

Pennsylvania State System of Higher Education Facilities Manual

Appendix VI-A-3 Infrastructure Inventory

Form Format and Definitions

Figure Column Headings

Infrastructure means the communications, utility, vehicular, and pedestrian circulation systems installed to support the operations of a State System university campus, branch campus, or educational center.

Category refers to one of the two types of facilities inventoried—either infrastructure or land improvements. The category includes all classes and components listed within the category heading.

Class refers to the specific kind of infrastructure system or land improvement included in the category, such as electrical distribution system, communications system, utility, roads, etc., as shown on the figure.

Subclass refers to the various assemblies of component parts that constitute a specific infrastructure of land improvement class.

Component refers to the variety of individual manufactured parts, combination of parts, or construction activity that must be assembled to formulate a specific infrastructure of land improvement, such as necessary piping, couples, manholes, and pumps to assemble a sewer system. Fasteners, joints, and other structural members required to connect the components are considered to be included in the component listed. The range of sizes have been grouped to reduce the size of the inventory, and although the actual sizes found may not match exactly the size listed, the closest size should be selected for inventory purposes.

Unit of Measure refers to the measurement used to determine the quantity of the components or subclass assembly.

Cost/Unit means the cost in U.S. dollars assigned to one unit of measure for the component described. The unit of measure and the corresponding cost were specified to provide a simple total replacement cost for a complete component without having to add components to get a complete and usable item.

Estimated Life/Years means the time in calendar years assigned to the unit measure until it has to be replaced.

Units is the actual number of units of a specific component or subclass estimated or determined by measurement to exist on a System university campus, branch campus, or educational center.

Replacement Cost is the calculated value of the cost of each component determined by multiplying the number of units existing times the unit cost.

Year Replacement means the year in which the component will reach the end of its useful life and should be replaced based on the estimated life.

Definitions

Electrical Distribution System includes active incoming primary feeders from the power company; the transformers to reduce the incoming voltage for distribution throughout the campus, either overhead on poles or underground; the switch gear and safety disconnects; and the duct banks (up to 12 conduits grouped together) complete with electrical wires and manholes used to distribute the wiring to all parts of the campus, the components of which serve the distribution system as a whole and are not installed as part of a building constructed for another purpose.

Communications Distribution System includes the active cable, by type, and the structures constructed specifically to support the communications system independently from other system components, such as electrical duct banks, exclusive of the electronic devices or equipment to use the system, such as telephones, televisions, computers, etc., outside the building and structures.

Steam Distribution System includes the direct burial steam and condensate lines as a unit and tunnels constructed for steam lines with both steam and condensate lines included in the linear cost shown.

Water Distribution System includes water lines, towers, pumping stations, fire hydrants, well meter pits, treatment plants, and chilled and hot water lines used for heating and cooling that are not part of a building or structure constructed for another purpose.

Storm Water Distribution System includes closed piping, culverts, headwalls, storm water manholes, retention ponds, dams, and open and closed drainage channels used to control the flow of water runoff.

Sewage Distribution System includes piping, lift stations, and manholes to control and remove sewage from buildings and structures.

Sewage Treatment Plant includes all piping and structures used in the treatment of sewage other than the buildings used to house the operators and staff of the plant and the vehicles used in the process.

Natural Gas Distribution System includes piping, meters, and pressure regulators used to distribute natural gas to buildings and structures.

Storage Tanks includes the above ground and underground tanks installed to store petroleum products for use in campus operations.

Roadway System includes the concrete- or asphalt-paved road system complete with curbing and directional/traffic control signs to circulate two lanes of traffic at any point, vehicular bridges, barriers, pedestrian controls, guard rails, street lighting, and electric or electronic traffic control devices. No distinction is specified as to thickness or width of pavement, other than that two vehicles going in opposite directions must be able to pass at a single point. Single lane roads are to be considered as half the unit of measure. Lengths of four-lane roadways should be doubled to account for the added road surface. The roadway system does not include parking lots or driving lanes within parking lots.

Sidewalk System includes the paved pedestrian pathway system and the stairway and pedestrian bridge system used to circulate pedestrians around and through the institution. The thickness, base,

and width specified denote a generic sidewalk and are not intended to be an exact measurement for all paved walkways. However, sidewalks should be measured in four-foot wide increments.

Land Improvements means the athletic fields, landscaping, and vehicular and pedestrian structures, quality of life amenities, and specialties installed to support outdoor athletic contests or outdoor recreation activities and/or to make the outdoor landscape and surroundings more pleasant or serviceable.

Athletic Fields includes various sports playing fields and surfaces constructed on System university campuses to support varsity and recreational programs of the university, such as baseball, basketball, football, soccer, lacrosse, field hockey, tennis, track, and volleyball. Field sizes may vary from NCAA standards to recreational-size playing surfaces, but must be of adequate size to permit standard play of the sport. Half-court or practice-size fields are included as a separate category.

Baseball Fields includes hardball and softball fields complete with backstops, fencing around the field, scoreboard, field lighting, and batting cages to support the varsity sports programs, and intramural or recreational fields with backstops and team benches. This component does not include structures such as bleachers, dugouts, and concession stands.

Basketball Courts includes outdoor concrete or asphalt full-court playing surfaces with goals, lighting, and fencing for intramural or recreational play without regard to size.

Football Fields includes turf or artificial playing fields for varsity competition, intramural, or recreational play with field drainage, lighting, and fencing; however, this component does not include stadium facilities, bleachers, scoreboards, fixed field irrigation systems, or storage facilities to support the field operations. Stadium facilities generally are included in the building and structure inventory.

Soccer/Lacrosse/Field Hockey/Rugby Fields includes the playing fields with goals, fencing, and lighting.

Tennis Courts includes the single-court playing surface with net, fencing, and lighting.

Track Fields includes the artificial track surface and drainage. Since most tracks are installed in conjunction with the football stadium, lighting and other improvements are included with other categories.

Volleyball Courts includes the grass or sandlot court with net and lighting and any fencing installed around the court.

General Land Improvements includes a variety of improvements to support athletic competition including playing fields, spectator bleachers, concessions stands, dugouts, fixed field irrigation systems, general area lighting not included in any other category, storage sheds and garages, electronic scoreboards, and practice fields.

Ground Improvements includes changes made to the landscape that require constant maintenance to improve the appearance or utility of the grounds for use not included in any other listed category, including open green space with landscaping, fixed irrigation systems other than moveable hoses, fencing, area lighting, and retaining walls.

Parking Facilities includes paved and unpaved vehicular parking lots, decks, and garages complete with lighting, fencing, and drainage.

Pedestrian Facilities includes improvements made to support safe and comfortable pedestrian movement about the campus in areas other than those involving roadway/pedestrian interface, which were addressed in the categories for roadways and sidewalks. This component includes patios, pedestrian malls, and mall and walkway lighting.

Amenities includes improvements made to beautify or enhance the utility of the campus including benches, commuter shelters, fountains, kiosks, trash containers, bike racks, smoking shelters, dumpster pads, campus signage, picnic tables, bell or clock towers, and flag poles. Kiosks and bell and clock towers are small structures that do not meet the requirements to be classified as a building or structure under Volume VI-A, constructed to house people temporarily to provide information, or to house a large clock or bells for campus-wide enjoyment.

Specialties include items unique to a campus that require maintenance, repair, and renovation or replacement to support campus operations such as driver training courses, firefighting facilities, etc.

Land is included at a fixed price to provide a total replacement picture of the campus. The land value will not be included in any calculations for funding considerations.

Pennsylvania State System of Higher Education
Infrastructure and Land Improvements Inventory

_____ University
FY _____

Category	Unit of Measure	Cost/Unit (\$)	Estimated Life/Years	# Units	Replacement Cost (\$)	Year Replacement
Infrastructure						
Class Component						
Electrical distribution system						
Overhead distribution lines with poles						
5-15 kV	Mile	50,000	0			
35 kV	Mile	65,000	0			
69 kV	Mile	125,000	0			
Direct buried distribution lines	Linear foot	100	5			
Duct bank, conduit, electrical wire, and manhole	Linear foot	375	0			
High voltage towers	Each	10,000	0			
Switch gear (primary/secondary distribution)						
Medium voltage equipment 5-15 kV						
Main switch gear (in cabinet with breakers and relays)	Each	50,000	0			
Transfer switch	Each	30,000	0			
Fused disconnect switch	Each	10,000	0			
Transformer (multiple building)						
<300 kva	Each	10,000	0			
>300<1,000 kva	Each	20,000	0			
>1,000<5,000	Each	50,000	0			
>5,000<15,000	Each	100,000	0			
>15,000	Each	225,000	0			
Communications distribution system						
Cable (count separate cables)						
Fiber optic with inner duct, if in electrical duct bank	100 linear ft (CLF)	1,000	5			
CATV	100 linear ft (CLF)	500	5			
Data	100 linear ft (CLF)	500	5			
Telephone	100 linear ft (CLF)	100	0			
Copper signal wire (emergency/energy management/fire)	100 linear ft (CLF)	100	0			
Communication structures (active)						
Signal manhole	Each	3,000	0			

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Category	Unit of Measure	Cost/Unit (\$)	Estimated Life/Years	# Units	Replacement Cost (\$)	Year Replacement
Independent conduit (separate from others)	Linear foot	375	0			
Satellite dishes	Each	10,000	0			
Central Independent Systems						
Fire alarm system						
Central receiving station	Per station	50,000	0			
Security system						
Central receiving units	Each	10,000				
Towers	Linear foot	1,000	0			
Steam						
Direct burial steam and condensate lines as a unit	Linear foot	600	0			
Tunnel with complete system	Linear foot	2,000	0			
Water						
Main (>6")	Linear foot	150	\$			
Lateral (<6")	Linear foot	50	\$			
Water tower	Per 1,000 gallon	5,000	0			
Pumping station	Each	1,100	0			
Fire hydrants	Each	4,000	\$			
Wells	Per foot of depth	75	0			
Meter pit	Each	25,000	0			
Treatment plant	Per 100,000 GPD	500,000	0			
Chilled water lines (<4")	Linear foot	30	\$			
Hot water lines (<4")	Linear foot	30	\$			
Storm water						
Lines (>4" <8")	Linear foot	75	\$			
Culvert/pipe up to >8" <24", 14 ga.	Linear foot	50	\$			
Headwalls (30" pipe, 3' long wing wall)	Each	2,000	0			
Manholes	Each	3,000	0			
Retention ponds/basins	Gallons	10	\$			
Dams (6' high)	Linear foot	200	0			
Open drainage channels	Linear foot	10	\$			
Closed drainage channels < 4' diameter	Linear foot	550	0			

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Category	Unit of Measure	Cost/Unit (\$)	Estimated Life/Years	# Units	Replacement Cost (\$)	Year Replacement
Closed drainage channels > 4' diameter	Linear foot	900				
Sewage						
Lines (4"-12")	Linear foot	50				
Lift stations	Each	50,000				
Manholes	Each	3,000				
Sewage treatment plant	Per 100,000 GPD	500,000				
Gas (natural)						
Lines <4"	Linear foot	10				
Lines >4"	Linear foot	40				
Meters	Each	2,000				
Pressure regulators (<3")	Each	2,000				
Storage tanks/lines						
Underground storage tanks (500-2,000 gallons)	Each	3,000				
Underground storage tanks (2,001-10,000 gallons)	Each	10,000				
Underground storage tanks (10,001-25,000 gallons)	Each	30,000				
Underground storage tanks (>25,000 gallons)	Each	75,000				
Above ground tanks (<5,000 gallons)	Each	3,000				
Above ground tanks (5,001-25,000 gallons)	Each	8,000				
Above ground tanks (>25,001 gallons)	Each	25,000				
Oil lines, steel (<3" diameter)	Linear foot	50				
Roadways						
Concrete roads/curbing and directional signs	Mile	750,000				
Asphalt roads/curbing and directional signs	Mile	550,000				
Street lighting	Each standard	6,000				
Bridges	Each	100,000				
ADA pedestrian controls	Per intersection	50,000				
Barriers	Each	500				
Traffic control signals	Per signal	50,000				
Guardrails	Linear foot	50				

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Category	Unit of Measure	Cost/Unit (\$)	Estimated Life/Years	# Units	Replacement Cost (\$)	Year Replacement
Sidewalks						
Sidewalks, concrete, 4" thick, 4" gravel base, 4'-10' wide	Linear foot	50				
Sidewalks, asphalt, 4'-10' wide	Linear foot	10				
Sidewalks, gravel, 4'-10' wide	Linear foot	5				
Pedestrian walkway bridge 8' wide	Linear foot	100				
Stairs, concrete cast in place 3'-6' wide with railings	Per riser	500				
Subtotal Infrastructure						
Land Improvements						
Athletic fields						
Baseball						
Hardball field, fence, and scoreboard	Each	300,000				
Softball field, fence, and scoreboard	Each	200,000				
Intramural softball field with backstop	Each	75,000				
Batting cage	Square foot	10				
Basketball						
Concrete surface with goals and court fencing	Each	20,000				
Asphalt surface with goals and court fencing	Each	15,000				
Lighting	Each	500				
Football						
Turf field with drainage	Each	1,000,000				
Artificial turf field with drainage	Each	600,000				
Field lighting	Per lamp	5,000				
Field fencing	Linear foot	100				
Soccer/lacrosse/field hockey/rugby						
Field with nets	Each	75,000				
Field lighting	Per lamp	5,000				
Tennis						
Tennis court with nets and court fencing	Each	30,000				
Tennis court lighting	Each	500				

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Category	Unit of Measure	Cost/Unit (\$)	Estimated Life/Years	# Units	Replacement Cost (\$)	Year Replacement
Track						
Artificial surface with drainage	Each	600,000				
Volleyball						
Sand lot with net	Lot	7,000				
Lighting	Each	500				
Grass lot with net	Each	2,000				
General						
Bleachers	Seats	100				
Concession building	Square foot	60				
Dugout	Square foot	30				
Irrigation systems for fields	Per head	100				
Storage shed or garage	Square foot	40				
Electronic scoreboard	Each	50,000				
Practice field	Square yard	5				
Grounds						
Developed green space	Acres	5,000				
Irrigation system (installed fixed system)	Per square foot	5				
Retaining walls, concrete	Cubic yard	230				
Retaining walls, wood	Cubic yard	150				
Lighting	Per fixture	3,000				
Parking facilities						
Parking lots with lights and drainage	Per car	1,000				
Parking deck with lights	Per car	12,000				
Parking garages above ground	Per car	15,000				
Parking garages below ground	Per car	35,000				
Unpaved parking (gravel)	Per car	800				
Emergency reporting phone station	Each	9,000				
Pedestrian facilities						
Patios	Square foot	10				
Pedestrian malls, pavers	Square foot	50				

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Category	Unit of Measure	Cost/Unit (\$)	Estimated Life/Years	# Units	Replacement Cost (\$)	Year Replacement
Pedestrian mall lighting	Each standard	2,200				
Walkway lighting	Each standard	5,000				
Handrails	Linear foot	50				
Amenities						
Benches	Each	500				
Commuter shelters	Each	3,000				
Fountains	Each	35,000				
Kiosks	Each	2,000				
Trash containers	Each	500				
Bike racks	Per bike	50				
Flagpoles, 20' and higher	Each	2,000				
Smoking shelter	Each	15,000				
Picnic tables	Each	750				
Bell tower	Each	60,000				
Clock tower	Each	50,000				
Dumpster pads	Square foot	10				
Campus signage	All	50,000				
Specialties						
Driver training course	Square foot	3				
Subtotal Land Improvement						
Total Infrastructure and Land Improvement						
Land Value	Acres	50,000	Indefinite			

Figure VI-A-2, Page 11 of 10