Civil Sitework

Components

- Building placement
- Ingress, Egress Routing
- Sidewalk
- Trash Enclosure
- Curbing
- Signage and Striping
- Pavement
- Subgrade, Building Pad
- Grading and Drainage
- Water, Sewer, other Utilities
- Landscape and Irrigation

General Standards

1. This section establishes the minimum design and construction requirements for civil sitework for new construction and expansions of school facilities.
2. All drawings including surveys and civil plans shall be prepared in AutoCAD DWG or .pdf format.
3. Site design shall be performed under the supervision of a Registered Civil Engineer and all civil related plans, reports and construction documents shall be signed and sealed in accordance with state statutes.
4. All site design shall conform to the applicable codes and to Federal, State, and local requirements of the Authorities Having Jurisdiction (AHJ).
5. A subsurface geotechnical analysis shall be performed by a Registered Geotechnical Engineer to determine soil properties and provide recommendations for design of footings, foundations, pavements and construction techniques.
6. The following publications (latest edition) shall be consulted by the design professional and are hereby included for reference:
   - Americans with Disabilities Act (ADA)
   - American Association of State Highway and Transportation Officials (AASHTO) Design Greenbook
   - Institute of Transportation Engineers (ITE Manual)
   - Manual on Uniform Traffic Control Devices (MUTCD)
   - Arkansas Department of Transportation (ARDOT) Specifications

Site Design Standards

1. Site planning and building placement – The placement of the building shall be closely coordinated with the architect to make good use of the property and ancillary facilities. The various modes of travel (pedestrian, bicycle, cars, buses, delivery vehicles) shall be separated as much as possible to provide safe and efficient access. Special attention shall be given to ingress and egress of

pedestrians, passenger vehicles, and buses, and short term and long term parking locations for each. Pedestrian and vehicular conflicts shall be minimized, as much as possible. Consideration shall also be given for proper drainage of the site during site planning design.

2. Parking – Parking stalls for cars shall be designed at 30°, 45° or 90° angle to the traffic flow direction and shall be a minimum of 9' by 18' in size or per the authorities having jurisdiction (AHJ) requirements, whichever is greater. See Chapter 4 of this manual for number of spaces required for each type of school. All accessible parking shall be designed per the latest edition of the Americans with Disabilities Act (ADA) Federal Guidelines and/or the local codes, whichever is more stringent. Drive aisles between car parking shall be a minimum of 24' for two-way traffic and a minimum of 16' for one-way traffic. Bus parking is recommended at 30° angle to traffic flow direction and oriented so the bus exit door allows students to exit in front of adjacent buses. Bus spaces shall be a minimum of 12' by 40'. Buses should not be required to back up. Drive aisles for buses are recommended to be a minimum of 20'. A parking summary shall be included on the site plan.
3. Sidewalks - Sidewalks shall be designed for access from the parking areas to all entry doors, as well as an accessible path from the street frontage, per ADA guidelines. Sidewalks shall be a minimum of 5' in width and shall be constructed of a minimum of 4" thick Portland cement concrete and minimum strength of 2500 psi.
4. Trash Enclosure – Trash enclosure shall be provided in a location accessible to trash trucks without conflicting with pedestrian routes or bus pick-up/drop-off point. The size of the enclosure may vary by size and number of dumpsters available from the provider. Where practical, recycling may also be staged in the trash enclosure area. The standard enclosure shall have three sides constructed of durable wood, synthetic, or masonry to a minimum height of 6' and capable of screening the dumpster(s) from view. The enclosure will be gated on the "open" side to screen the dumpster interior and provide access. The enclosure shall be positioned so that the "open" side faces a drive entrance with a minimum of 35' direct approach to the enclosure. The trash enclosure shall be constructed on an 8" concrete slab and slab shall extend at least 15' in front of dumpster for the entire opening.
5. Curbing –Curbing shall be provided around the entire pavement perimeter and at all pavement edges. All curbing shall be defined on the site work drawings as to type of curb, size and general location. All permanent curbing shall be concrete. Extruded concrete curbing epoxied to the pavement surface is not permitted. Asphalt curbing shall only be allowed along pavement edges when it is adjacent to a future development area.
6. Traffic Signage and Striping – Traffic signage shall conform to the Manual on Uniform Traffic Control Devices (MUTCD), and at a minimum shall include stop signs where traffic leaves the school property and/or enters a public

Pick-up/drop-off area Sidewalks
Consideration for wider sidewalks in pick-up/drop-off areas and areas leading to main entries are recommended.

Bollards at Trash Enclosure
Bollards are recommended at each corner of the enclosure, where exposed to traffic.

Curbing
Special care should be taken to ensure that all curb radii at entrances, around islands and around curves are sufficiently large enough to accommodate bus turning movements.

thoroughfare. The school shall defer to local authorities for proper off-site signage of public rights-of-ways.
7. Fencing – Fencing in and around playgrounds shall conform to ASTM F2049.
8. Vehicular Traffic Security Gates – If the district incorporates vehicular traffic gates (i.e., swinging gates) into the campus ingress/egress sites, the gates shall be designed to be secured in both the open and closed positions to ensure safety for pedestrians and vehicles.

Signage and Striping

Additional interior signage, including pedestrian crossings, stop signs, directional arrows, and informational signage may be necessary.

Striping and pavement markings should be considered to aid in the safe and efficient movement of vehicles through the site.

Pavement Design Standards

1. Pavement design shall be based on a minimum design period of twenty (20) years.
2. Pavement design shall be as recommended by the geotechnical engineer and shall consider such variables as the California Bearing Ratio (CBR) of the soil, anticipated traffic volume and vehicle mix (i.e. automobiles, buses, single axle trucks, double axle trucks, etc.) The design professional shall consult the ITE Manual, as well as Chapter 4 of this manual, for determination of anticipated traffic loads for various school types and sizes. The design shall also be based on sound geotechnical practices, existing soil conditions, knowledge of local conditions, and availability of material and pavement performance.
3. Pavement design shall include, at a minimum, the following paving design sections:
   - Standard Duty Asphalt Paving – for use in areas of car traffic and car parking
   - Heavy Duty Asphalt Paving – for use in bus lanes, bus parking, delivery vehicle access, trash truck access, and extreme high use vehicular areas
   - Standard Duty Concrete Paving - for use in areas of car traffic and car parking and/or areas of mixed use traffic
   - Heavy Duty Concrete Paving – for use in bus lanes, bus parking, delivery vehicle access, trash truck access, and extreme high use vehicular areas
   - Heavy Duty Reinforced Concrete Paving – for use in trash enclosure areas, loading docks, truck wells, delivery doors or other areas of extreme loading
4. Pavement and base materials shall conform to the Arkansas Department of Transportation specifications for materials and pavement design.
5. Asphalt pavement design shall conform to Superpave specifications and consist of three layers: surface course, binder course, and crushed aggregate base course, resting on a properly prepared subgrade.
6. Concrete paving shall have a minimum strength of 3000 psi.

Subgrade and Building Pad Preparation Standards

1. Site specific recommendations by the geotechnical engineer shall supersede this section.
2. Topsoil shall be stripped from the site and stockpiled (on-site if possible) per the geotechnical recommendations. Topsoil removal shall be to a sufficient depth to remove

the layers containing organics. Topsoil may be reused for top dressing of landscape areas or other non-structural fill areas, where applicable.

3. Preparation of the site subgrade shall be per the recommendations of the geotechnical engineer, and may include scarifying and re-compaction, over-excavation, cut, fill, lime stabilization, cement stabilization, dewatering, moisture conditioning, or compaction.
4. Subgrade must be properly shaped to the desired sections and elevation and shall be compacted so that it is firm, hard and unyielding. The subgrade shall be at least 12" thick and free of organic and other deleterious materials. Subgrade under paved areas shall be compacted to 95% maximum dry density Modified Proctor per ASTM D-1557.
5. Subgrade for the "building pad" shall extend 5' beyond the perimeter walls of the building and at least 4' below the floor slab and base layer. Subgrade for the building pad shall have a maximum plasticity index of 20 and a maximum liquid limit of 40.
6. The "building pad" subgrade soils shall have a minimum allowable bearing capacity of 3,000 psf.
7. Structural fill placed in the "building pad" area shall be placed in 8" lifts (max) and shall be compacted to 95% maximum dry density Modified Proctor per ASTM D-1557.

Grading and Drainage Design Standards

1. The site shall be graded to safely and efficiently convey stormwater through and around the site.
2. The site shall be designed to safely convey the 100 year storm event. When stormwater piping is used, piping shall be designed to convey the 25 year storm event, or per the AHJ, whichever is greater. The site shall conform to the AHJ requirements for stormwater detention/retention, if required.
3. The design professional shall set the finish floor elevation of the building at an elevation at least 1' above base flood elevation (BFE), or per the AHJ requirements, whichever is greater.
4. Grading around the building shall slope away from the building at a minimum of 2% slope for at least 10' from the building walls. Care should be taken to ensure that landscaping, mulch, topsoil, sod or other materials do not inhibit proper drainage around the base of the building. Where possible, foundation plantings and irrigation close to the foundation walls should be avoided, in order to reduce the effects of moisture under the footings and slabs.
5. Surface drainage swales through playgrounds and play areas shall be prohibited. Inlets and/or pipe openings in playgrounds and play area shall be avoided, and if unavoidable, shall be adequately designed to prohibit students from access.
6. All paved areas, unless otherwise required by code, shall be designed between a 5% maximum and a 1% minimum slope.
7. All landscape areas shall have a maximum slope of three (3) horizontal to one (1) vertical (3:1) and a minimum slope of 1%.

Grading at Play Areas
Play areas generally should be sloped at 2% to promote positive drainage and eliminate ponding and puddles.

8. Ponding around drainage inlets in paved areas shall be limited to a maximum of 6" depth.
9. Stormwater detention/retention ponds should be placed away from play areas and playgrounds, where applicable. Safety of the student should be considered to prevent accidental access or accidental drowning. Fencing, landscape barriers, transition zones, or other buffers may be utilized where student safety is a concern.
10. Slopes in and around stormwater detention/retention area shall have a maximum slope of four (4) horizontal to one (1) vertical (4:1) for ease of maintenance.
11. All drainage inlets on school sites shall be designed as "child safe" to reasonably prohibit student access into inlets and drainage boxes.
12. All grated inlets shall use "bicycle safe" grates.

Water and Sewer Design Standards

1. Domestic water and sanitary sewer shall conform to the requirements of the Arkansas Department of Health.
2. Domestic water main lines shall maintain at least 10' horizontal separation from sanitary sewer mains. Water and sewer lines shall maintain 18" vertical separation.
3. Design of the water system shall include the necessary domestic and fire protection needs for the site. The civil engineer shall coordinate with the plumbing engineer to ensure the system has the adequate capacity for the needs of the site.
4. Civil design documents shall include design of water and sewer commencing 5' outside the building and continuing to the point of connection at the public main.
5. Water system design shall include all main lines, service lines, and fire lines outside the building, as well as fire hydrants, meter locations, valves and other appurtenances.
6. Water pipe materials may include copper, PVC, and ductile iron conforming to American Water Works Association specifications.
7. Water lines shall be designed for burial below frost depth and of adequate depth to avoid damage during construction.
8. Sanitary service lines shall be a minimum of 4" diameter PVC, and mainlines shall be minimum 8" PVC.
9. All facilities with food preparation shall have a grease interceptor which complies with Arkansas Plumbing Code Section 1003.3 and Local requirements. Grease interceptors shall be placed in a location away from normal pedestrian traffic, but generally accessible for the maintenance/pumping vehicle.
10. Utility easements shall be provided where public mains cross private property.
11. Proper trenching and bedding of water and sewer lines shall be required
    - Bedding Material: Provide Class I-A or I-B granular material in accordance with ASTM D 2321 which is free from clay lumps, organic, or other deleterious material.
    - Haunching Material: Provide Class I-A, I-B or Class II

Stormwater Quality Initiatives
The design professional should consider stormwater quality initiatives, such as filtration strips, bio-swales, and other water quality devices, where applicable.

Landscape and Irrigation
The landscape and irrigation designer should endeavor to be good stewards of the environment and to conserve water resources through quality design, plant selection, and available technology.

Landscape design should include attention to appropriate plant selection on the basis of: plant hardiness zones, avoidance of hazardous plant material (toxic, poisonous, thorny, etc.), avoidance of plant materials with undesirable litter/fruit dropping, species that are indigenous or well adapted to the region, and plant material that is less susceptible to insect issues. Native species and drought tolerant species should also be considered.

Irrigation should be designed to protect the school's landscape investment. Irrigation systems may include traditional spray head irrigation, drip irrigation, xeriscape, or a combination thereof. Regardless of the system used, care should be taken to ensure that the system is well-planned, well-zoned, well-timed, and efficient in its operation. Irrigation systems should account for plant material precipitation rates and controlled zones to prevent overwatering and/or wasted irrigation. The use of rain sensors should be included in the irrigation system.

The irrigation system should have its own irrigation meter (separate from the domestic water meter) in municipalities where sanitary fees are calculated based on water usage.

granular material in accordance with ASTM D 2321 which is free from clay lumps, organic, or other deleterious material. Haunching is considered the zone from the bottom of the pipe to the spring line of the pipe.

12. Trenching and construction shall comply with all OSHA requirements. The site shall be graded to safely and efficiently convey stormwater through and around the site.

Utility Design Standards

1. Civil engineer shall be responsible for design of site routing of utilities from 5' outside of the building to the point of connection. These may include electric, telephone, gas, and fiber optic routing. The civil engineer shall coordinate with the design team and the utility providers for connection points, service demarcation points, building entry points and load requirements.
2. Utility services shall be placed underground, where possible.
3. Electrical transformers and other utility appurtenances shall be placed away from playgrounds, play areas, and pedestrian walkways, or fenced to adequately prohibit student access.
4. All vaults, meter boxes, and pull boxes in traffic areas shall be "traffic rated H-20".
5. Utility easements should be provided for primary electric service runs to and including the transformer location. Secondary electric service runs typically do not require easements.
6. Empty conduits for future use should be provided under paved entrances and driveways.
7. Proper trenching and bedding of utility lines shall be required.
   - Bedding Material: Provide Class I-A or I-B granular material in accordance with ASTM D 2321 which is free from clay lumps, organic, or other deleterious material.
8. Trenching and construction shall comply with all OSHA requirements.