

Site Selection and Design

Introduction

The purpose of this chapter is to provide the Local Educational Agency and the Design Professional with informative guidelines to consider prior to the selection, purchase, and development of a site. The Office of School Construction Grants & Review has established standards with respect to site selection and design. Contact the Office of School Construction Grants & Review for additional information.

Site selection is one of the key components to any successful school project. A review of natural resources and regulatory hurdles must be factored in as part of the site selection process. Before looking for a new site, some basic criteria should be established. The following resources or potential concerns must be reviewed for each site: floodplains (100-year, 500-year, floodway, coastal hazard zones); hurricane surge zones; potential for sea level rise; wetlands (inland and tidal); critical habitats; soil types; soil contamination; groundwater contamination; hazardous wastes, substances, and materials; and/or applicability of the CT Department of Energy and Environmental Protection (CT DEEP) Property Transfer Law. These same resources or concerns should be reviewed even for extensions/additions to existing school facilities.

Site Assessment/Evaluation

For all new sites and for existing sites when an expansion or addition will occur, a Phase I Environmental Site Assessment is required to evaluate the potential for environmental liabilities associated with current and past property use and to assess regulatory compliance.

The Phase I Environmental Site Assessment shall be in accordance with the American Society for Testing and Materials Standard #1527, Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process, or similar standards.

All new sites must be evaluated with respect to the CT DEEP Property Transfer Law to determine if the new site meets the definition of “establishment” (see CGS Section 22a-134). If the new site meets the definition of an “establishment,”* then an investigation of the parcel is required in accordance with prevailing standards and guidelines. Based upon the

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 site may be reduced in size if wetlands occupy the site or if part of the area is in a floodplain. Such issues as irregular topography, shallow depth to bedrock or site contamination can escalate site development costs.

Following are additional factors to consider when 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 Concerns (for example, soil contamination, groundwater contamination, Environmental Use Restrictions, and/or Property Transfer Law applicability)
- Testing
- Aesthetic Considerations
- Vehicular Circulation
- Pedestrian Circulation
- Storm System
- Detention and Retention Ponds
- Sanitary/Sewerage
- Directional Signage
- Playscapes
- Lighting
- Landscaping
- Positive Drainage

investigation, one of eight Property Transfer Forms must be executed, and a copy of the form must be filed with the CT DEEP. It is important to remember that if the new site meets the definition of an establishment, and if there was a release of a hazardous water or a hazardous substance, then the parties negotiating the transfer must determine who will be responsible for investigating and remediating the pollution as part of the property transfer.

**Establishment means any real property at which or any business operation from which: (A) on or after November 19, 1980, there was generated, except as the result of remediation of polluted soil, groundwater or sediment, more than one hundred kilograms of hazardous water in any one month; (B) hazardous waste generated at a different location was recycled, reclaimed, reused, stored, handled, treated, transported, or disposed of; (C) the process of dry cleaning was conducted on or after May 1, 1967; (D) furniture stripping was conducted on or after May 1, 1967; or (E) a vehicle body repair facility was located on or after May 1, 1967.*

Stormwater

For sites disturbing more than one acre, a Stormwater Pollution Control Plan shall be prepared per CT DEEP General Permit requirements. For sites less than one acre, an erosion and sediment control plan shall be prepared in accordance with CT Guidelines, as amended.

Conclusion

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

Grant reimbursements for land acquisition are limited to the acreage for the project even when the parcel is far greater.

Site Design

Once a good site is secured, the next task is site design. Good site design includes separate bus and car circulation, safe passage for students entering or exiting buses, and bus parking arranged in a continuous line or a 45-degree parking arrangement.

Visitor and staff parking and a separate service drive are recommended.

Orientation of the building is an important factor when considering energy usage. A majority of the windows should be located on the north or south side of the building. Easy access to the main entrance should be obvious to all.

Site Size

The recommended minimum site size found in this section should be considered when evaluating a new school site.

- Recommended minimum site sizes are:
 - Elementary School: 10 acres plus 1 acre per 100 students
 - Middle School: 15 acres plus 1 acre per 100 students
 - High School: 20 acres plus 1 acre per 100 students
- Deviations from recommended minimum site sizes may be needed because of extenuating circumstances, especially in urban areas.
- Larger site sizes or additional acreage may be needed to allow adequate land for storm water detention, building expansion, topography features, sub-surface sanitary sewage systems, etc.

Urban Site Size

It is recognized that not all sites, especially those found in urban areas, will be able to accommodate new or replacement facilities. Therefore, it may be necessary to modify or reduce areas such as parking and circulation to “fit” the facility on the smaller site. A list of reductions to consider is provided to assist the LEA and Design Professional in analyzing different size options.

- 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.
- Reduce the amount of greenspace to be provided.
- Reduce/decrease the size/number of playfields/playscapes to be provided.
- Delete the bus drop-off and parent drop-off areas and provide curbside service only.

Parking

The following chart is intended to assist in the development of the recommended parking for new facilities. The information is provided as a guideline, not a requirement.

In addition, the following actions should be considered.

- Provide the suggested number of accessible parking spaces as indicated in the chart below.
- Confirm all parking quantities with local building, planning, and/or zoning departments.
- Locate staff parking in a secured area separated from other facility parking.
- Check to see that the 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
Note 1:	Teaching stations are determined at a percentage of 1 per 25 students.													
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)													
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%.													
Note 4:	Administration includes principals, secretarial, and itinerant staff.													
Note 5:	Custodial/maintenance staff includes full-time staff for regular school hours. Calculation: 1 staff per 150 students.													
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%.													
Note 7:	Visitor parking is calculated at 2% of building student capacity.													
Note 8:	Student parking is calculated at 20% of all High School students.													
Note 9:	Minimum required parking is determined by the total of staff, visitor, and student parking or by required zoning.													

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 Design Professional 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 Design Professional 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 Design Professional 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

Outdoor Athletic and Recreation Fields

- 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 quantities of 1-2 have 5' surrounding and between courts. Courts in quantities 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

Environmental Restrictions

- Wetland delineation must be performed if the presence of a wetland is suspected.
- A designated wetland may prevent site development.
- Mitigation may be needed if a wetland is to be disturbed.
- Consider air pollution reduction methods.
- Floodplain
- Potential long-term side effects of sea level rise, especially along the coast.

Topography

- A reasonably level area is needed to accommodate buildings, parking, student playscapes, and physical education areas.
- There should be sufficient slope to allow for positive drainage to storm outlets or other discharge points.
- Retain natural features where possible.
- Avoid low-lying areas that could have long-term water/drainage issues.

Vehicular Access and Circulation

- A traffic study may be needed to determine 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 line distances at proposed entry and exit for hazardous conditions.
- Two or three entry/exit points into the site are recommended to provide appropriate separation of car and bus traffic.
- Maintain separate car and bus circulation areas. Buses should not be required to back up.
- Diagonal bus parking spaces should be 12 - 13 feet wide by the length of the bus. Spaces 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.

Directional Signage

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

Pedestrian Circulation

- Consider constructing walks a minimum of 8-feet wide and a maximum of 12-feet wide from major drop-off drives to major entrances. Minor connecting walks are to be a minimum of 5-feet wide.
- Walks should be reinforced concrete, a minimum of 4 inches thick, with light broom finish. Consider thickened or reinforced edges. Bituminous walks are also acceptable.
- Provide concrete curbs and concrete paving at student drop-off, trash/dumpster pads, and other heavy use areas.
- Walk slope should be a minimum of 1 percent and a maximum of 1:20. If walk exceeds 1:20, it should be designed as a ramp.
- Provide bollards at main entrance walk to block vehicles.

Soil Characteristics

- Obtain preliminary soil borings to obtain characteristics for foundation design, pavement design, storm design, and excavation requirements.
- The presence of high ground water may result in the need for an underground drainage system.
- Erosion characteristics may affect long-term stability issues.

Site Utilities

- Storm water may need to be retained and 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 should be discharged into an approved sewage system per applicable codes.
- 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 may be needed. An on-site well system may be needed to provide water for domestic use and fire protection systems. Consult with the CT DPH and CT DEEP.
- The Design Professional should evaluate the need and method 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

- Consider clearing 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.
- Consider methods to reduce the loss of soil during construction by storm water runoff, including topsoil.
- Sediment should be prevented from running off into storm or receiving streams.
- Consider a Vegetation Preservation Plan and a Soil Management Plan.

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, placement and design of site signage, and size of parking spaces can affect site development costs and flexibility.

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 and 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.

Testing

- A Phase II Environmental Assessment may be required for areas of the site which indicate the potential for contaminants.
- For existing buildings, hazardous material surveys and reports for lead, asbestos, and other material of concern may be required.

Aesthetic Considerations

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

Design storm system to applicable local standards or CT DOT Drainage Manual and CT DEEP General Permit Conditions and requirements.

Storm 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 should be designed using the 10-year return period and intensity-duration curves consistent with the region.
- 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.

Positive Drainage

- At building perimeter, exterior grade 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.

Detention Pond

- Detention ponds 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.

Sanitary Sewerage

- The disposal of sanitary sewerage to the local utility 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.

Playscapes

- Play equipment should 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 should comply with ADA guidelines.
- Provide a firm, stable, slip-resistant, and resilient soft surface under and around play equipment. Depth and type of soft surfaces 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 should comply with ADA guidelines.

Lighting

- Provide a 10 foot-candle illumination level at main building entrances. Provide a 5 foot-candle illumination level at all entrances except main entrance.
- Light fixtures 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 foot-candles at entrance/exit drives. Provide an illumination of 1.0 foot-candles within parking areas and bus drop-off/pick-up areas.

Lighting (continued)

- Lighting should be high-intensity discharge type or LED 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 Design Professional should have discussions with the School District to determine light fixture switching and time clock programming.
- Minimize site lighting where possible and model the site lighting using a computer model.
- Consider shielding all site lighting and minimize up-lighting.

Landscaping

- 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 limiting or eliminating the use of potable water for landscape irrigation.

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