**Online Appendix A: CPTED School Assessment (CSA) Scales and Items**

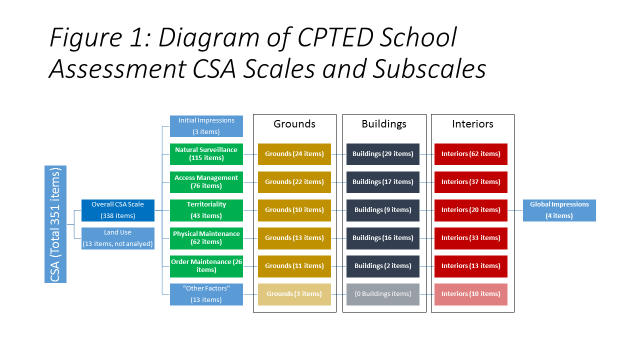
**CSA Scale Overview:**

The CSA is an observational tool that can be used to assess physical conditions and use of the school environment on a typical school day. The CDC developed the CSA to measure consistency of the physical elements of schools with CPTED principles. The CSA tool is comprised of 351 statements which describe the ideal condition for each geographic area of a school campus, divided into many subscales used as the main exposures in this analysis. Each observed area or element is rated on a five-point Likert scale with values ranging from ‘1’ to ‘5’, with 5 being the highest degree of correspondence between the stated ‘ideal’ and the ‘actual’ condition that is observed. Scales were constructed as an average of all non-missing component items, where at least one of the component items needed to be complete for a given school in order for an average to be constructed, otherwise the scale was missing for that school.

Figure 1: Diagram of CPTED School Assessment (CSA) Scales and Subscales illustrates the flow of the 351 items of the CSA tool as they are included or excluded from the range of 24 CSA scales analyzed. In summary, an “Overall CSA Scale” consists of 338 items (colored dark blue), excluding only 13 “Land Use” items which were not analyzed. Most of these 338 CSA items are organized primarily into 5 CPTED principles (colored green, including all boxes to the right) related to environmental design and use: “Natural Surveillance” (115 items), “Access Management” (76 items), “Territoriality” (43 items, also including 4 “Global Impressions” items), “Physical Maintenance” (62 items), and “Order Maintenance” (26 items). The overall CSA scale also includes 3 items for “Initial impressions” (which otherwise are not included in the 5 CPTED principle subscales nor the 3 general location subscales), and 13 items for “Other Factors” (which are not included in the 5 CPTED principle subscales but are included within the general location subscales).

In addition, three overall general location scales combine (from top to bottom) the subscales for Grounds (83 items, colored brown), buildings (73 items, colored dark grey), and interiors (175 items, colored red) across all five CPTED principles as well as “Other Factors” (3 semi-transparent boxes only analyzed as part of the 3 general location scales and overall CSA scale). In addition, the 5 CPTED principle scales are further divided into the 3 general locations of “Grounds”, “Buildings”, and “Interiors”, creating 15 mutually exclusive principle by location subscales.

Finally, location-specific exposures (not show in Figure 1) are subsets of the 3 general location subscales (i.e., grounds, buildings, interiors) broken down into location-specific sets of items (e.g. bus loading and unloading areas, entries and exits, restrooms, classrooms, etc.). These scales and subscales are described in greater detail below.



**Summary of Items in CSA Scales:**

Due to the volume of items going into each scale, the following is not an exhaustive list of all items going into the overall CSA scale, 5 principle scales, 3 general location scales, 15 principle by general location scales, Initial Impressions, Global Impressions, and “Other Factors”. Instead, selected items are summarized for illustration of the types of ratings going into each scale.

***Overall CSA Scale:***

The overall CSA scale (338 items) includes items from the 5 CPTED principles (as described below): “Natural Surveillance” (115 items), “Access Management” (76 items), “Territoriality” (43 items), “Physical Maintenance” (62 items), and “Order Maintenance” (26 items). The overall CSA scale also includes 3 items for “Initial impressions” and 13 items for “Other Factors”.

The 3 “Initial impression” items are statements registering general first impressions of the school grounds, buildings, and interiors. These impressions are generally spontaneous and represent a ‘felt’ response rather than a systematic assessment. This would be the equivalent of what is commonly referred to as ‘curb appeal’. The initial impression items are ratings for each of the 3 general locations (i.e., “Initial impressions of the school {grounds/buildings/interiors} are positive”).

The 13 “Other Factors” items are based on common themes such as:

* Sufficient capacity for the orderly movement of vehicles, for the storing of belongings, and for all students to sit in authorized locations (4 items);
* “Student displays include a wide range of student interests and cultural backgrounds” (6 items);
* “There are outdoor learning areas that provide out-of-doors opportunities for students”;
* “There is an abundance of natural light within interior spaces”; and
* “The temperature in interior spaces is neither too hot nor too cold”.

***Five CPTED Principle Scales and Principle by General Location Subscales:***

Most of the CSA items are organized primarily into 5 CPTED principles related to environmental design and use: Natural surveillance, access management, territoriality, physical maintenance, and order maintenance. In turn, each of these 5 principles are divided into 3 general location subscales to yield 15 principle by general location subscales. Many of the items share a similar structure, for example “{Specific location} is/are in good condition” was asked for 46 separate locations under physical maintenance. Similarly for natural surveillance, “{Specific location} is/are easily monitored” was asked for 36 separate locations, and another 20 items ask if “{Specific location} is/are well lit” for separate locations. Examples of related items for each scale or subscale are as follows:

*Natural surveillance (115 items):* Natural Surveillance involves the design and placement of physical features in such a way as to maximize visibility and avoid auditory isolation. It includes the use of windows, placement of walkways, lighting, and a host of other design considerations to provide opportunities for casual surveillance. Providing for natural surveillance eliminates hiding or hard-to-see places and increases the perception of human presence or supervision. It puts the potential offender under threat of being observed, identified and dealt with, while affording the potential victim or authority figure the opportunity to take appropriate action. Environments that are open with activities that are easily observed tend to create an atmosphere of comfort for the users.

*Grounds (24 items):*

* “{Specific location} is/are easily monitored” (9 items)
* “{Specific location} is/are well lit” (4 items)
* “Perimeter fencing allows for natural surveillance of school grounds” (6 items)
* “There are authorized adults visible and available for assistance in proximity of parent drop off areas during arrivals” (4 items)
* “Visitor parking is located directly adjacent to the main entry of the administrative offices”

*Buildings (29 items):*

* “{Specific location} is/are easily monitored” (12 items)
* “{Specific location} is/are well lit” (2 items)
* “The public entry is located adjacent to the administration area and visitor parking”
* “Extensive windows and glazed doors enhance natural surveillance of the public entry” (2 items)
* “Buildings are organized to promote natural surveillance of the school campus” (12 items)

*Interiors (62 items):*

* “{Specific location} is/are easily monitored” (13 items)
* “{Specific location} is/are well lit” (14 items)
* “The lobby area is visible from adjacent administrative offices” (17 items)
* “Extensive use of windows in the lobby area provides natural surveillance opportunities” (6 items)
* “There are authorized adults visible in interior corridors during arrivals” (7 items)
* “Multiple stall restrooms have open zigzag entries, rather than door systems” (2 items)
* “The student serving line is orderly” (3 items)

*Access management (76 items):*Access Management is the physical guidance of people and vehicles coming and going from or within a place by the use of real or perceived barriers and other features, such as lighting, signs, landscaping artwork, or color. Managing access increases user comfort by providing orientation and guidance as to the preferred and safest routes. It increases the likelihood that persons using inappropriate routes or being in limited areas will be noticed and dealt with. Furthermore, it prevents access and thus inappropriate behaviors in unauthorized areas. Good access management promotes orderly behaviors, which can increase the comfort levels for students, staff and visitors.

*Grounds (22 items):*

* “{Specific location} is/are secured {sometime in a given context}” (5 items)
* “Signs direct approaching vehicles and pedestrians to appropriate entries to the school property” (10 items)
* “Physical or symbolic barriers along the property boundary present an attractive appearance” (3 items)
* “Landscaping elements do not allow easy access to roofs, windows, or other upper level areas”
* “Access to dumpsters is controlled”
* “Students are dropped-off and picked-up at authorized locations”
* “The organization of the school campus is easily comprehended”

*Buildings (17 items):*

* “{Specific location} is/are secured {sometime in a given context}” (5 items)
* “Vehicular travel routes are clearly marked” (3 items)
* “Screening walls or other architectural features do not allow for easy access to the roof or upper level areas” (5 items)
* “There is a wayfinding system, which includes signs; plant materials; and artwork, monuments or other landmarks” (3 items)
* “Sidewalks clearly mark routes to the entrances of portable buildings”

*Interiors (37 items):*

* “{Specific location} is/are secured {sometime in a given context}” (19 items)
* “{Specific location} has/have limited access” or “…is controlled” (8 items)
* “Signs direct visitors to the office” (4 items)
* “{Specific location} has a well-defined entry(s)” (3 items)
* “Visitors have distinctive and highly visible name tags”
* “The organization of interior spaces is easily comprehended”
* “Secured classroom doors can be exited in an emergency”

*Territoriality (43 items):*Territorialityis the use of physical attributes to delineate space and to promote and express a sense of pride and ownership of an area. It sends a message that unacceptable behavior will not be tolerated.

*Grounds (10 items):*

* “{Specific location} is/are attractive/welcoming” (2 items)
* “There is an attractive and visible sign indicating the schools name near the primary entry”
* “The school grounds are enhanced with landscaping, student artwork, monuments or other physical means” (2 items)
* “School property boundaries are delineated from adjacent properties”
* “There are pedestrian amenities such as seating and trash receptacles located along key pedestrian pathways” (2 items)
* “There are no unattractive barriers such as barbed or razor wire on the school grounds”
* “Security devices are unimposing”

*Buildings (9 items):*

* “Courtyards are enhanced with landscaping, student artwork, or other physical means” (4 items)
* “Building design and architectural attributes present an attractive appearance” (3 items)
* “Exterior waiting areas provide shelter from foul weather”
* “Building mounted security devices, such as cameras and window grates, are unimposing”

*Interiors (20 items):*

* “{Specific location} is attractive, cheerful and inviting” (5 items)
* “Motivational signs, temporary or permanent, herald accomplishments, reflect student pride, give positive messages and otherwise encourage student excellence” (6 items)
* “{Specific location} is enhanced with plants, artwork, posters or other physical means” (6 items)
* “Entry {Interior} security devices are unimposing” (3 items)

*Global Impressions (4 items):* In addition to items for the 3 general locations, the territoriality scale includes four items for global impressions that are not included in the principle by location subscales. Statements pertaining to the overall atmosphere or ambiance of the school and area. These impressions are similar to initial impressions in that the ratings represent a ‘felt’ response, rather than a more systematic assessment. These ratings are completed after all other ratings have been completed.

* “The school is inviting”
* “The school is attractive”
* “The school is cheerful”
* “The atmosphere is uplifting”

*Physical maintenance (62 items):*Physical Maintenance is the repair, replacement, and general upkeep of items, spaces, buildings, or areas. It includes removing graffiti and repairing vandalized, worn or damaged features, the use of durable materials, and regular maintenance. Maintaining the physical environment allows for the continued use of an item or space for its intended purpose and serves as an additional expression of ownership and pride.

*Grounds (13 items):*

* “{Specific location} is/are in good condition” (9 items)
* “There are no signs of vandalism” (2 items)
* “There are no foul odors” (2 items)

*Buildings (16 items):*

* “{Specific location} is/are in good condition” (11 items)
* “There are no signs of vandalism” (4 items)
* “There are no signs of graffiti on exterior walls”

*Interiors (33 items):*

* “{Specific location} is/are in good condition” (26 items)
* “There are no foul odors” (4 items)
* “The interior air quality is fresh”
* “There are no other signs of vandalism” (2 items)

*Order maintenance (26 items):* Order Maintenance is the attention to minor acts of misbehavior and the reduction of opportunities for inappropriate behavior. It includes the use of signs to clarify expectations, the presence of clearly identifiable authorized adults who can manage and respond to minor acts of disorder and having policies in place to quickly remove graffiti. Maintaining order encourages pro-social behaviors and prevents the escalation of offensive behaviors. Order maintenance is closely aligned with physical maintenance. Dealing effectively with trash, litter, vandalism, graffiti, minor acts of disruption, and the esthetic appearance of school grounds is critical to creating a safe, orderly, and comfortable environment.

*Grounds (11 items):*

* “Parent drop-offs proceed in an orderly manner” (7 items)
* “Posted rules are located at key points around the school grounds” (2 items)
* “All parking spaces are clearly marked”
* “There are no continuously occurring loud noises on school grounds”

*Buildings\* (2 items):*

* “Exterior Stairs, Balconies, Ramps, and Open Upper Level Commons: Pedestrian flows are orderly”
* “Courtyards: There are no signs of graffiti”

*Interiors (13 items):*

* “Pedestrian flows are orderly” (6 items)
* “Lockers are adequately spaced to avoid crowding” (2 items)
* “There is sufficient space between tables to allow orderly circulation”
* “The behavior in the cafeteria(s) is orderly”
* “Restrooms: There are no signs of graffiti”
* “Security personnel wear distinctive clothing and have distinct, visible identification badges”
* “There are no continuously occurring loud noises in the interior spaces”

\* For this analysis, only the “Order Maintenance: Buildings” subscale had missing data for 15 schools which did not have data for either of the two component items (shown above) due to the fact that the building design features (exterior stairs, balconies, ramps, and open upper level commons; courtyards) did not exist for those schools. Models ran without error and met convergence criteria for this exposure based on the 35 remaining schools with at least one of these items rated, having N=3,160 students within these schools. All other exposure scales had all 50 schools complete.

***General Location Scales:***

Most of the CSA items (excluding 3 items for “Initial impressions”, 4 items for “Global impressions”, and 13 items for “Land Use”) are categorized into three scales corresponding to general geographic location (grounds, buildings and interiors) on the school campus. Each of the 3 general locations typically include a number of items for specific locations, with examples as follows:

* **Grounds** (83 items)
  + Perimeter (6 items)
  + Points of Entry (6 items)
  + Parent Drop-off/Pickups (9 items)
  + Bus Unloading/Loading (9 items)
  + Vehicular Routes (4 items)
  + Parking Areas (10 items)
  + Exterior Pedestrian Pathways and Gathering Areas (13 items)
  + Bike Racks (2 items)
  + Exterior Athletic Areas (4 items)
  + Other (4 items)
  + General (16 items)
* **Buildings** (73 items)
  + Entries and Exits (9 items)
  + Exterior Stairs, Balconies, Ramps and Open Upper Level Corridors (4 items)
  + Exterior Walls (6 items)
  + Courtyards (7 items)
  + Portables (Including Trailers) (9 items)
  + General (8 items)
  + Accessory Buildings (10 items each for up to 3 accessory buildings, if applicable)
* **Interiors** (175 items)
  + Main/Visitor Lobby (13 items)
  + Student Entry Areas – Other than Main Lobby (12 items)
  + Administrative Offices (8 items)
  + Corridors (14 items)
  + Stairs and Balconies (4 items)
  + Restrooms (12 items)
  + Classrooms (10 items)
  + In-School Suspension Areas (3 items)
  + Cafeteria(s) and Food Courts (15 items)
  + Auditorium(s) (4 items)
  + Gymnasium(s) (6 items)
  + Locker Rooms (Mens/Boys) (11 items)
  + Locker Rooms (Women/Girls) (11 items)
  + Libraries and Media Centers (8 items)
  + Elevators (5 items)
  + General (21 items)
  + Other, Including Accessory Buildings (6 items each for up to 3 interiors, if applicable)

***Location-Specific Scales:***

The location-specific exposures are subsets of the three general location subscales (i.e., grounds, buildings, interiors) broken down into 12 location-specific sets of items, modeled in the analysis as an exposure against location-specific outcomes derived from the CPTED student survey as described in Appendix B. These 12 location-specific subscales are as follows:

*Grounds:*

* parking areas (10 items),
* pathway and gathering areas (13 items),
* exterior athletic areas (4 items), and
* bus loading and unloading areas (8 items)

Buildings:

* entries and exits (9 items)

Interiors:

* corridors (14 items),
* restrooms (12 items),
* classrooms (10 items),
* boys locker rooms (11 items),
* girls locker rooms (11 items),
* gym (6 items), and
* cafeteria (15 items)