

Site Selection and Design

Purpose

The purpose of this chapter is to ~~assist~~ provide the ~~School~~ ~~District~~ and the Design Professional with informative guidelines to consider prior to selection, purchase, and development of a site. DPSAFT has not established standards with respect to site selection and design. Information is included for informational purposes only.

Site Selection Criteria

At first look, a potential site may appear to be a good acquisition. There are many factors, however, that can distort the picture. A large site can diminish may be reduced in size if wetlands are to be avoided occupy the site or if part of the area is in a floodplain. There ~~must~~ should be a ~~stream or other outsource nearby to remove storm drainage watershed nearby to allow for adequate storm drainage.~~ Hilly Irregular topography can escalate site development costs. Adequate ~~space~~ area is needed to retain and release storm water from the site.

Access to and from the site, ~~which has connection to from~~ a major highway or road artery, is an important factor. ~~Aside from the~~ In addition to understanding surface characteristics, sub-surface conditions may require exploration. Preliminary soil borings should be ~~taken~~ considered to ascertain the presence of poor soil, high water table, voids, or other impediments. A Phase I environmental study should be a requirement.

Site Design

With a good site available, site design and layout becomes the next task. Good site design ~~dictates that includes separate bus and car traffic should not cross circulation.~~ Likewise, students should not be required to cross car traffic lanes either safe passage for students entering or leaving exiting buses. and Bus parking should be arranged in a continuous line or, preferably, in a 45 degree parking arrangement.

Site Design (continued)

Visitor and staff parking, as well as and a separate service drive, is recommended. ~~Event parking is difficult to provide since large events usually only occur a couple times per year.~~

~~The~~ Orientation of the building critical is an important factor when considering from an energy usage standpoint. ~~The~~ A majority of the windows should be face a located on the north ~~or south direction~~ side of the building. Easy access to the main entrance should be obvious to all.

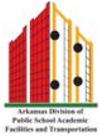
Good site design requires careful and thorough planning to provide maximum safety, and efficient utilization of site features.

Site Size

The recommended minimum site size found in this section should be considered when considering a new school site. ~~is consistent with current Arkansas State Board of Education standards. The site size was also based on a compilation of code requirements from cities in the Midwest and practical experience of site design. Most state education departments either mandate or recommend the minimum number of acres needed for the specific grade levels. These size guidelines are consistent with those recommended in the Council of Educational Facility Planners International (CEFPI), *Guide for School Facility Appraisal*.~~

Site Design

~~From past professional site design experience, sound judgment can determine if the visual survey of the site will satisfy the project needs. Useable topography, good surface drainage, available site utilities, and vehicular access are important. Soil borings must be obtained. Site design criteria are good practice recommendations, rather than standards.~~



Site Size

- ~~The~~ Recommended minimum site sizes are:
 - Elementary School: 10 acres plus 1 acre per 100 students
 - Middle School: 20 acres plus 1 acre per 100 students
 - High School: 35 acres plus 1 acre per 100 students
 - Combination Schools:
 - PK-12 School: 40 acres plus 1 acre per 100 students
 - PK-8 School: 20 acres plus 1 acre per 100 students
- Deviations from ~~the~~ recommended minimum site sizes may be ~~required~~ needed because of extenuating circumstances, especially in urban areas.
- ~~Where possible,~~ Larger site sizes or additional acreage should be strongly considered may be needed to allow adequate land for ~~development,~~ storm water detention, building expansion, topography features, subsurface sanitary sewage systems, etc.



1.

Urban Site Size

The site sizes given attempt to accommodate a range of available site sizes. It is also recognized that not all sites, especially those found in urban areas, will be able to accommodate a new or replacement facilityies, even with the smallest site size recommended in this Arkansas School Facility Manual. Therefore, it may be necessary to modify/reduce areas such as parking and circulation to "fit" the facility on the smaller site. A list of possible site size reductions to consider is provided below for to assist the administration School District and Design Professional to in analyzing the different size options. The list is not all inclusive and all decisions need to involve all interested parties prior to deleting or reducing a program.

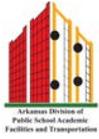
- Decrease the footprint percentages from the ideal target sizes identified in the Proposed Building Footprint chart
- Decrease the amount of visitor and staff parking to be provided
- Decrease the amount of student parking provided
- Decrease the amount of mechanical yard space to be provided
- Delete the bus drop-off and parent drop-off areas and provide a curbside service only
- Reduce the amount of greenspace to be provided
- Reduce/decrease the size/number of playfields/playgrounds to be provided

Urban Site Introduction

- The Urban Building Footprint section presents the building sizes recommended for various grade levels and student populations. It also indicates what portion of that area should be reflected in footprint area of the building, i.e., what portion should remain on the first floor of the building.
- After evaluation of all possible factors affecting the size of the new or existing site, the Design Professional shall submit the itemized evaluation for review and approval.
- The Urban Parking section presents total parking spaces recommended for various grade levels and student populations.
- The Urban Elementary School example presents the total site area recommended for an elementary school with a 350 student population.
- The Urban Middle School example presents the total site area recommended for an middle school with a 550 student population.
- The Urban Middle School example presents the total site area recommended for a middle school with a 550 student population.
- The Urban High School example presents the total site area recommended for a high school with a 1,000 student population.
- The Outdoor Athletic and Recreation Fields section presents the total area required for each type of outdoor athletic or recreation facility, and is intended as a guideline in adjusting recommended site sizes.

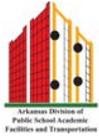
Urban Building Footprint

- The following chart is intended to assist with building footprint size selection:



4000 Site Guidelines Selection and Design

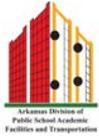
Percentage of Building Footprint to Total Area (GSF)							
Building Size	GSF	50%	60%	70%	80%	90%	100%
ELEMENTARY SCHOOLS							
200 students	34,400						34,400
350 students	47,600						47,600
550 students	70,400			40,280	56,320		
700 students	89,600			62,720	71,680		
MIDDLE SCHOOLS							
200 students	32,600						32,600
350 students	54,600						54,600
550 students	86,350			60,445	69,080		
700 students	109,200		65,520	76,440			
HIGH SCHOOLS							
250 students	51,750						51,750
500 students	95,500			66,850	76,400		
1,000 students	178,000		106,800	124,600			
1,500 students	249,000	124,500	149,400				
2,000 students	322,000	161,000	193,200				



Urban Parking

- The following chart is intended to assist in the development of the minimum recommended parking for new facilities.
- Provide the required suggested number of accessible parking spaces within quantities allocated as indicated in the chart below.
- Confirm all parking quantities with ~~the~~ local building, planning, and/or zoning departments.
- It is suggested that Contain staff parking in a be located in a secured area separated from other facility parking.
- Verify Check to see that the minimum required number of parking spaces equals or exceeds the requirements of the local governing agencies.

Description	Elementary Schools				Middle Schools				High Schools					
	200	350	550	700	200	350	550	700	250	500	1000	1500	2000	
Building Capacity	200	350	550	700	200	350	550	700	250	500	1000	1500	2000	
Teaching Stations	8	14	22	28	8	14	22	28	14	23	44	62	81	See Note 1
Staff Parking														
Teachers	8	14	22	28	10	16	26	33	16	27	52	73	96	See Note 2
Ancillary Staff	4	7	11	14	4	7	11	14	2	5	10	15	20	See Note 3
Administration	3	4	7	9	3	5	8	11	5	7	12	16	20	See Note 4
Custodial/Maintenance	2	3	4	5	2	3	4	5	2	4	7	10	14	See Note 5
Food Service	2	3	5	6	2	3	5	6	3	5	10	15	20	See Note 6
Total Staff Parking	19	31	49	62	21	34	54	69	28	48	91	129	170	
Total Visitor Parking	4	7	11	14	4	7	11	14	5	10	20	30	40	See Note 7
High School Student Parking									50	100	200	300	400	See Note 8
Minimum Required Parking	23	38	60	76	25	41	65	83	83	158	311	459	610	See Note 9
<p>Note 1: Teaching stations are determined at a percentage of 1 per 25 students.</p> <p>Note 2: Teachers are calculated at the following utilization of teaching stations: Elementary 100%; Middle-85%; High School-85%. Calculation: Teaching Station/Utilization percentage = Number of Teachers (24/.85 = 29)</p> <p>Note 3: Ancillary staff includes teaching aides, media center specialist, special education staff, etc. Total is calculated as percentage of the student population as follows: Elementary-2%; Middle-2%; High-1%.</p> <p>Note 4: Administration includes principals, secretarial, and itinerant staff.</p> <p>Note 5: Custodial/maintenance staff includes full-time staff for regular school hours. Calculation: 1 staff per 150 students.</p> <p>Note 6: Food service staff is calculated at 1 staff per 100 meals served with 80% building capacity participation for a full-service kitchen. Satellite kitchen would reduce staff by approximately 50-75%.</p> <p>Note 7: Visitor parking is calculated at 2% of building student capacity.</p> <p>Note 8: Student parking is calculated at 20% of all High School students.</p> <p>Note 9: Minimum required parking is determined by the total of staff, visitor, and student parking or by required zoning.</p>														



Urban Elementary School - 350 students

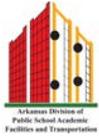
Building Footprint (One-Story)	47,600 SF	1.09 acres	PK-2/3-5 Playgrounds (see
Note 1)	17,500 SF	0.40 acre	Parking and Drives (see Note 2)
	15,200 SF	0.35 acre	
Play Fields (see Note 3):	96,840 SF	2.22 acres	one multipurpose field
(360'x250')			
one softball field (200' outfield)			
one basketball court			
Subtotal:	177,140 SF	4.06 acres	
Add 20% Greenspace (see Note 4)	35,428 SF	0.81 acre	
TOTAL:	212,568 SF	4.88 acres	
Recommended site size:		5.25 acres	

Note 1: This space footage, based on 50 SF per student, allows for a hard surface play area and a soft surface play equipment area for each playground.

Note 2: This estimate of area, based on 400 SF per car, allows for drives, a drop off pick-up zone, and a service area drive.

Note 3: Softball fields may partially overlap multipurpose field.

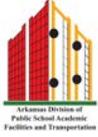
Note 4: Setting aside 20% of the site square footage requirements as greenspace ensures adequate space for separation of the various elements located on each site. Site landscaping is included in this area.



Urban Middle School - 550 students

Building Footprint (Two-Story)	69,080 SF	1.59 acres
Parking and Drives (see Note 1)	26,000 SF	0.60 acre
Play Fields (see Note 2):	<u>400,264 SF</u>	<u>9.19 acres</u>
one six-lane running track		
one soccer/football and event field in track interior		
one baseball field (350' outfield)		
two softball fields (200' outfield)		
two basketball courts		
Subtotal:	495,344 SF	11.38 acres
Add 25% Greenspace (see Note 3)	<u>123,836 SF</u>	<u>-2.84 acres</u>
TOTAL:	619,180 SF	14.22 acres
Recommended site size:		14.50 acres

- Note 1: This estimate of area, based on 400 SF per car, allows for drives, a drop-off/pick-up zone, and a service area drive.
- Note 2: Pole vault is not included at track.
- Note 3: Setting aside 25% of the site square footage requirements as greenspace ensures adequate space for separation of the various elements located on each site. Site landscaping is included in this area.



Urban High School – 1,000 students

Building Footprint	106,800SF	2.45 acres
Parking and Drives (see Note 1)	124,400SF	2.86 acres
Play Fields (see Note 2):	<u>797,090 SF</u>	<u>18.30 acres</u>
one eight lane running track		
one soccer/football and event field in track interior		
one practice football field		
one practice soccer field		
two baseball fields (350' outfield)		
two softball fields (250' outfield)		
ten tennis courts		
four basketball courts		
Subtotal:	1,028,290 SF	23.61 acres
Add 30% Greenspace (see Note 3)	<u>308,487 SF</u>	<u>7.08 acres</u>
TOTAL:	1,336,777 SF	30.69 acres
Recommended site size:		31.00 acres

Note 1: This estimate of area, based on 400 SF per car, allows for drives, a drop-off/pick-up zone, and a service area drive.

Note 2: Pole vault is not included at track.

Note 3: Setting aside 30% of the site square footage requirements as greenspace ensures adequate space for separation of the various elements located on each site. Site landscaping is included in this area.

Outdoor Athletic and Recreation Fields

- The following information is intended as a guideline in adjusting the recommended site sizes by adding or deleting playing fields. When selecting a site, consideration should be given regarding the size and configuration of type and quantity of outdoor athletic and recreation fields to be accommodated.
- ~~The designer should note that the Urban Elementary, Middle, and High School sections of this chapter use some overlap of recreational fields in determining total area required for all fields at each site.~~
- ~~The designer must consider configuration of each field in determining the actual area to add or delete for each field. Refer to guidelines for court and field dimensions.~~
- The designer should also consider drainage, circulation, access, and the need for bleacher seating when determining school site sizes.
- Specific Sizes:
 - ~~Baseball: Based on 350' radius to centerfield and 300' radius to right and left outfield with 60' offset from baseline to sideline fence. 135,806 SF 3.12 acres~~
 - ~~Softball:

 - One field with outfield overlapping multi purpose field (includes 360' x 195' multi purpose field) 91,200sf 2.09 acres.
 - One field no overlap 53,824sf 1.24 acres~~
 - Soccer/multi purpose field 70,200sf 1.61 acres
 - Track and Field Events
 - 6 lane track with interior field (no events) 146,000sf 3.35 acres
 - 6 lane track with interior field with discus/shotput combo 172,322sf 3.98 acres
 - 8 lane track with interior field and events 187,500sf 4.30 acres

Play Fields (continued)

Specific Sizes (continued):-

Tennis

- 10 courts 63,530sf 1.53 acres
- 4 courts 24,480sf 0.56 acre

Basketball Courts are 84' x 50'. Courts in quantity of 1-2 have 5' surrounding and between courts. Courts in quantity of 3 and up have 10' on ends and 5' to sides and between courts

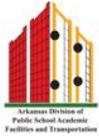
- 1 court 5,640sf 0.13 acre
- 2 courts 10,810sf 0.25 acre
- 3 courts 23,400sf 0.54 acre
- 4 courts 34,840sf 0.80 acre

Site Design

General

Aside from site size described in Chapter 4, the following are additional factors to be considered for when judging determining the merits of a potential site:

- Topography
- Vehicle Access
- Soil Characteristics
- Site Utilities
- Site Preparation
- Codes and Zoning
- Adjacent Property
- Easements/Rights-of-Way
- Environmental Restrictions
- Testing
- Aesthetic Considerations
- LEED rating system
- Demographics
- Vehicular Circulation
- Pedestrian Circulation
- Storm Sewer System
- Detention Pond
- Sanitary/Sewerage
- Directional Signage
- Playgrounds
- Lighting
- Landscaping
- Positive Drainage



Topography

- A reasonably level area is ~~required~~ needed to accommodate buildings, parking, student playgrounds, and physical education areas.
- There should be sufficient slope to allow for positive drainage to storm sewer outlets or other discharge points.
- Retain natural features.
- ~~Do not develop facilities on land~~ whose elevation is lower than 5 feet above the elevation of the 100 year flood as defined by FEMA should not be considered for development.

Vehicular Access

- A traffic study may be ~~required~~ needed to predict the impact of the school at peak times of arrival and dismissal-
- Consult local street or highway departments for turn lane, drive widths, and radius requirements.
- Review site distances at proposed entry exit for hazardous conditions.
- Two or three entry/exit points into the site are recommended to provide appropriate separation of car and bus traffic.

Soil Characteristics

- Obtain preliminary soil borings to obtain characteristics for foundation design, pavement design, storm sewer design, and excavation requirements.
- The presence of high ground water may result in the need for an underground drainage system.
- Erosion characteristics ~~will~~ may affect the need for temporary measures, such as silt fence, etc.
- ~~If a geotech investigation was performed an earlier time, those results need to be checked.~~

Site Utilities

- Storm water ~~must~~ may need to be detained on site and released at a rate that will not exceed current runoff rates and meets requirements of the authority having jurisdiction.
- Sewage from school buildings ~~shall~~ should be discharged into an approved sewage system per applicable codes.

Site Utilities - cont'd

- A water flow test will provide data on the available water flow in gallons per minute (gpm), static pressure available, and available residual pressure for fire protection systems.
- If a local water service is not available, an on-site well system ~~is~~ may be required ~~needed~~. ~~The~~ An on-site well system ~~shall~~ may be required ~~needed~~ to provide water for domestic use and fire protection systems. ~~When a well is considered, a test well is to be drilled.~~ The Environmental Protection Agency ~~must~~ should be contacted to make an evaluation of the proposed well system.
- The Site Design Professional ~~is required~~ to should evaluate the need and method ~~to provide~~ of providing gas service to the building. If natural gas service is not available, the installation of liquid propane (LP) gas should be investigated.

Site Preparation

- ~~Clear~~ Consider clearing ~~the site of~~ vegetation only as necessary for building, parking, roads, and walks.
- Adequate space should be available on-site for construction staging - location of stockpiles, portable field offices, storage of construction materials, and equipment.
- ~~Prevent~~ Consider methods to reduce the loss of soil during construction by storm water runoff and/or wind erosion, including topsoil.
- ~~Prevent~~ Sedimentation should be prevented from running off into ~~of~~ storm sewer or receiving streams.
- Every effort should be made to minimize disruption to the site.

Codes and Zoning

- Incompatible or nonconforming zoning may necessitate a zoning change variance or a special exception land use permit.
- Zoning ordinance restrictions such as building height, setback, fence height, landscaping, screening requirements,

Adjacent Property

- Screening of noise and views may be required. Minimize environmental pollution.
- Consider the safety of children walking to and from the school site during use of outdoor athletic and play facilities.
- Adjacent railroad rights-of-way or busy streets may require the use of earth berms, landscaping, and/or fencing.

Easements/Rights-of-Way

- Easements and rights-of-way for roads, sewers, gas, power, water, and oil lines should be researched for potential development restrictions.
- Acquisition of additional rights-of-way may be required to accommodate left turn lanes, tapers, passing blisters, and utility extensions.

Environmental restrictions

- Wetland delineation must be performed if the presence of a wetland is suspected.
- A designated wetland may prevent site development.
- Mitigation ~~will~~ may be required ~~needed~~ if a wetland ~~must~~ is to be disturbed. ~~Replacement ratios will be higher than the wetland being impacted. The most pristine wetlands are considered "unmitigable" not allowed to be disturbed or replaced.~~
- ~~Prevent polluting the air with dust and particle matter. Consider air pollution reduction methods.~~

Testing

- A Phase I Environmental Assessment should be completed to evaluate the potential for environmental liabilities associated with current and past property use and to assess regulatory compliance.
- ~~Perform~~ Consider performing a site investigation and records search of hazardous materials used, stored, or disposed of on the property; proximity to landfills; adjoining property uses; proximity to properties listed on the United States Environmental Protection Agency, Comprehensive Environmental Response, Compensation, and Liability Information System.

Testing - cont'd

- A Phase II Environmental Assessment may be required for areas of the site which indicate the potential for asbestos and other contaminants.
- ~~Brownfield sites: Rehabilitate damaged sites where development is complicated by real or perceived environmental contamination, reducing pressure on undeveloped land.~~

Aesthetic considerations

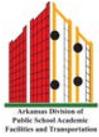
- It is preferable to choose a site with natural features compatible and complementary to the proposed building and site development.

~~13. LEED rating system~~

~~14. Demographics~~

Vehicular Circulation

- Maintain separate car and bus circulation areas. Buses should not be required to back up.
- Diagonal bus parking spaces should be 12 feet to 13 feet wide by the length of the bus. Spaces ~~shall~~ may be aligned at a 45-degree to 60-degree angle to the curb.
- Angle diagonal bus parking spaces so the bus exit door will allow children to exit in front of the adjacent bus.
- Provide parking spaces near delivery/receiving area for food service and custodial staff.
- Locate staff parking near visitor parking for economy of pavement design where possible. Staff parking can also be located to one side of the bus parking lot in the area not required for bus traffic.
- Consult building codes for parking space number and size.



Pedestrian Circulation

- ~~Provide~~ Consider constructing walks a minimum of 8-foot wide and a maximum of 12-foot wide from major drop-off drives to major entrances. Minor connecting walks are to be a minimum of 5-foot wide.
- Walks ~~are to~~ should be reinforced concrete, a minimum of 4 inches thick, with light broom finish. Consider thickened or reinforced edges.
- Walk slope ~~is to~~ should be a minimum of 1 percent and a maximum of 1:20. If walk exceeds 1:20, it ~~shall~~ should be designed as a ramp.
- Provide bollards at main entrance walk to block vehicles.

Storm Sewer System

- Create positive drainage away from building. Collect storm water in a series of inlets or swales to be detained and filtered on-site.
- Connect the building site storm drainage system by means of downspouts or roof drains to the building storm drainage system.
- All storm piping ~~shall~~ should be designed using the 10-year return period and intensity-duration curves consistent with the region.
- All storm piping and culverts ~~shall~~ should have a smooth interior. All pipe with a diameter greater than 24 inches shall be concrete, aluminized steel, or HDPE.
- Design the project site to maintain natural slope and water flows by promoting infiltration.
- Reuse storm water volumes generated for non-potable uses such as landscape irrigation, toilet and urinal flushing, and custodial use.

Detention Pond

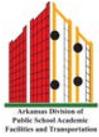
- Detention ponds ~~are to~~ should be designed to prevent storm water from flowing off the site at a rate greater than permitted by the authorities having jurisdiction. Detention ponds are normally dry except after rainfalls.
- Side slopes ~~shall~~ should not exceed 4:1 and may be increased to 2:1 in the immediate vicinity of headwalls or other discharge control devices.
- All detention ponds which serve an area greater than 15 acres ~~shall~~ should be designed using an appropriate hydrograph method. The inflow hydrograph shall be routed through the pond using standard engineering methods to obtain the discharge hydrograph.
- Provide riprap or other erosion control measures at inlet and outlet of pond.

Sanitary/Sewerage

- The disposal of sanitary sewerage to the local utility ~~shall~~ should be approved by the local authority having jurisdiction.
- Appropriate methods for the disposal or treatment of sanitary sewerage consists of conventional gravity sewer, force main, septic with leach field system, or sand filter and on-site treatment plants.

Directional Signage

- Provide "Stop", "Yield", "No Parking", "One-Way", "Do Not Enter", or other signs as necessary to maintain a fluid traffic stream.
- Signs, and the installation of signs, are to meet the requirements of the authority having jurisdiction.
- For handicap signage consult ADA requirements.



Playgrounds

- Play equipment to be in compliance with “ASTM F 1487-95 or most current version of the Standard Consumer Safety Performance Specification for Playground Equipment for Public Use” and the current guidelines for public play equipment by the United States Consumer Product Safety Commission.
- The design of play equipment ~~shall~~ should comply with Americans with Disabilities Act guidelines.
- Provide a firm, stable, slip-resistant, and resilient soft surface under and around play equipment. Depth and type of soft surfaces ~~shall~~ should comply with ASTM F 1292-99 or most current version of Specification for Impact Attenuation of Surface Systems Under and Around Playground Equipment.
- Provide an accessible route of travel through soft-surface play area. Choice of surfacing and minimum areas of surfacing required ~~shall~~ should comply with Americans with Disabilities Act guidelines.

Lighting

- Provide a 10-footcandle illumination level at main building entrances. Provide a 5-footcandle illumination level at all entrances except main entrance.
- Light fixtures ~~shall~~ should be high-density discharge type located directly over doors, or high-density discharge type recessed in overhangs or soffits located directly over doors. Fixtures shall be designed for exterior use. Wall-mounted fixtures shall be vandal resistant.
- Provide an illumination level of 0.5 footcandles at entrance/exit drives. Provide an illumination of 1.0 footcandles within parking areas and bus drop-off/pick-up areas.



Lighting - cont'd

- Lighting ~~shall~~ should be high-intensity discharge type located on poles with a concrete base. Pole height shall be a maximum of 39 feet. Lighting shall be controlled by photoelectric cells, time clocks, or time management system. The Site Design Professional ~~shall~~ should have discussions with the ~~s~~School ~~d~~District to determine light fixture switching and time clock programming.
- Minimize site lighting where possible and model the site lighting using a computer model.
- ~~Shield~~ Consider shielding all site lighting and minimize uplighting.

Landscaping

- ~~Do~~ Should not exceed 3:1 slope on lawn areas where mowing is required.
- On slopes greater than 3:1, provide slope controlled vegetation to retard erosion. Consider safety of children.
- Provide low maintenance shrubs and flowering trees to emphasize main building entries.
- ~~Consider native vegetation.~~
- Consider ~~l~~imiting or ~~e~~liminating the use of potable water for landscape irrigation.

Positive Drainage

- At building perimeter, exterior grade ~~shall~~ should be 8 inches or more below first floor level, except at entrances. The ground around the building perimeter shall slope down and away from the building for a minimum of 20 feet to eliminate any standing water.