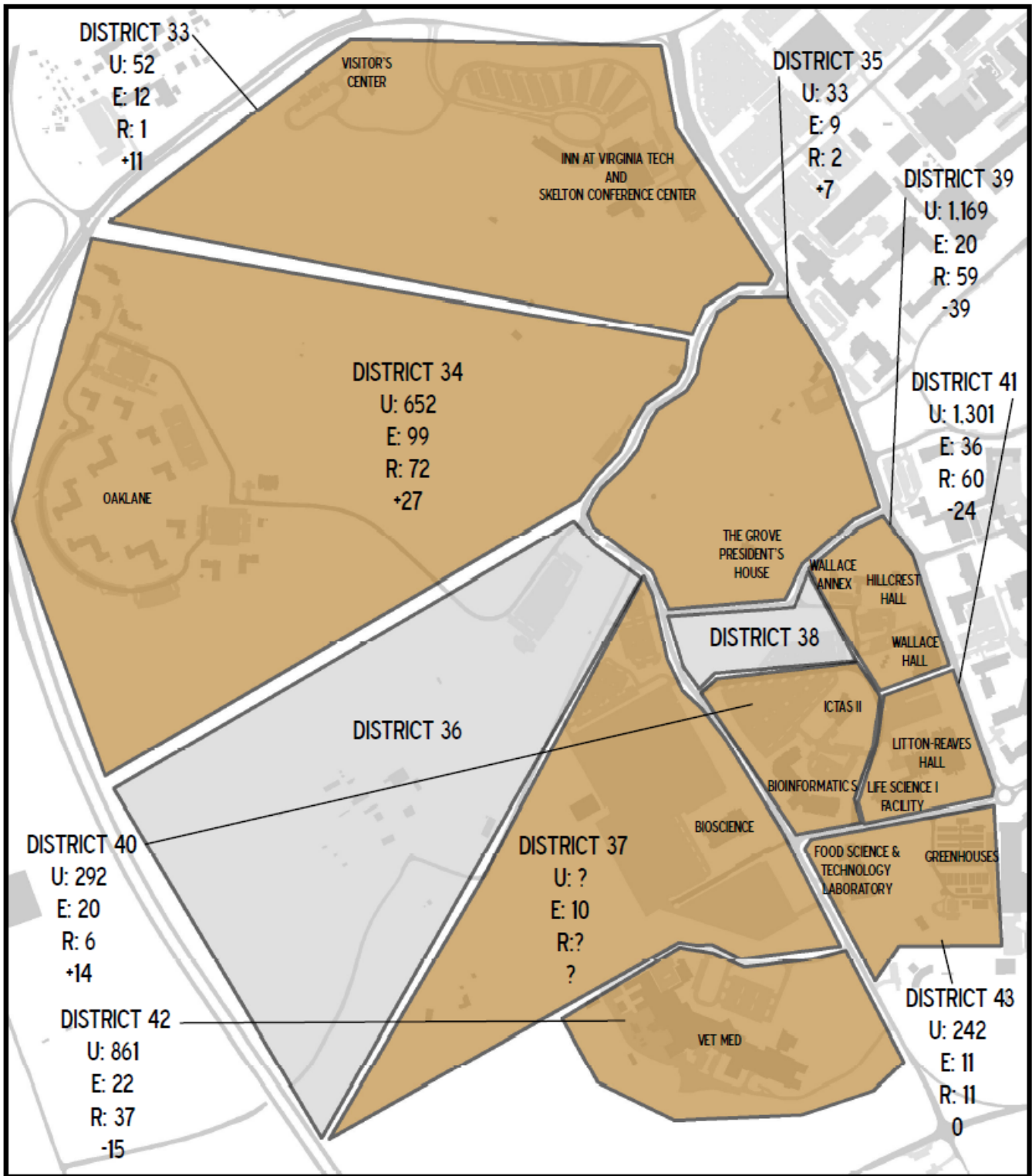


SOUTH DRILLFIELD DISTRICTS BICYCLE PARKING

U: POTENTIAL USERS (16,598)
E: EXISTING LOOPS (848)
R: REQUIRED LOOPS (1,198)
+/-#: LOOP EXCESS/SHORTAGE (-350)

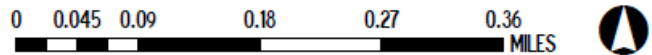


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 CREATED BY: KATHRYN ZERINGUE, 7.1.13

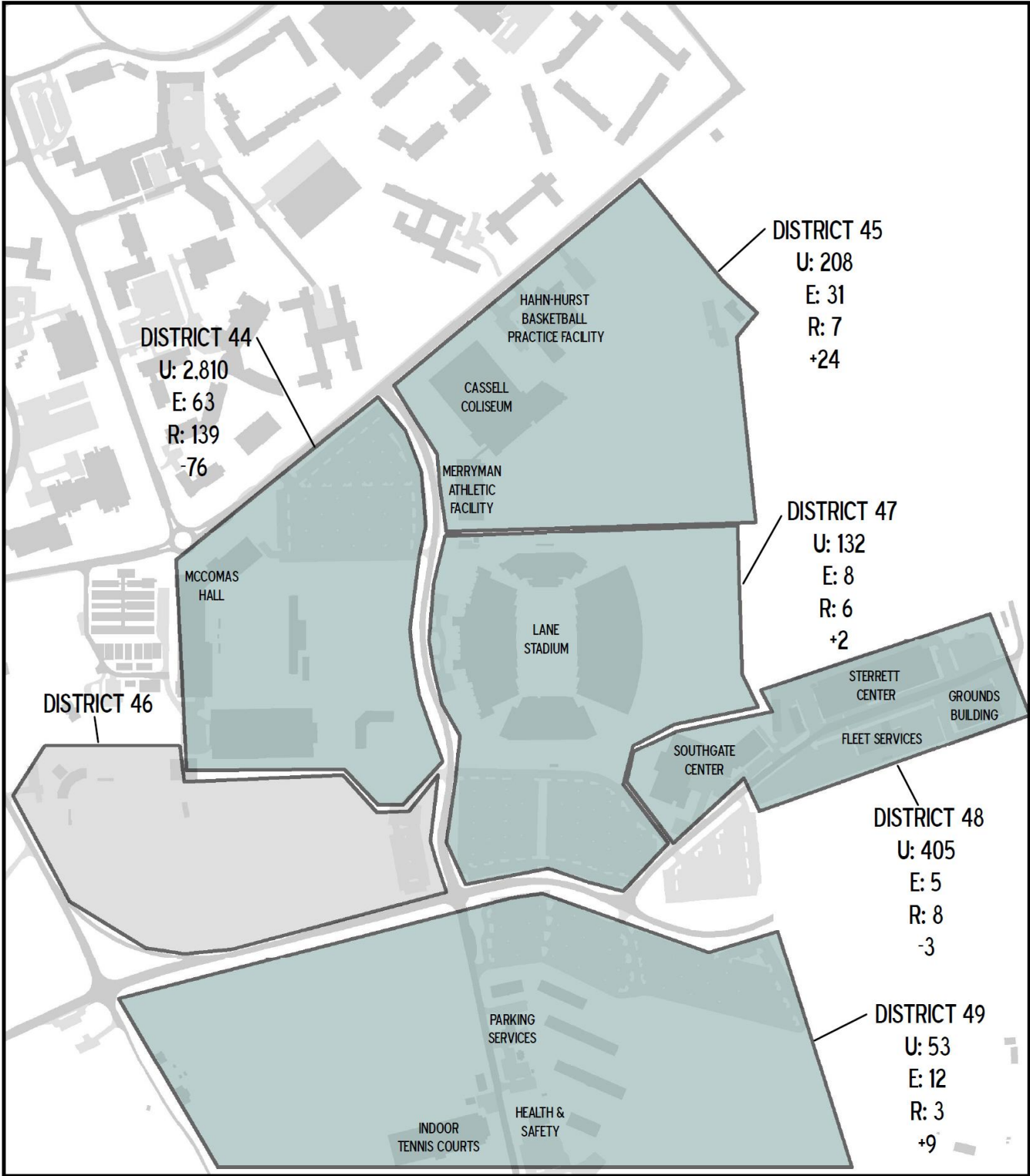


WEST CAMPUS DISTRICTS BICYCLE PARKING

U: POTENTIAL USERS (3,950)
 E: EXISTING LOOPS (229)
 R: REQUIRED LOOPS (248)
 +/-#: LOOP EXCESS/SHORTAGE (-19)

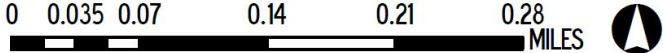


UNIVERSITY BICYCLE PARKING PLAN, 2013
 DATA SOURCE: VIRGINIA TECH GIS DATABASE
 CREATED BY: KATHRYN ZERINGUE, 7.1.13



ATHLETIC DISTRICTS BICYCLE PARKING

U: POTENTIAL USERS (3,608)
 E: EXISTING LOOPS (119)
 R: REQUIRED LOOPS (163)
 +/- #: LOOP EXCESS/SHORTAGE (-44)



UNIVERSITY BICYCLE PARKING PLAN, 2013
 DATA SOURCE: VIRGINIA TECH GIS DATABASE
 CREATED BY: KATHRYN ZERINGUE, 7.1.13

BIKE PARKING PLAN

Site Planning

Bicycle Rack Standards

Recommendations of bicycle racks for Virginia Tech follow the guidelines presented by the Association of Pedestrian and Bicycle Professionals (APBP). APBP states that a successful bicycle rack design provides proper support so that the user can lock and unlock their bicycle and load and remove cargo without the bicycle flopping over due to the front wheel turning. Above all, bicycle racks must provide a way to lock the bike with a U-lock because cable locks and chains are easily cut.

APBP recommends selecting a bicycle rack that meets all of the following criteria:

1. Supports the bicycle in at least two places to prevent the bike from falling over
2. Allows locking of the frame and one or both wheels with a U-lock
3. Is securely anchored to the ground
4. Allows front-in and back-in parking, and resists cutting, rusting, and bending or deformation

The following racks meet all of the design criteria:

1. Inverted u-rack
2. Post and ring rack



Inverted U-Rack



Post & Ring Rack

1. Inverted U-Rack
 - a) Cost: Low-medium cost per bicycle.
 - b) Space Efficiency: Rack is within bicycle footprint.
 - c) Materials & Maintenance: No moving parts, only anchors and finish may need maintenance.
 - d) Aesthetics: Variety of finishes available; alternative shapes expand options.
 - e) Security: Easily allows locking of bicycle and at least one wheel when properly sited; allows removal of second wheel and locking with single lock; square tubing recommended because round tubing is more vulnerable to cutting.
 - f) Safety & Detectability: Racks and parked bicycles are detectable and do not pose tripping hazard.

- g) Usability: Intuitive; supports bicycle at two points; easy to park when properly sited and spaced; accessible from both sides.
 - h) Capacity: Two bicycles per inverted u-rack.
2. Post and Ring Rack
- a) Cost: Low-medium cost per bicycle.
 - b) Space Efficiency: Rack is within bicycle footprint, may be retrofitted to unused meter posts during parking conversion.
 - c) Materials & Maintenance: No moving parts, only anchors and finish may need maintenance.
 - d) Aesthetics: Variety of customized finishes, designs, and shapes possible.
 - e) Security: Easily allows locking of bicycle and at least one wheel when properly sited; allows removal of second wheel and locking with single lock; square steel tubing recommended because round tubing is more vulnerable to cutting; cast metal rings vulnerable to prying.
 - f) Safety & Detectability: Racks and parked bicycles are detectable and do not pose tripping hazard.
 - g) Usability: Intuitive; supports bicycle at two points; easy to park when properly sited and spaced; accessible from both sides.
 - h) Capacity: Two bicycles per post and ring

Virginia Tech Rack Standard

The inverted u-rack, model BK-2224, has been the standard bike rack for the university since 2008. The rack is manufactured locally by Renaissance Site Furnishings in Roanoke, VA. Racks are custom manufactured based on existing needs, and each rack can accommodate 3-9 loops. This model meets all ABPB bicycle rack design requirements.

In spring 2013, students, faculty, and staff were surveyed at multiple events hosted by Alternative Transportation and the Environmental Coalition. Participants were asked which rack they preferred: the inverted u-rack or the post and ring rack and whether they preferred a galvanized or bronze finish. 79% of survey respondents preferred the inverted u-rack over the 21% who preferred the post and ring rack. Similarly, 79% preferred the bronze finish over the galvanized finish. Virginia Tech has selected the bronze finish as the preferred color for the recommended inverted u-rack, BK-2224 model as the standard campus bicycle rack.

Single Rack Parking Area Design

Typical design standards for a single bike rack (single loop) have the following characteristics:

- a. A single loop supports securing two bikes with the most common bike placement “centered” on the loop.
- b. Each loop is 2’ from the next loop with a common configuration being five loops on a “rack”.
- c. The rack is placed on a hard surface “pad” of concrete, asphalt, or concrete pavers. The pad is, as a minimum, 8’ wide (due to the width of most bikes: 5.6’) which allows for a bike to be locked to the rack at the front or rear wheels.

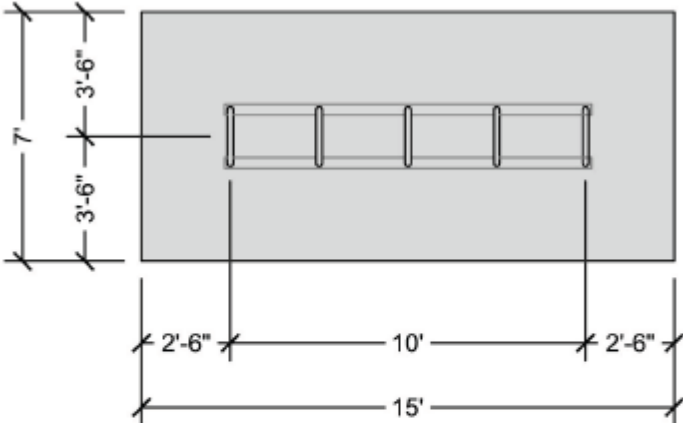
- d. The pad will have, as a minimum, 3' of hard surface on both ends of the last loop of the rack. Additionally, a hard surface approach to the pad is encouraged with at least 3' on both sides. This is often accomplished by placing the pad directly adjacent to a sidewalk or plaza surface.

Bike Parking Hub Area Designs

Below are the characteristics of a generic mass bike parking hub to be used when 30 or more bike loops (60 bikes) are installed at a single site.

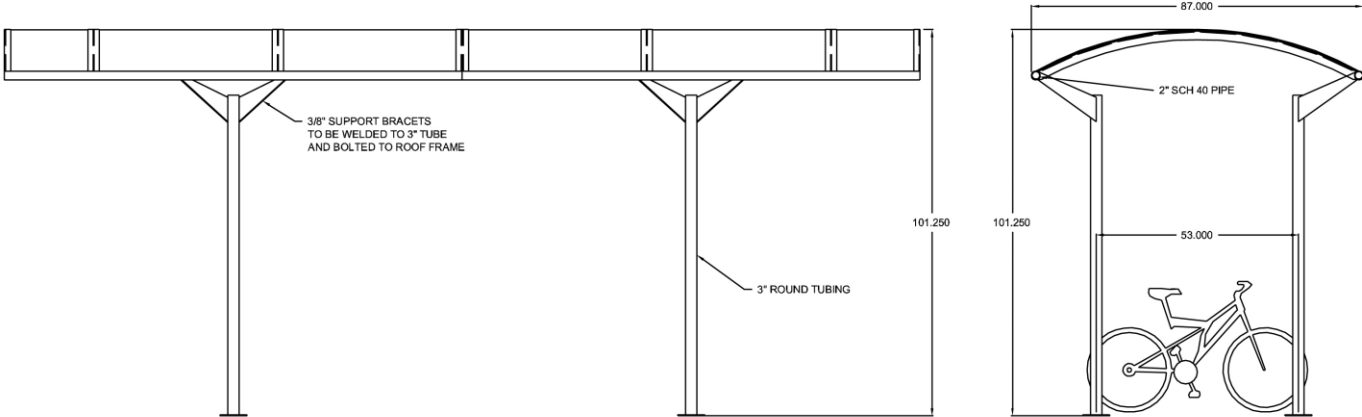
- a. **Lighting:** Efforts will be made to incorporate existing lighting. When unavailable, standard Hokie Lights will be used at the same interval as used for sidewalks (80' intervals).
- b. **Landscaping:** Shade trees are needed to shelter the bikes. Tree planters around the perimeter and within bike loop aisles should be based on rack/ slab layout- generally about 1 tree per (3) 5-loop rack run (about 38' o.c.).
- c. **Surface Treatment:** Bike loops should be secured into concrete. Concrete pavers or stamped concrete should be used to break up the monolithic appearance of the surface particularly in the bike loop aisles. Curbing is encouraged around landscaping to discourage pedestrians and cyclists cutting thru turf and planted areas.
- d. **Trash Receptacles:** at least one receptacle should be located at the site and it should be a dual recycle/trash unit.
- e. **Additional Amenities:** (if funding is available):
 - i. Blue Light Phone
 - ii. Covered Shelter
 - iii. Bike Fix-It Station
- f. **Bike Rack Cover:** Cover over the bike racks should be considered for resident hall areas and for racks & hubs in predominantly faculty & staff office areas. The cover should blend into the architectural fabric of campus and be visually unobtrusive. The cover does not need to include side or end panels.

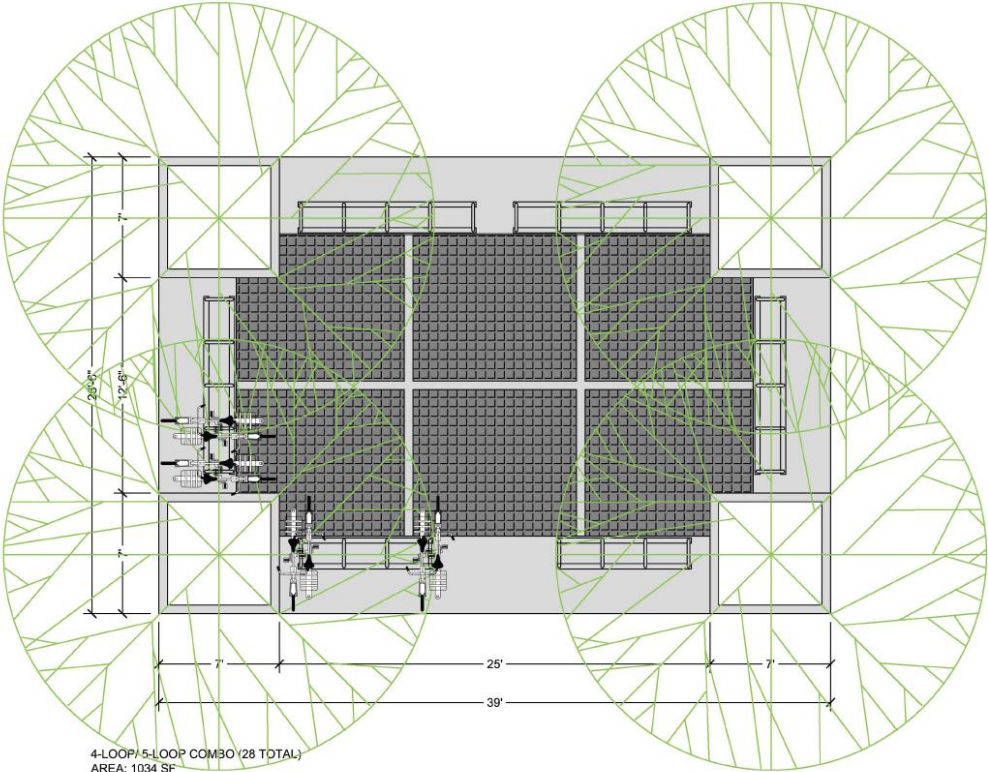
Sample Bike Parking Hub Site Designs



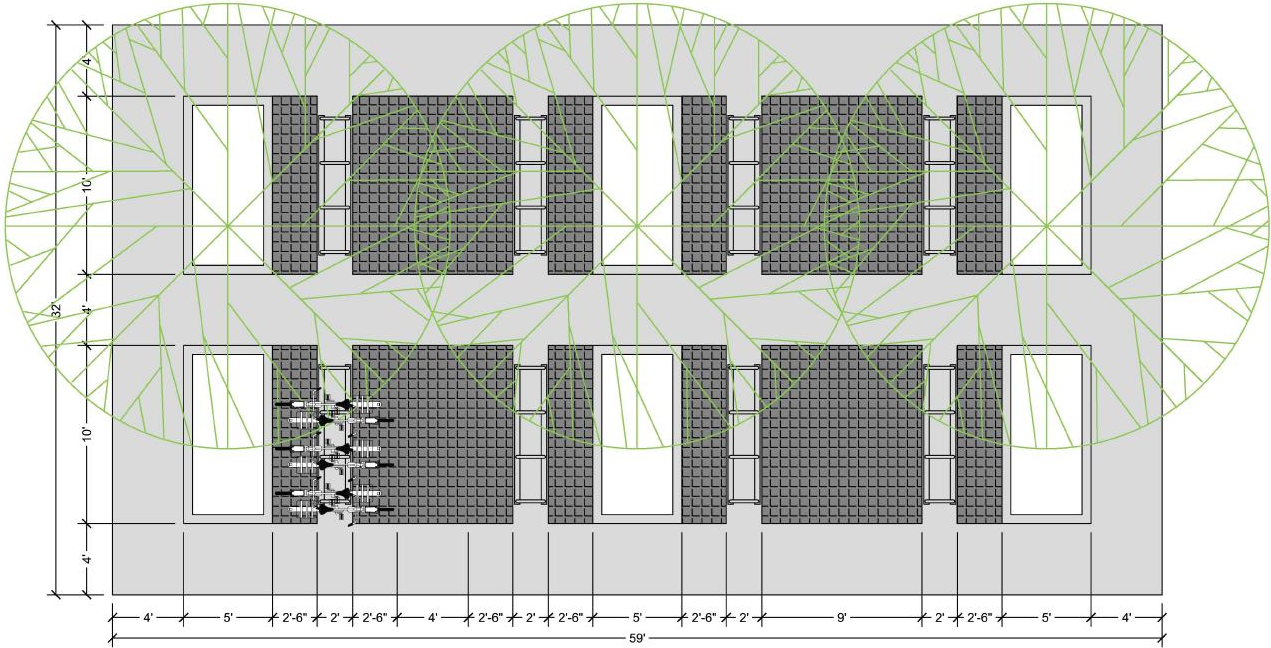
STANDARD 5-LOOP RACK
AREA: 105 SF
21 SF/ LOOP

Covered Shelter for Bike Racks:

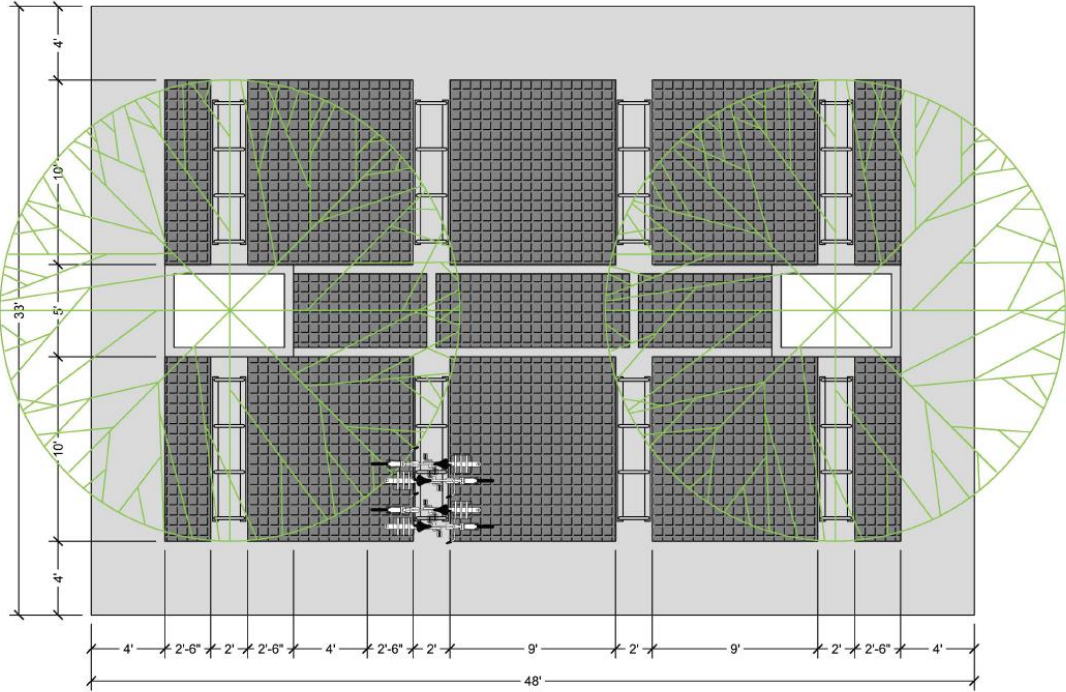




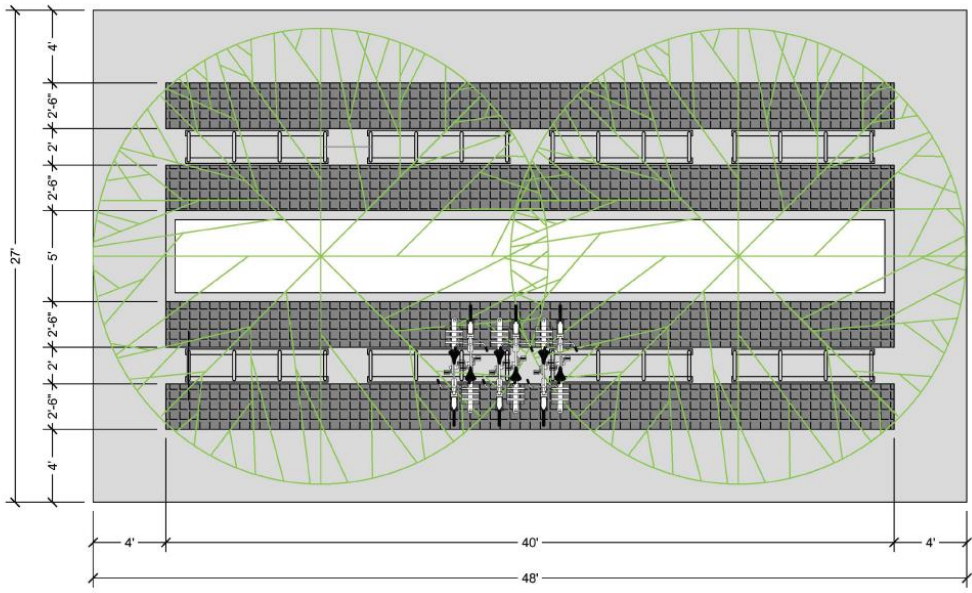
4-LOOP/ 5-LOOP COMBO (28 TOTAL)
AREA: 1034 SF
36.93 SF/ LOOP



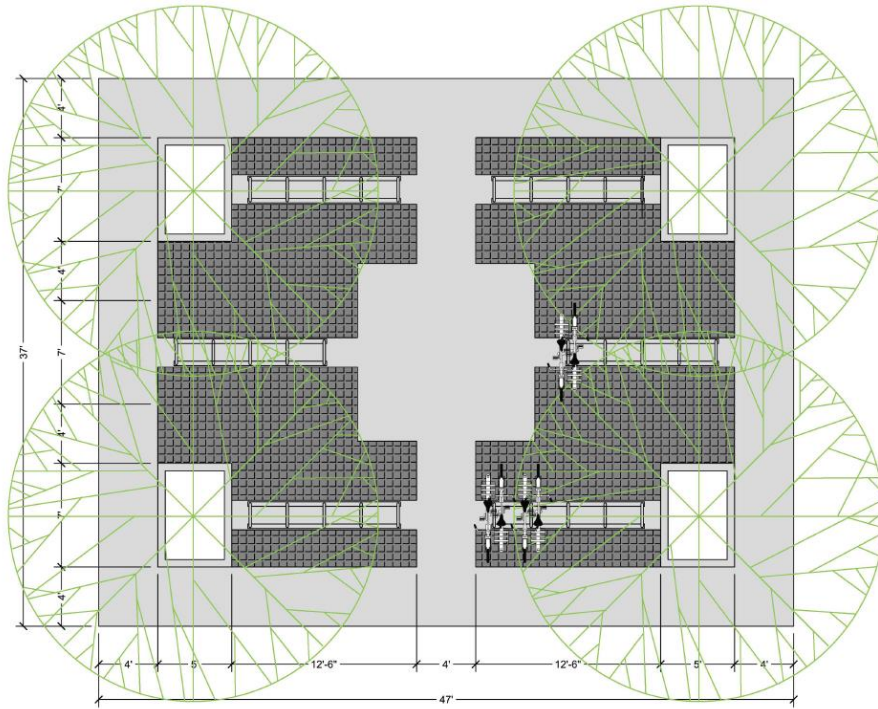
4-LOOP (32 TOTAL): OPTION 'A'
AREA: 1888 SF
59 SF/ LOOP



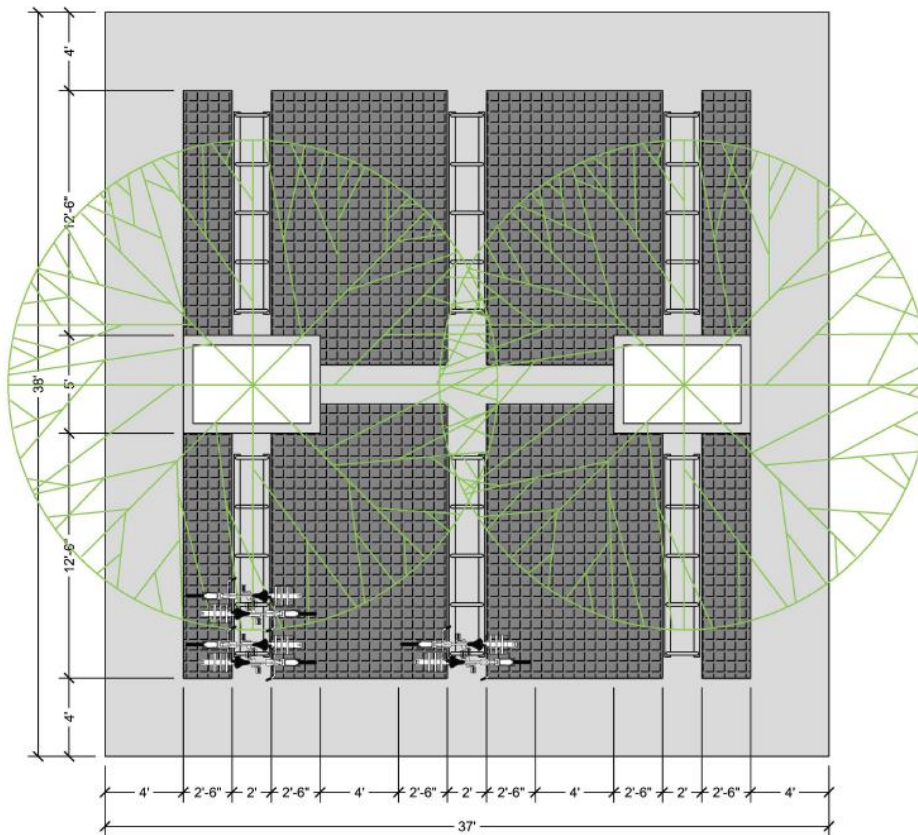
4-LOOP (32 TOTAL); OPTION 'B'
AREA: 1584 SF
49.5 SF/ LOOP



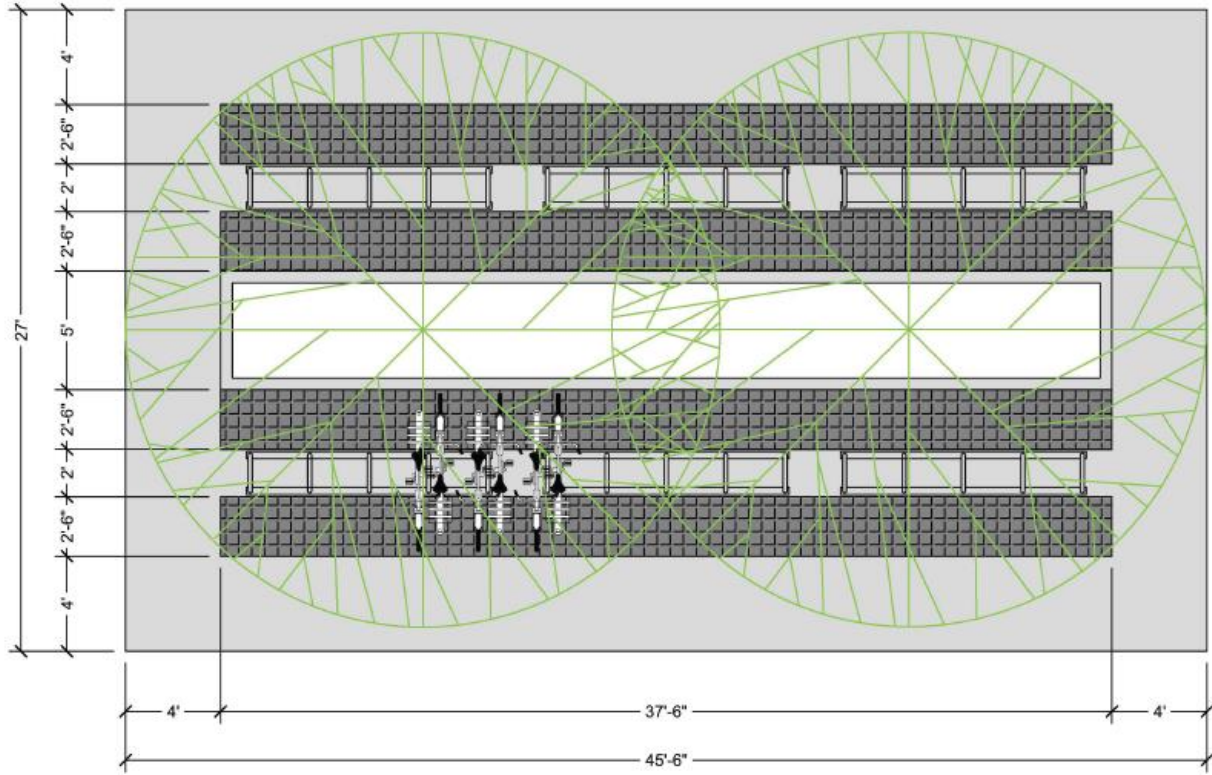
4-LOOP (32 TOTAL); OPTION 'C'
AREA: 1296 SF
40.5 SF/ LOOP



5-LOOP (30 TOTAL): OPTION 'A'
 AREA: 1739 SF
 57.97 SF/LOOP



5-LOOP (30 TOTAL): OPTION 'B'
 AREA: 1406 SF
 46.87 SF/LOOP



5-LOOP (30 TOTAL); OPTION 'C'
AREA: 1229 SF
40.97 SF/ LOOP

BIKE PARKING PLAN

Implementation

Main Campus Bike Parking Funding & District Prioritization

The implementation plan for bike parking is predicated on the identification of a viable funding source for alternative transportation. Assuming this funding source is identified, then a phased approach to increasing bike parking will be implemented by Parking & Transportation with the support of the Office of University Planning. The intent will be to incrementally increase bike parking starting with prioritizing the districts of campus with both high use and significant deficiencies. The rate at which new hubs are added to campus will be based upon the availability of funds and the overall need.

When a district is prioritized by Parking and Transportation and the Office of University Planning, they will schedule a site visit to identify potential locations for bike hubs. The Office of University Planning will work with Parking & Transportation to design the hubs and prepare a construction cost estimate. Parking & Transportation will locate funding for the hub and provide administrative oversight for the construction.

Long-Term Residential Bike Parking Funding & District Prioritization

Similar to the strategy for short-term parking, long-term bike parking will be installed as funding becomes available. When a funding source is identified, long-term parking will be prioritized based on high use and significant deficiencies. Districts with residential buildings will take precedence over other districts for prioritization. The university will continue to follow the LEED standard for sheltered bicycle parking near residential halls. As residential buildings are remodeled or newly constructed, sheltered bicycle parking will be provided for 15% of peak occupants.

As a residential district is identified by Parking and Transportation and the Office of University Planning, they will engage Student Affairs in a site visit to identify potential sites for bike hubs. The Office of University Planning will work with both Student Affairs and Parking & Transportation to design the hubs and prepare a construction cost estimate. Student Affairs will locate funding for the hub and provide administrative oversight for the construction.

Highly Prioritized Districts

- District 10: (Multi-Use) Squires Student Center, Newman Library, Graduate Life Center, University Bookstore (short 97 loops)
- District 20: (Academic) Derring Hall, Hahn Hall North Wing, Hahn Hall South Wing, Pamplin Hall, Robeson Hall (short 104 loops)
- District 26: (Residential) Payne Hall, New Res Hall, O'Shaughnessy Hall, Lee Hall, Pritchard Hall, Peddrew-Yates Hall (short 128 loops)

BIKE PARKING PLAN

Resources

Anderson, Eric. 2010. APBP Bicycle Parking Guidelines, Second Edition. Cedarburg, WI: Association of Pedestrian and Bicycle Professionals. www.apbp.org.

Leadership in Energy and Environmental Design. 2009. SSc4.2: Alternative Transportation-Bicycle Storage and Changing Rooms. New Construction 2009 Rating System. LEED User. Retrieved November 2012 from <http://www.leeduser.com/credit/NC-2009/SSc4.2>

Virginia Tech Design and Construction Standards. 2013 (Draft Version). Virginia Tech Office of University Planning.

Virginia Tech Space Inventory: Master Building List. 2012. Blacksburg, VA: Virginia Tech Facilities Operations. Retrieved January 2013 from <http://space.facilities.vt.edu/>

Virginia Tech Spatial Database [computer file]. 2013. Blacksburg, VA: Virginia Tech Facilities Operations. Retrieved July 2013 from sde.gis.vt.edu