School-Oriented Development:

A New Paradigm for Neighborhood Planning

by

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ABSTRACT

Many school facility-planning theories have proposed an integrated role for schools within their surrounding neighborhood, advocating analogous approaches to creating “community schools” that involve social and community services at school sites that support both students and local residents. Despite the popularity of this concept in the education community, the idea of schools as community centers has not entered the mainstream of urban planning thought or practice. As the community schools movement continues to grow, planners should be engaged to support and leverage community school developments using their unique role as mediators of public and private interests. Furthermore, planners tend to have a broad perspective of communities that can facilitate synergistic partnerships and development patterns beyond the immediate school site. The aim of this research was to reframe the existing literature on community schools into a unified School-Oriented Development (SOD) neighborhood planning paradigm that 1) proposes a typology based on the relationships between schools and their surrounding communities, and 2) suggests urban form guidelines that will support these relationships in a child-friendly environment. These outcomes were achieved through the creation of a prototype SOD SmartCode Module that incorporates an SOD typology.

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Chapter 1

INTRODUCTION

Many school facility-planning theories have proposed an integrated role for schools within their surrounding neighborhood, advocating analogous approaches to creating “community schools” that involve social and community services at school sites that support both students and local residents. The Coalition for Community Schools [CCS] (http://www.communityschools.org/) has acted as a clearinghouse for information and resources concerning this type of school development.

> Community schools are both a place and a set of partnerships between the school and other community resources. There are a number of national models and local community school initiatives that share a common set of principles: fostering strong partnerships, sharing accountability for results, setting high expectations, building on the community’s strengths, and embracing diversity and innovative solutions. (CCS, 2011)

As of 2009, community school initiatives had been adopted in 44 states (CCS, 2009), at both the local and state levels, and have consistently shown positive results for students, families, schools, and communities (Blank, Melaville,& Shah, 2003, p. 33). Research attributes the growth of this movement in the last few decades to four key factors:

> 1) the call for improved educational quality and academic outcomes among young people;
> 2) the demand for more efficient and effective health and social service delivery designed to meet the comprehensive needs of children and families;
> 3) increased recognition of the developmental needs of young people and the importance of building on their assets; and,
> 4) expanded efforts to strengthen the human, social and economic underpinnings of neighborhoods and communities. (Melaville & Blank, 1998, p. 7)

Despite the popularity of this concept in the education community, the idea of schools as community centers has not entered the mainstream of urban planning thought or practice. Whereas most of the existing literature collected and distributed through CCS focuses on the school facility itself, the proposal of this research is to truly integrate the school and community for neighborhood-level planning that benefits the education of students as well as the everyday lives of local residents. As the community schools movement continues to grow, planners should be engaged to support and leverage community school developments using their unique role as mediators of public and private interests. Furthermore, planners tend to have a broad perspective of communities that can facilitate synergistic partnerships and development patterns beyond the immediate school site. The aim of this research was to reframe the existing literature on community schools into a unified School-Oriented Development (SOD) neighborhood planning paradigm that 1) proposes a typology based on the relationships between schools and their surrounding communities, and 2) suggests urban form guidelines that will support these relationships in a child-friendly environment.

Defining School-Oriented Development

Since the 1920's, the idea of organizing communities around schools has been a recurring theme in community planning, and has been written about under many names, including: "Neighborhood Unit" (Perry, 1929), "City of Learning®" (Strickland, 2003), "Communities of Learning"

(Shoshkes, 2004), “Community-Centered Schools” (Council for Educational Facility Planners International [CEFPI] & Environmental Protection Agency [EPA], 2004; Maryland Department of Planning, 2008), “Community Schools” (CCS, 2011) “Community-Oriented Schools” (Lawrence-Hurt, 2008), and “Smart Growth Schools” (Goldberg, 2005; Norris, 2009). All of these concepts propose essentially the same idea, which is to design school sites so that they better support both the children who attend them and the local residents who live nearby.

Organizing these concepts into a neighborhood-level planning approach means changing the relationship between a school and its surrounding community. It is a departure from the conventional relationship where schools are very isolated from their physical context, which is largely framed as a security precaution (Hoffman, 2009). In contrast, SOD proposes that the neighborhood and school operate in a space that is integrated both physically and conceptually. The physical environments of the schools and neighbors interlock to promote a sense of community and identity. In an abstract sense, the mission of the school and the everyday needs of the community are not separate, but symbiotic.

Objectives and Scope

This research gives the concept of schools as neighborhood centers a new name, School-Oriented Development (SOD), which moves beyond the school site to become a comprehensive community-planning paradigm. The objectives of this research are: 1) to review the precedents

of community schools-based planning, 2) to assemble commonalities in these precedents to propose an SOD typology, 3) to create a SmartCode module that outlines design principles for SOD, and 4) discuss the relevance and applicability of SOD in current planning practice.

The translation of existing community school principles into an SOD typology and urban form guidelines is methodologically research-based. Chapter 2 reviews the existing literature on SOD-related principles by examining the interdisciplinary nature of SOD, precedents of SOD-type models, and implications for urban form gleaned from these precedents.

Next, Chapter 3 reviews three case studies of community schools, which are instructive to the development of the SOD typology that proposes three different types of School-Oriented Development: Neighborhood Centers, Family Schools, and Cultural Hubs. These SOD types are derived from models of existing schools' varying relationships with the local community. Briefly, the Neighborhood Center SOD clusters community uses around the school site so that facilities like libraries and recreation centers are shared between the school and local residents. A Family School SOD offers services on site that are available to both students and their families, providing a more limited community center. In the Cultural Hub SOD model, a school's curriculum is integrated with the programs of nearby cultural institutions like museums, so that students' education is extended beyond the school building.

This typology is explained and applied in Chapter 4, which outlines the proposals of the SOD SmartCode Module. While the idea of community schools is present in the education field, there is a lack of knowledge about how to design these types of school sites or the neighborhoods that surround them. The creation of urban form guidelines through this SmartCode Module can be a significant contribution to the successful building and retrofitting of schools that operate as the centers of their neighborhoods.

The SmartCode is a form-based code developed initially by the New Urbanist firm Duany Plater-Zyberk & Co. in 2003, and is available as an open-source. It has been updated based on feedback from various practitioners, and is currently in version 9.2, (Center for Applied Transect Studies [CATS], 2009). The SmartCode is based on the rural-to-urban transect developed by Duany Plater-Zyberk & Co. that characterizes intensities of urbanism, and addresses planning issues at each level of declension from urban to rural development types (Duany, 2010). To date, over 100 U.S. cities and counties have calibrated the SmartCode (CATS, 2009). Many modules have been created, including Transit-Oriented Development, Sprawl Repair, and Bicycling, which address specific planning issues and can be plugged into the SmartCode to allow local customization.

The Module developed through this research may not be definitive enough to act as a regulatory document, but it serves as a prototype to

show how SOD may begin to fit into cities' long-range planning schemes. As is clear from the Review of Literature (Chapter 2), the concept of SOD is well-documented as an ideology; the novel contribution of an SOD typology and SmartCode module will be to connect these theories to potentials for practice in urban planning.

The design of an SOD is also based on the objective of creating a child-friendly space, recognizing that children, as the most vulnerable segment of the population, are a good barometer for how a community is serving its citizens overall (UNICEF, 2009). The implications of child-friendliness in neighborhood design include concerns for walkability and safety that promote a sense of independence for children to learn to be responsible citizens.

Child-friendly design dovetails with the recent "free range kids" movement, a controversial parenting idea that advocates giving children more freedoms and allowing them to be more self-reliant (Skenazy, 2009).One of the most prominent arguments in this parenting debate is whether or not it is safe to let children walk to school alone. "The trip to and from school has become emblematic of the conflict parents feel between teaching children autonomy and keeping them safe," (Hoffman, 2009). It is difficult, however, to allay parents' fears when sidewalks are discontinuous, crosswalk signals are too short, and traffic moves too quickly (Pedestrian and Bicycle Information Center [PIBC], 2007). A well-designed SOD, as proposed in the SOD SmartCode Module in Chapter 4,

would help quell this debate, as better walkability and a stronger sense of community would make the journey between home and school safer.

For clarification, it is necessary to explain that the SOD SmartCode Module focuses on primary and secondary education, generalized as elementary schools serving kindergarten through fifth grade, middle schools serving sixth through eighth grade, and high schools serving ninth through twelfth grade. Other grade configurations, like schools that serve kindergarten through eighth grade or high schools with only tenth through twelfth grade are not addressed specifically, but could serve as SOD centers. Educational facilities for young children and young adults, such as pre-schools and colleges, are not treated as the primary centers for an SOD, but are suggested as complementary uses for an SOD site.

In addition to these school type distinctions is the issue of public versus private schools for SODs. Because SOD is intended as a neighborhood planning strategy, this research and the SOD SmartCode Module focus on public schools, as students attend them based on proximity. Private schools, on the other hand, tend to have a larger catchment area for students and more selective attendance criteria. These other school types should be explored as the SOD paradigm develops, but the scope of this research was limited to public primary and secondary schools in order to establish a broad foundation for future evolution of the SOD concept.

After documenting the SOD SmarCode Module, its implications, application, and practicality as a prototype model for an SOD planning paradigm are discussed in Chapter 5. Finally, Chapter 6 provides conclusion to the research and suggests possibilities for further study.

Chapter 2

REVIEW OF LITERATURE

The Review of Literature addresses the precedents for community schools from three perspectives that inform the development of the SOD SmartCode Module. First, the role of urban planning in education and different interdisciplinary agencies that have straddled these fields are explored. Next, cohesive theories on community planning around schools are reviewed and compared, which leads to analysis and regrouping of the urban form guidelines within these theories into a set of themes that guide the proposed SOD planning paradigm.

Interdisciplinary Approaches to SOD

There is a disconnect between the realms of education and urban planning that needs to be overcome (Vincent, 2006) in order to integrate school and community reform under a new SOD ideology. Vitiello (2006) points out the lack of school planning instruction in graduate planning programs, which has left a gap between academia and practice. In fact, there is evidence that several silo-busting coalitions involving the concept of SOD have taken hold in the last decade or so. However, despite stocks of free information available on the internet, school facility planning as part of community development still seems to be a niche issue.

As previously mentioned, CCS may be the most prominent of these coalitions between planning and educational agencies. This transdisciplinary group includes partners specializing in community

development; education; family support/human services; government (local, state, and federal); health and mental health; local community school networks; national community school networks; philanthropists; policy, training, and advocacy; school facility planning; state entities; and youth development (CCS, 2011). Besides providing a wealth of resources on its website, this coalition is important in demonstrating the comprehensive approach necessary to both education and community reform.

One of the most proactive members of CCS is the National Center for Community Schools, an initiative created by the Children's Aid Society. The National Center for Community Schools has facilitated the development of more than 15,000 community school adaptations nationally and internationally. This agency has been especially active in New York City, where it has partnered with the New York City Department of Education to create more than 20 community schools (Children's Aid Society, 2011).

An important coalition resource is the widely cited "Citizen's Guide" (Bingler, Quinn & Sullivan, 2003) that brings together design recommendations and case studies for creating school-centered neighborhoods. This publication has helped to galvanize the schools-as-neighborhood-centers movement by providing practical steps for local citizens and examples of their successes.

Another positive example for cross-agency coordination is provided by the state of Maryland's Department of Planning, which released a comprehensive set of guidelines and a model for the creation of neighborhood schools (Maryland Department of Planning, 2008). This publication outlines important considerations in school facility planning, including school-siting guidelines for rural, suburban, and urban schools. Most importantly, it addresses planning knowledge to practitioners and stakeholders in an easy-to-understand set of guidelines that promotes coordination.

In addition to Maryland, New Jersey also initiated a strategy to design schools as community centers as part of a statewide redevelopment plan (Shoshkes, 2004). The School Construction Initiative was enabled through legislation that launched a $12.3 billion construction and renovation program, which was underwritten by the state planning office with the goal of rebuilding schools as centers of communities (Bird, 2001). The positive results of this program are attributed partly to its operation at many levels of government and grass roots support (Shoshkes, 2004), which moved the process smoothly from planning to implementation.

Related to this interdisciplinary approach is another common theme of modern school-centered community literature: an emphasis on using the current inadequacies of educational facilities as an opportunity to reinvest in schools that support their surrounding communities (Bird, 2001;

Bingler et al, 2003; Council for Educational Facility Planners International & Environmental Protection Agency, 2004). In fact, this was a major rationale for New Jersey's undertaking, which was framed as "an unprecedented and exciting opportunity to more fully integrate bricks and mortar into the fabric of communities" (Bird, 2001, p. 2).

The need for education reform through School-Oriented Development only makes sense if it benefits the quality of education that students receive; otherwise there is no motivation for schools to take on additional responsibilities. Research has consistently shown that small, neighborhood schools with small class sizes provide better academic outcomes for children— both short and long-term— especially for minority and inner-city children (Blank, Melaville, & Shah, 2003). Perhaps the most important goal of SOD is to secure benefits both to the educational mission of the school and to the daily lives of local stakeholders.

Precedents for SOD

In the literature, there is both historical precedent and a well-documented modern movement for planning communities around schools. Perhaps the first example is documented in Clarence Perry's 1929 monograph on the "Neighborhood Unit," which proposes neighborhood-level planning around elementary schools and other civic institutions. Perry chose the public school for the center because "It is the one conspicuous governmental edifice that is found in every local community, and because of its importance it deserves a dignified site. Placing it in the

central zone of the unit not only serves the convenience of the pupils but emphasizes its significance to the community" (Perry, 1929/1974, p. 72). Although the school at the center of the neighborhood was only one element of Perry's Neighborhood Unit, that concept became a lasting influence on planning theory.

A modern approach is proposed by the Citizen's Guide (Bingler et al, 2003), which serves as a response to the disinvestment in school facilities over the last several decades, and impending population increase in schools as the echo-boom—children of baby-boomers—reach school age. The authors recommend reinvesting in schools and communities simultaneously, and offer six design principles, saying that community schools should:

- enhance teaching and learning and accommodate the needs of all learners
- serve as a center of the community
- result from a planning and design process that involves all community interests
- provide for health, safety, and security
- make effective use of available resources
- be flexible and adaptable

(Bingler et al, 2003, p. 5)

The case studies in this publication are split between urban schools, where the schools benefit through partnership with community organizations like the YMCA, and rural schools, where an agglomeration of services can enhance value to widespread residents.

In a more education-based approach, urbanist Roy Strickland developed a paradigm called the "City of Learning®" (COL) which seeks to

better integrate communities with educational institutions. The basis of Strickland's model is the need for education to reach beyond the school building and into the community, providing real-world contexts for learning and mentoring. In this way, COL "embraces educator's arguments that healthy neighborhoods support successful learning and make school design and programming holistic by looking beyond the school building to the school setting at the neighborhood, town, and city scales" (Strickland, 2002). The approach is similar to Bingler et al, as shown by COL's ten principles:

1. Integrate COL stakeholders— teachers, students, administrators, parents, and civic and business leaders— into the planning process.
2. Break out of the "big box" school.
3. Coordinate school projects as part of a strategic plan.
4. Inventory learning opportunities in neighborhoods and towns and construct a "lesson plan" derived from local resources.
5. Inventory neighborhood and town sites and buildings as opportunities for various kinds of learning and recreation facilities.
6. Where possible, mix uses at school sites.
7. Coordinate agencies, programs, and funding sources that can contribute to school projects.
8. Consider the private sector in delivering learning facilities and services.
9. Include learning space in buildings of all types.
10. Use technology to support COL.

(Strickland, 2003, pp. 5-7)

Strickland's approach is perhaps the most integrative, as it seeks to bring children's learning outside of the school as part of their daily education. This differs from other approaches that look to coordinate the goals of schools and their surrounding communities, but with less overlap.

Also in the last decade, the principles of Smart Growth have been harnessed to propose a better model for education called “Smart Growth Schools” that promotes smaller, more community-oriented schools (CEFPI & EPA, 2004; Goldberg, 2005; Lawrence-Hurt, 2008). The EPA has embraced the Smart Growth movement, and has a “Cross-Media” program that specifically studies Smart Growth as related to schools. This group of interrelated works espouses smaller, neighborhood-sized schools that promote walkable environments and mix uses on the school site. Principles of Smart Growth Schools include:

- Promote a sense of safety and security
- Build connections between members of the school and the community
- Instill a sense of local pride
- Engage students in learning
- Encourage strong parental involvement
- Improve public health and sense of responsibility
- Foster environmental stewardship, energy efficiency, and a community-oriented smart growth ethic

(CEFPI & EPA, 2004, pp. 11-12)

Norris (2009) of Placemakers, a prominent New Urbanist firm, created an evaluation method for measuring existing conditions of schools called the “Smart Growth Schools Report Card”. The Report Card also makes suggestions for improvements, with the goals of saving the community money, decreasing the environmental impact of the schools on the community, improving the health of students, and increasing long-term support for the school system by those who do not have school-aged children (Norris, 2009). While this may be a useful tool for measuring

results, it does not present a strategy for making schools more compatible with Smart Growth ideals.

A commonality among these precedents is the tendency toward creating qualitative descriptors through sets of principles with little graphic or numeric support. The purpose of creating an SOD SmartCode Module, is to provide plan and section illustrations that translate the verbiage of these ideas into a clear, demonstrative vision with concrete urban form guidelines.

The Role of Urban Form in School-Oriented Development

The most significant contribution of existing literature to the creation of the SOD SmartCode Module are the recurring themes in the built environment that make the SOD approach (under any name) effective. The most complete recommendations regarding urban form are from the Maryland Department of Planning, which gives a comprehensive list of school site and design criteria:

School Site Selection
- in a neighborhood with a complete sidewalk network.
- in or adjacent to a neighborhood that has a residential or mixed use zoning classification greater than three units per acre.
- on or near streets with posted speed limits under 30 mph.
- in locations with clearly defined pedestrian crosswalks on two lane streets that have parallel parking.
- within one quarter of a mile of a transit stop.
- in neighborhoods where windows and doors face the street and sidewalk.

School Site Design:
- should serve the community and encourage pedestrian access from neighborhoods.
- should locate the most important school building near the principal roadway serving the facility.

- should place parking lots and bus queuing lanes at the sides or rear of school facilities.
- should design building entrances near the principal roadway and should be architecturally distinctive and easily identified from a distance, and should be accessible from the roadway by uninterrupted sidewalks.
- should connect sidewalk and trail facilities with neighborhood sidewalks and trails
- should locate bicycle parking structures near the main entrance to the school.
  (Maryland Department of Planning, 2008, p. 21)

This list was a useful beginning for developing the SOD SmartCode Module. The Maryland Department of Planning publication is also the only one that provides diagrammatic description for school design guidelines (Figure 1). Unfortunately, these diagrams seem to generalize conventional school site forms rather than suggesting an alternative. The shortcomings of such a list and the school site concepts in Figure 1 are addressed in this research by using urban form guidelines, which are less prescriptive than site concept models, but more concrete than written suggestions.

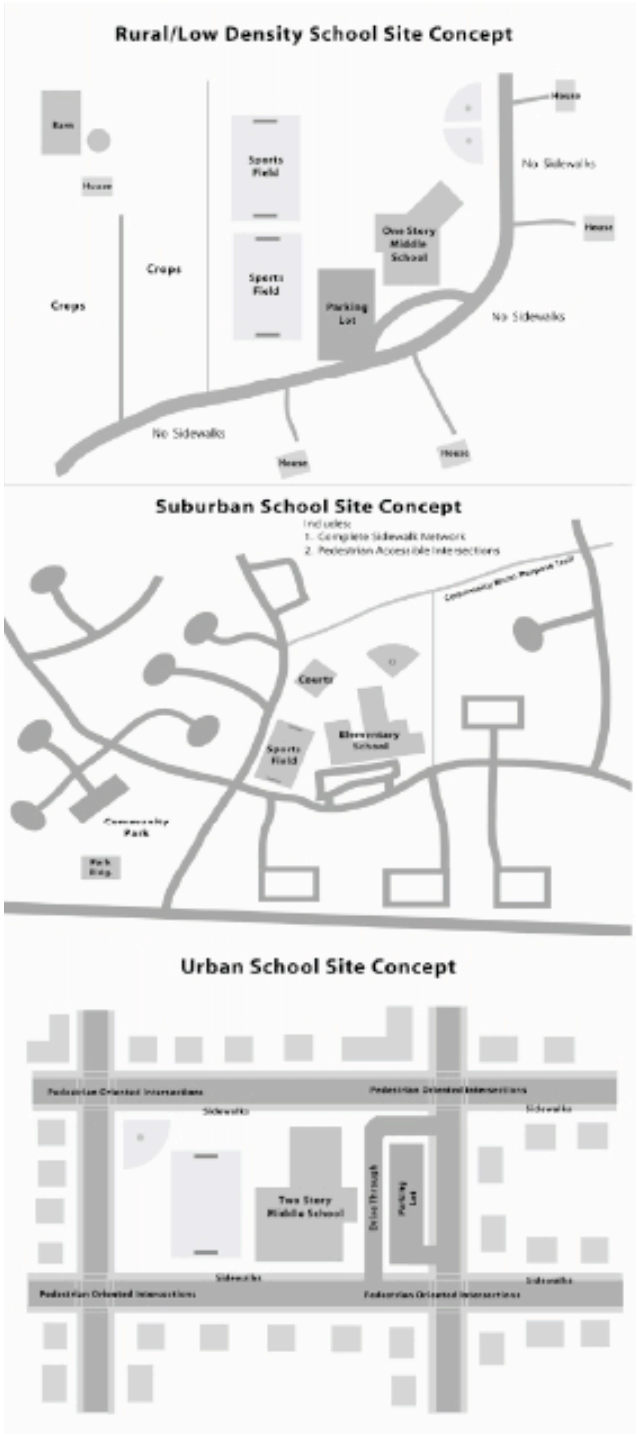


Figure 1. School Siting concepts for rural, suburban, and urban schools. From Maryland Department of Planning, 2008, pp. 32-34

For additional analysis, the recommendations made in the literature were organized into two principle themes that have urban form implications for SOD. The first theme is an interdependent relationship between a school and its surrounding community, so that the school functions as the center of a complete neighborhood. In terms of form, this translates to small school buildings and mixing uses on school sites. The second theme is child-friendly design, and its urban form implications are based on safe walkability for children. These two themes also frame the interventions proposed by the SOD SmartCode Module in Chapter 4.

Community-School Relationship.

The small, neighborhood school is the heart of any SOD-type of proposal. As a key feature of smart growth approaches, this means infilling or redeveloping existing schools, rather than building new schools on large sites at the edges of communities that promotes leapfrog development (CEFPI & EPA, 2004; Bingler et al, 2006). Many, but not all, states have school site acreage standards (CEFPI & EPA, 2004, p. 17) that drive the construction of large schools on large sites. The co-location of community uses can help to better utilize space on oversized sites.

Further support comes from a study that analyzed size, location, and accessibility of schools as related to students' transportation choices (Furey, 2003). Findings indicated that school siting decisions have a significant impact on whether students walk, bike, drive, or take a bus to school, which effects students' health, vehicle emission levels, and traffic

congestion. The findings support the need for smaller schools and renovation of existing school facilities rather than new construction (Furey, 2003).

In the case of retrofitting larger school sites to be more community-oriented, Bingler et al (2003, p.11) suggest that school designers create smaller units within the school to help foster a sense of community. This idea draws from the university model, which is often a large campus made up of smaller schools, and could be applicable to large secondary schools as well.

An additional urban form consideration is the prominence of the school site and visual recognition that it receives (Perry, 1929; Maryland Department of Planning, 2008). The school should be located at the center of a neighborhood, in an elevated area if possible (Norris, 2009). This principle relates to Perry's original version of the neighborhood unit, which was to provide the school an important place both in the physical community and in local residents' minds.

The co-location of community-supportive uses on a school site can also support a more integrated relationship between a school and its surrounding neighborhood, because a school must cater to all local stakeholders to serve as the center of a neighborhood (Bingler et al, 2003; Bird, 2001). For students, this means having facilities, like a library, after-school program, or recreation center that are available outside of school hours. This allows more independence for children in a safe environment

and broadens their socialization, which is a goal of child-friendly planning. For local residents not directly tied to the school, this can mean a walkable place to spend time, take continuing education classes, go to a health clinic, or pick up a few groceries.

Child-Friendly Urban Form.

The most significant concern for co-locating uses on a school site should be whether or not they are appropriate to children that attend the school. For an elementary school, this will mean lower-intensity uses, like a senior center, day care, and health clinic. A high school, on the other hand, can have higher-intensity uses that will be useful to young adults, including restaurants and cafes, a recreation center, and a library media center equipped with computers and internet access.

The school site and its physical context are major factors in walkability, which is another concern of child-friendly design. Large school catchment zones, where students live more than two miles from the school, discourage students from biking or walking to school (Norris, 2009). This means that schools that serve as community centers for higher-density development nodes will significantly improve walkability.

A study commissioned by the EPA emphasizes the importance of walkability as part of an SOD plan. Researchers sampled students aged 5-18 in Atlanta, Georgia “to examine if and how a variety of factors influence school travel. Factors examined in the study include parental perception of neighborhood safety from crime and traffic, and

neighborhood design around the home, the route to school, and the school" (Lawrence Frank & Company, Inc., 2008). The findings of this study confirm the impact of neighborhood design on walkability, safety, carbon emissions, and obesity in children, and suggest that smart growth design principles could serve to mitigate these effects if implemented. Several design strategies improve pedestrian friendliness, including narrower roads, wider sidewalks, human-scale street furniture, street trees, and zero-setback lines.

Additionally, Maryland's Models & Guidelines cites an overlap between the goals of walkable scale and safety of school children:

> If schools are fully incorporated into communities, they are by design, walkable. Residences are located on the street and neighbors are often aware of activity that occurs in front of their homes and businesses. Sidewalks are provided and maintained and intersections are designed or redesigned to safely accommodate pedestrian travel...Neighborhood schools are community resources and security is heightened because the residents of the community are engaged, neighbors are vigilant and the eyes are on the street. (Maryland Department of Planning, 2008, p. 19)

This supports the idea that good connectivity and neighborhood integration are directly connected to the safety of children around schools.

Bingler et al (2003) promote small, neighborhood schools and Crime Prevention through Environmental Design (CPTED) principles as a solution for improved school security: "CPTED works particularly well for neighborhood schools, where people know each other by name, or where school use by outside organizations expands adult participation—and

therefore supervision—at many levels" (p.11). This smaller, closer environment uses social capital to prevent victimization of school children.

The fundamental CPTED principles that schools can use to improve safety are natural surveillance, access control, and territoriality (Schneider, 2010). In terms of urban form, this means visual openness of design, pronounced entries, and clear demarcation of the school site.

Summary

As shown by these precedents in school-centered planning, there is a demonstrable overlap between community planning, education, health, and social goals that can be addressed through the development of vibrant community centers. SOD takes these precedents a step further by balancing the needs of the school with the needs of the community in a form that is accessible to all stakeholders. The urban form guidelines proposed by the SOD SmartCode Module also fill a gap in the existing literature between policy ideas and site planning.

Chapter 3

CASE STUDIES OF COMMUNITY SCHOOLS

The three case studies reviewed in this chapter were chosen in order to show a variety of student ages, urban intensities, contexts within the community, and supplemental community uses. While they do not provide an exhaustive view of the forms that SOD can take, they do show several examples along the range of possibilities. They also provide the basis for the SOD typology proposed in the SOD SmartCode Module in Chapter 4.

Tenderloin Community School

The Tenderloin Community School is an elementary school completed in 1999 that serves the urban Tenderloin neighborhood of San Francisco. The impetus for the school's creation was the fact that the Tenderloin was the only San Francisco neighborhood without its own elementary school, requiring the 1,200 plus elementary-aged kids in the area to bus to 50 different schools (Bay Area Women's and Children's Center, 2011).

The school site accommodates a medical and dental clinic, counseling rooms, adult education classrooms, a parent resource center, community kitchen, community garden, and play yards in addition to the elementary school, in a four-story structure that has an open roof (San Francisco Unified School District, 2007). The intensely urban environment (Figure 2) with large civic functions to the south like San Francisco City

Hall, the California Supreme Court, and the San Francisco Main Library, dwarf the school and challenge its neighborhood-scale function. A distinction in this case study is that the facilities provided on the school site are not open to the general public, but are for the support of students and their families only. Many of these residents are from low-income immigrant families (Bingler et al, 2003, p. 24), so the school's more intimate support system is especially significant.

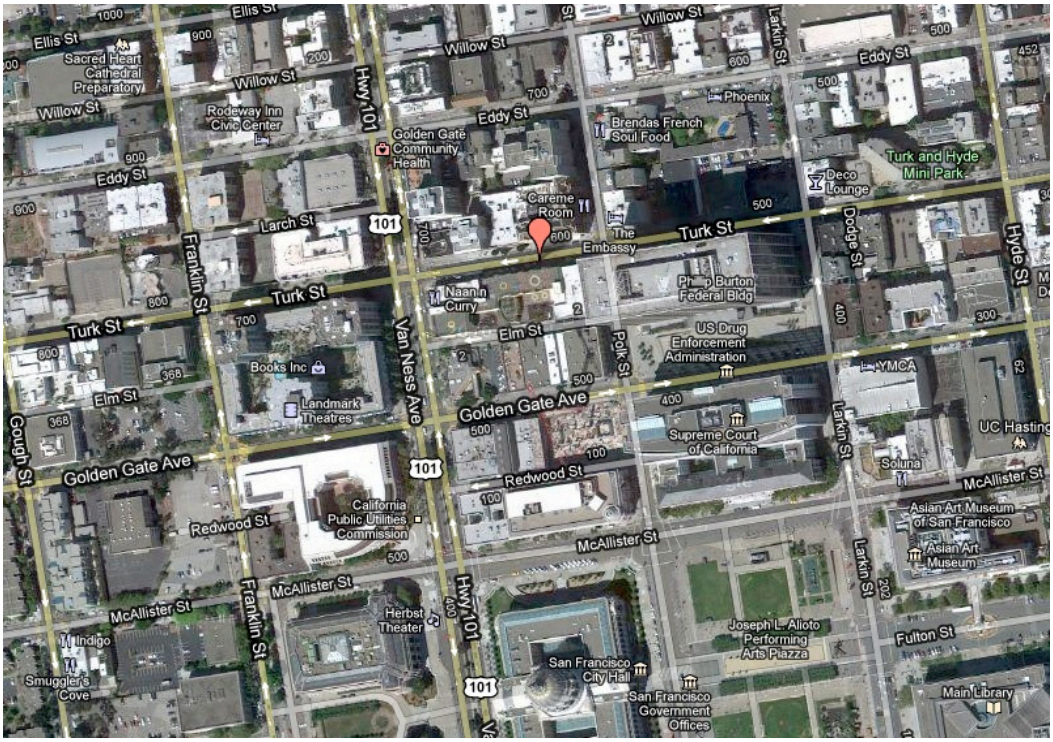


Figure 2. The Tenderloin Community School's urban context in San Francisco, located at center marker. Adapted from Google Maps, 2011, retrieved from www.maps.google.com.

The open roof (Figure 3), with play courts and a community garden, allow an open-air environment that is safe for the young children that attend the Tenderloin Community School. It also provides another area to accommodate children who attend before or after school programs. The

integration of an early-childcare facility aids families with young children, and eases the transition of pre-school kids to elementary school.

Figure 3. Tenderloin Community School from south. Esherick Homsey Dodge & Davis (2011). "Tenderloin Community School." Retrieved from EHDD Architecture website: http://www.ehdd.com/index.php?p=ehdd&flashid=1245#/6840

By examining the solutions for a community school in the densest of urban environments, sites with less space constraints quickly seem less challenging. This extremely urban example also demonstrates how the SOD model can provide safety for children, making the idea of community involvement less threatening to parents and educators.

Moore Square Museums Magnet Middle School

Integrated into the fabric of downtown Raleigh, North Carolina in a historic district, Moore Square Museums Magnet Middle School was built in 2002 within the Downtown East Residential Redevelopment Area (CEFPI & EPA, 2004, pp. 36-37). Construction of the three-story school

building was made possible through assembly of blighted and vacant parcels on a 4-acre site, a fraction of the size of other comparable middle schools in the state, which are 25 acres or larger (CEFPI & EPA, 2004, p. 36). The school collaborates annually with more than 12 different nearby museums to integrate art, sciences, history, and culture into the students' curriculum (CEFPI & EPA, 2004, p. 36; Moore Square Museums Magnet Middle School, 2011).

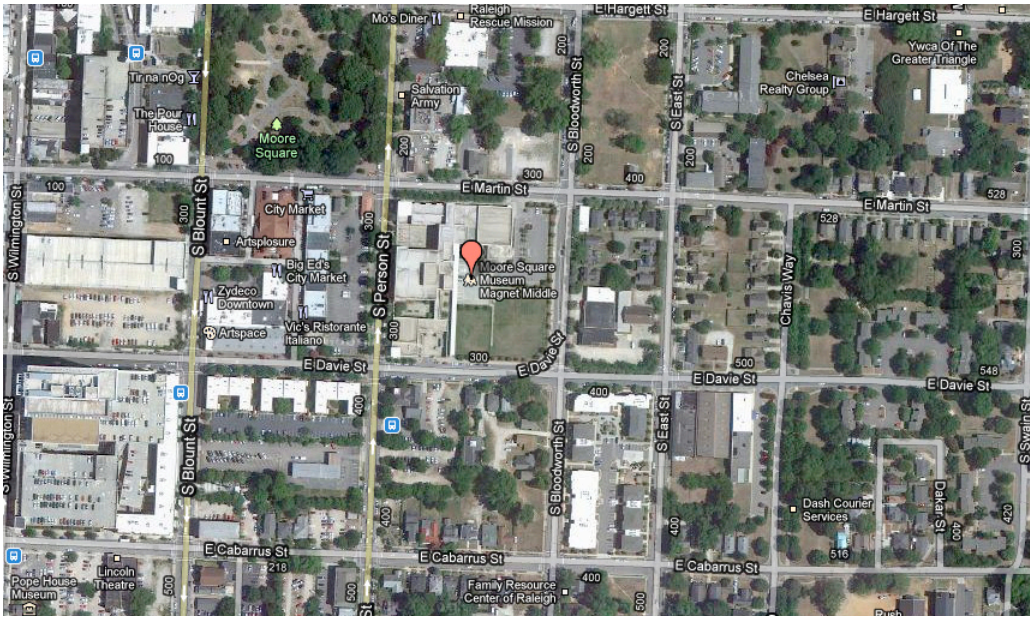


Figure 4. Urban context of Moore Square Museums Magnet Middle School, located at center marker. Adapted from Google Maps, 2011, retrieved from www.maps.google.com.

The small block size, narrow streets, on-street parking, and comprehensive sidewalk network of downtown Raleigh make it a pedestrian-friendly neighborhood for the school (Figure 4). Nearby museums that supplement the student curriculum are located in walking distance, expanding the reach of the educational realm of the school into the city itself. In addition to pedestrian opportunities, the site is also about

a block and a half southeast of a major bus depot, providing students and faculty with transit options (CEFPI & EPA, 2004, pp. 36-37).

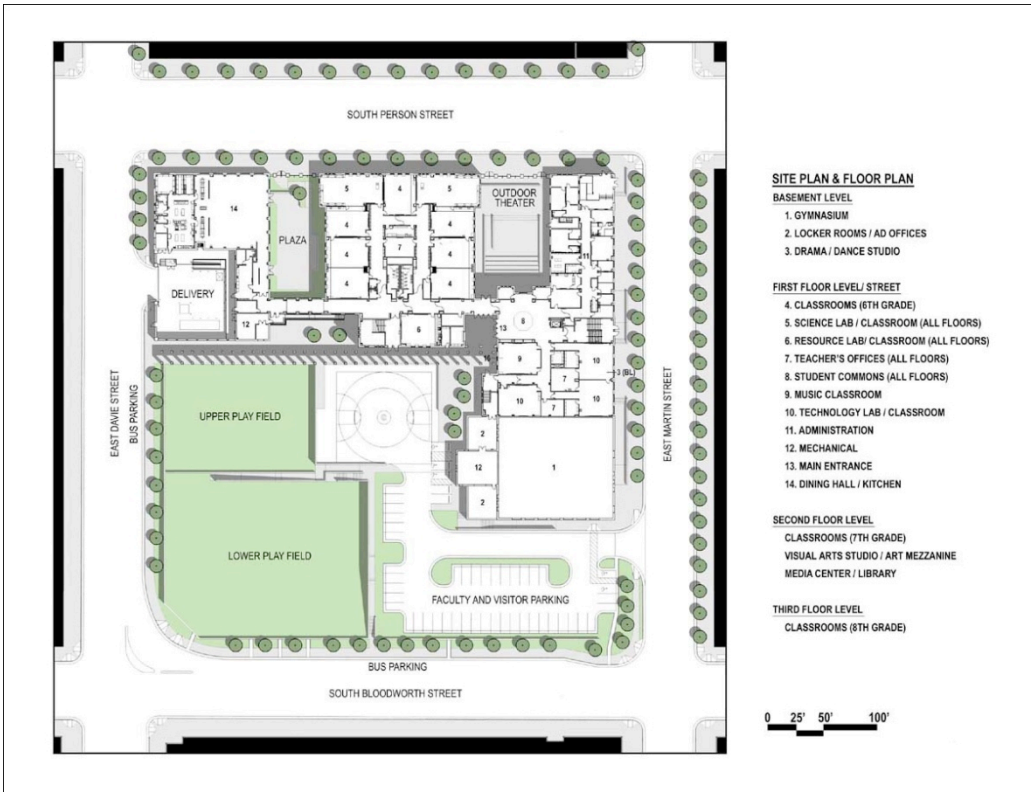


Figure 5. Site plan for Moore Square Museums Magnet Middle School. Note that in this diagram, north is to the right. From Design Share: Design for the Future of Learning. (2004) "Design Share 2004 Recognized Value Award: Moore Square Museums Magnet Middle School," by Little Diversified Architectural Consulting, Design Share, retrieved from http://www.designshare.com/index.php/projects/moore-square-middle. Copyright 2004© DesignShare.

Despite the urban context of the school, there is still a full-sized gymnasium and two playing fields on site (Figure 5), which are also used by the community for intramural sports leagues (EPA, 2004, p. 14). The site design also uses zero-lot lines, so that the school building hedges the street and encourages a close pedestrian environment. Two outdoor spaces are carved from the west side of the school site, creating a plaza and outdoor theater that allow outdoor learning opportunities.

Inderkum High School

Inderkum High School is located in a northern community of Sacramento California, and was developed based on a 1994 community plan that envisioned integration of land uses and eventual connection to a light rail line. The community is oriented around the Town Center, meant to serve as both the geographic and activity center of the area (City of Sacramento Community Development Planning, 2009, pp. 3-4). The master plan of the community placed Inderkum High School adjacent to the Town Center, and included a local library branch and Los Rios Community College on the site (Figure 6).

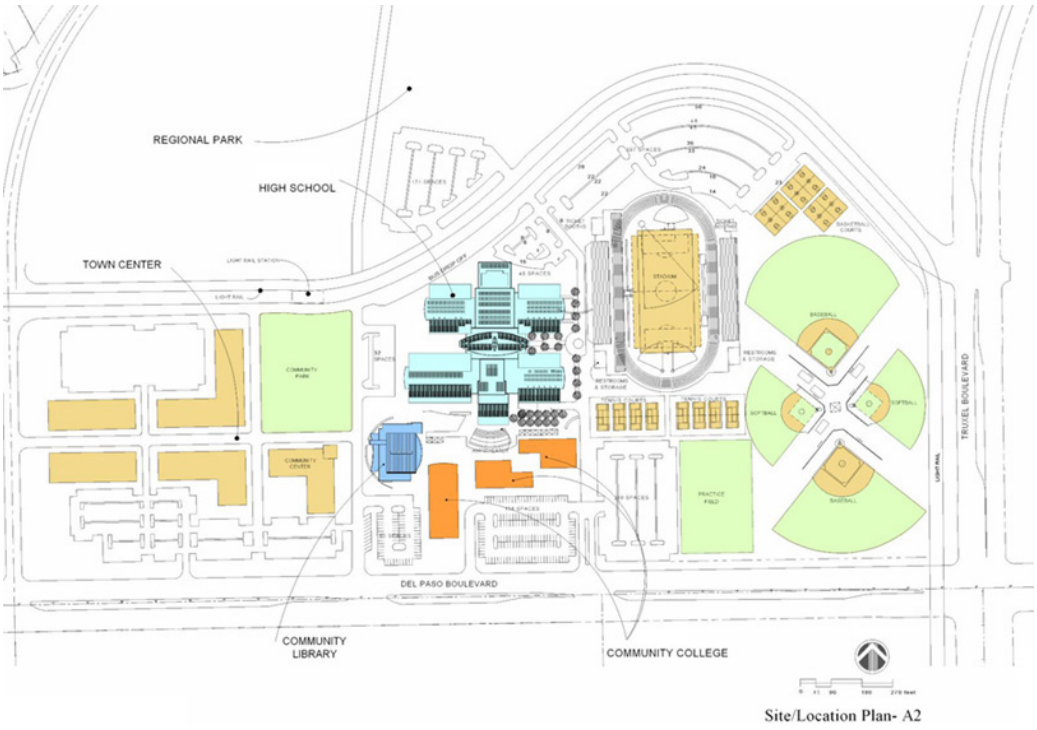


Figure 6. Site plan of Inderkum High School. From Design Share: Design for the Future of Learning. (2003) "Design Share 2003 Citation Awards: Inderkum High School," by Nacht & Lewis Architects, Design Share, retrieved from http://www.designshare.com/index.php /projects/inderkum-high. Copyright 2003© DesignShare.

Additionally, the school's athletics use adjacent public park land and a community aquatic center. Inderkum High School itself is a two-story, 235,000 square foot building developed on 36 acres of land, which is small compared to California's usual 60-acre site standard (CEFPI & EPA, 2004, pp. 44-45).

As shown in Figure 6, the site plan of the school is oriented toward the Town Center to the west, with pedestrian connections and narrow streets leading to a community park and community center. Parking for the community college and the high school are located at the north and south edges of the site, feeding from the small offshoot of New Market Drive and the multi-lane arterial of Del Paso Road, respectively. This

helps promote a pedestrian environment in the Town Center by focusing on the adjacency of the school site and the community uses.

The more specific campus site plan (Figure 7) shows the courtyard space that unites the high school, library, and community college. This central space is an important placemaking attribute; by having the three main uses front one another, the form promotes the intermingling of high school students, college students, and local residents.

Figure 7. Campus plan of Inderkum High School. From Design Share: Design for the Future of Learning. (2003) "Design Share 2003 Citation Awards: Inderkum High School," by Nacht & Lewis Architects, Design Share, retrieved from http://www.designshare.com/index.php/projects/inderkum-high. Copyright 2003© DesignShare.

An additional noteworthy element of the Inderkum High School plan is the proximity toprojected future light rail. This shows the potential

integration of Transit-Oriented Development principles with SOD, and how SOD may be a good precursor for the later addition of transit. In this case, SOD and Smart Growth principles that led to the integration of the Town Center and school could lend economic feasibility to implementing the light rail line in the future. In this case, it is possible that SOD becomes a place type associated with Transit-Oriented Development.

Comparison of Case Study Schools

As shown by the diversity of the case studies, an SOD solution can take many forms. For the Tenderloin Community School, a dense urban environment and a vulnerable set of students meant a more sheltered approach that allows open space on the roof. The building form is integrated with the city context, with only bright colors on the exterior to highlight it as a place for children. All of the community functions are housed in a single structure, stacked and pieced together to support functional harmony on the interior. For this example, the community uses of the school were limited to students and their families, with a special emphasis on health and continued education for whole families.

In contrast, the Moore Square Museums Magnet Middle School functions by opening downtown Raleigh's cultural learning opportunities to adolescent students, allowing them some independence in a moderately urban environment. Although space is somewhat limited in this example, a three-story school building allows enough area for playing fields and outdoor learning spaces. This SOD is less about bringing the community

into the school site, and more about creating a catalytic project in a historic redevelopment area that will encourage a community to form around it.

Unlike the first two case studies, the Inderkum High School example was built on a greenfield site. The community design uses Smart Growth principles to prevent the sort of big-box school development that spurs leapfrogging and sprawl. By sharing the site with a public library and community college, high school students have an opportunity to take post-secondary classes, as well as interact with adults and older students who can provide mentoring. This open and integrated form is appropriate for the age and needs of the high school students.

Chapter 4

DEVELOPMENT OF THE SOD SMARTCODE MODULE

This chapter explains the way that the SOD SmartCode Module is organized, how it relates to the existing SmartCode, and provides description of and commentary on each section of the module. The entire annotated SOD SmartCode Module can be found in Appendix A.

The SmartCode itself, without additional module plug-ins, is referred to as the “base code” (CATS, 2009, p. iv), and is divided into seven articles:

> - Article 1 contains the general instructions pertaining to all other Articles.
> - Article 2 prescribes how Regional Plans designate the Open Sectors intended for open lands and the Growth Sectors intended for development and redevelopment. It also prescribes what Community Unit types belong in each Sector.
> - Article 3 prescribes the requirements for New Communities, including the Transect Zones that make up each type.
> - Article 4 prescribes the Infill requirements for areas already urbanized.
> - Article 5 prescribes lot and building standards within each Transect Zone.
> - Article 6 contains diagrams and tables supporting the other Articles.
> - Article 7 contains terms and definitions supporting the other Articles.
>
> (CATS, 2009, p. x)

When a community adopts the SmartCode, it must calibrate the base code to local conditions, which can include the adoption of modules. Modules contain written code, which is organized according to the articles and sections of the base code so that it can be inserted seamlessly into the base code document during the calibration process. Tables and diagrams

of modules are either appended to those that exist within Article 6, or added to the end of Article 6 if they present a new concept.

The SmartCode is arranged in two-page spreads; the right page of each spread is the actual code, and the left page is the “SmartCode Annotated”. These annotations are advisory commentary meant to aid in adoption and interpretation of the SmartCode, and are not included in legal code documents. The SOD SmartCode Module uses the same two-page spread layout with annotations on the left page. The discussions here include the commentary from the “SmartCode Annotated” pages of the Module, though they are not explicitly labeled as such; instead, they are integrated into the verbiage of the explanations that show how the Module was developed.

The sections of this chapter are arranged by concept, and do not follow the order of the sections and tables in the annotated SOD SmartCode Module. Thematically, the proposals of the SOD Module fall into three categories that organize the chapter in a logical progression (parallel to the urban form implications section in Chapter 2): administrative procedure, community-school relationship, and child-friendly urban form.

Please note that terms which are capitalized in this chapter refer to terms that are defined in the SOD SmartCode Module in Article 7 (see Appendix A).

Administrative Procedure

The first part of the SmartCode describes the planning process, names the relevant authorities and their responsibilities, and outlines plan procedures. For the SOD SmartCode Module, this means creating language that gives municipalities the power to create SODs, and explains the scale and process for fitting them into regulating plans. In the SmartCode adoption process, regulating plans are diagrammatic maps that allocate Regional Sectors, Community Unit Types, and Transect Zones within the municipality.

Process.

This portion of the written code addresses addendums to Articles 1 and 3 of the base code. Article 1, Section 4 of the base code describes the government process for adopting and calibrating the SmartCode and supporting regulating plans (CATS, 2009, p. SC4). The SOD SmartCode Module would add a section that says: School-Oriented Development projects may be subject to supplementary review by the local education authority. In effect, this statement provides the legal basis for school officials to have a voice in SOD.

Inclusion of this section acknowledges the fact that the success of SOD is highly dependent on an interdependent relationship between the local education authority (i.e. school district, school board) and the municipal planning body. The primary goal of SOD should always be to enhance the educational mission of the school. However, this is not limited

to traditional measures of academic performance, like test scores. Instead, the augmentation of school children's experiences as part of a community can also be considered to enhance the educational mission of the school.

Community Unit Types.

Next, in Article 3, Section 3 and Article 4, Section 2, the base code describes where and how Community Unit Types should be assigned in a regulating plan to New Community Plans and Infill Community Plans, respectively. The SOD addendum to both of these sections adds SOD as a fifth Community Unit Type, after Clustered Land Development (CLD), Traditional Neighborhood Development (TND), Regional Center Development (RCD), and Transit Oriented Development (TOD) (Center for Applied Transect Studies, 2009, p. SC10). However, with the way the base code is structured, only CLD, TND, and RCD are included in a regulating plan, and TOD is then used as an overlay on one of these three Community Unit Types. Because SOD is conceptually parallel to TOD, it makes sense for SOD to be activated through overlays as well. The SOD addendum, then, copies the language for creating TODs, merely replacing "TOD" with "SOD". This means that an SOD would function the same way as a TOD in the SmartCode, and is allowed through the establishment of an overlay within a community unit.

A change to Building Function, in Article 5, Section 8 of the SmartCode is related to the addition of SOD as a Community Unit Type. Table 12, part f of the base code contains a matrix of "by right" and "by

warrant" educational uses allowed within each Transect Zone. This matrix allows Childcare Centers in Transect Zones 2 through 6, but is much more restrictive for Elementary Schools, Trade Schools, High Schools, and Colleges. In order to allow integration of elementary, middle, and high schools within Transect Zones 2 through 6 via SODs, the Module specifies that, given an SOD overlay variance, schools are permitted "by right" within an SOD. This amendment to the base code effectively overrides the matrix in Table 12 of the base code when an SOD is involved.

The annotation for Article 3 in the Module also discusses the scale of the SOD overlay, which is generally dependent on the extent of the pedestrian shed for children who attend the school around which a particular SOD is centered. This may be up to half a mile for older children, or a quarter mile for younger children. Other factors that should be considered in determining the scale of the SOD overlay include the attendance area of the school, and the presence of arterials, highways, or other obstacles that limit children's access to the school by walking or biking.

Community-School Relationship

The most distinctive attribute of SOD planning is that it changes the conventional relationship between the school and its surrounding community. This relationship varies, however, depending on the characteristics and goals of both entities in the SOD. To better understand these variations in the relationship, an SOD typology was created. As the

SOD SmartCode Module is written, the SOD typology is advisory rather than regulatory because it is meant to suggest the applicability and possibilities of SOD, but not restrict it in an overly prescriptive way. Urban form implications of the typology are also discussed in this section.

SOD Typology.

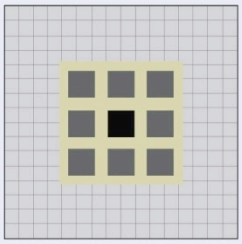
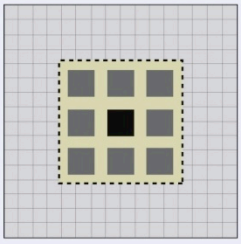
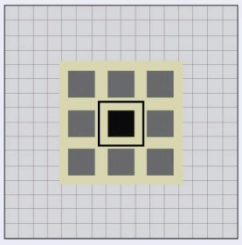
The SmartCode's basis in the transect makes it very specific to the physical urban form of development, which means that using the same sort of urban form distinctions for an SOD typology would make it incompatible with the base code. Instead, the case studies reviewed in Chapter 3 informed the relevance and conceptual genesis of an SOD typology. This typology can be applied to the transect—because each type would vary based on its transect context—but it is not transect-dependent. Similarly, the typology is not specific to the age of the students at the school, so that each type can be interpreted for an elementary school, a middle school, or a high school.

The SOD typology is rooted in the relationship between a school and its surrounding neighborhood. This can range from the very open and two-way relationship espoused by the Inderkum High School case study, to the semi-closed relationship described in the Tenderloin Community School case study, to the one-way relationship of the Moore Square Museums Magnet Middle School case study approach (see Chapter 3). These three relationships form the basis of the three SOD types, as shown in the SmartCode Module in Table SOD-1 (Table 1). This table also

allocates urban form elements that correspond to different SOD types—namely Private Frontages and Outdoor Space Elements—which are discussed in more detail later in this section.

Table 1

SOD-1: Types of School Oriented Development

	NEIGHBORHOOD CENTER	FAMILY SCHOOL	CULTURAL HUB
Description	 Community uses are integrated on the school site, so that the school serves community interests while additional facilities augment the services that the school can provide to students. Serves as, or contributes to, the central civic space for a community.	 Includes uses on site that cater to the students as well as their families, providing before and after school options for students, their siblings, and parents. Has support services for families only, and is not open to the general public.	 Partnerships with nearby cultural facilities like museums and theaters provide active learning experiences which are built into students' curriculum. Can be based on co-location with one institution or proximity to several institutions
Community-School Relationship	• two-way • unrestricted	• two-way • restricted	• one-way • unrestricted
Characteristics	• provides the basis for a complete community • is the most inclusive SOD type, in terms of catering to the full range of community stakeholders • can be adapted to large or small scales • co-located uses must be sensitive to age of students that attend the school	• can supplement social services for underserved populations including low-income and immigrant families • exclusivity can benefit high-crime or high-intensity urban areas by providing a safe haven for children and families • may be most appropriate for elementary and middle schools, since younger students are more dependent on parental involvement	• will tend to locate in city centers where cultural institutions cluster • can serve as opportunity for magnet school that focuses on arts or sciences particularly (depending on institutional partnerships) • may be most appropriate for smaller scale if curriculum is specialized
Private Frontages	Front Plaza Front Steps Overhang Entrance	Vestibule Private Courtyard	Front Steps Overhang Entrance
Outdoor Space Elements	Outdoor Classroom Community Garden	Outdoor Classroom Student Learning Garden	Outdoor Classroom Student Learning Garden
Examples	Inderkum High School (Sacramento, CA) City Heights K-16 Educational Collaborative (San Diego, CA) Neptune Community School (Neptune, NJ)	Tenderloin Community School (San Francisco, CA) PS 5, The Ellen Lurie School (New York, NY)	Moore Square Museums Magnet Middle School (Raleigh, NC) School of Environmental Studies (Minneapolis, MN) Henry Ford Academy (Dearborn, MI)

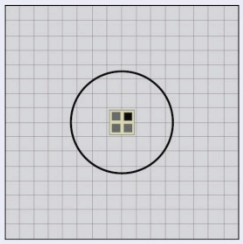
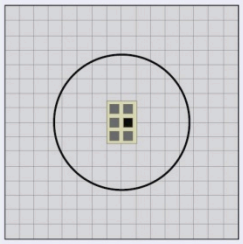
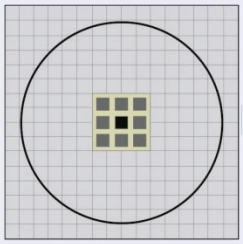
The first type is the Neighborhood Center SOD, which is exemplified by the Inderkum High School case study, where the school site hosts a public library, community college, and park, and is adjacent to the Town Center. This supports the educational mission of the school by increasing the library capacity and collection, providing opportunities for high school students to take college courses, exposing high school students to a collegiate atmosphere socially, and increasing space for physical recreation. It also supports the local community by providing a neighborhood center with a library and park. The design of the site, with a public space enfronting the high school, library, and community college also promotes intergenerational mixing, which helps build a sense of community in the neighborhood. These are all transferable qualities that support an open, two-way relationship between the school and the surrounding community, which is the essence of the Neighborhood Center SOD.

More generally, then, a Neighborhood Center SOD should serve as the public center of a community. There should be design consideration given to the way that the school building itself interacts with the site, so that student entrances and facilities are distinct from public entrances and facilities during the school day. Table SOD-2 of the SmartCode Module (Table 2) provides further detail about the form and land uses appropriate for Neighborhood Center SODs based on student ages. This table

describes some of the variations between Neighborhood Center SODs based on elementary, middle, and high schools.

Table 2

SOD-2: Neighborhood Center SOD Details

	ELEMENTARY SCHOOL	MIDDLE SCHOOL	HIGH SCHOOL
			
Student Grades **Student Ages**	Kindergarten - 5th grade 5 - 10	6th - 8th grade 11 - 13	9th - 12th grade 14 - 18
Pedestrian Shed	1/4 mile	1/4 mile - 1/2 mile	1/2 mile
Number of Households	1000	1000 - 3000	3000+
Compatible Community Uses	Library media center Health/dental clinic Park Community garden After-school program Adult continuing education Daycare Pre-school Senior center	Library media center Health/dental clinic Park Community garden After-school program Adult continuing education Recreation/fitness center Performing arts center	Library media center Health/dental clinic Park Community garden Adult continuing education Recreation/fitness center Performing arts center Community college Vocational school
Compatible Private Development Types	Corner store Small grocery	Corner store Small grocery Cafe/coffee shop	Corner store Small grocery Cafe/coffee shop Restaurant Neighborhood retail Office
On-site Residential	Teacher housing Senior housing	General multi-family Low-income multi-family	General multi-family Low-income multi-family
Housing Types	Rowhouse Apartment building	Rowhouse Apartment building	Apartment building Loft building

The pedestrian shed is related to the scale of the neighborhood that a Neighborhood Center SOD may serve. Elementary schools tend to be small and have the most vulnerable set of students, so they would

generally create the smallest and least intense center for a smaller neighborhood. At the other end of the spectrum, high schools are usually much larger, and have a larger attendance area and the most mature students, so they could form the basis of a larger and more intense center for a larger neighborhood. This is reflected in the size of the pedestrian shed, where an elementary school is based on a five-minute walk, a high school is based on a ten-minute walk, and a middle school falls somewhere in between. The diagrams at the top of Table 2 reflect this range of scale and intensity.

It is also necessary to have an adequate number of residents within an SOD to support its services. Although the unique offerings of a given SOD will vary, and therefore the amount of local resident support will also vary, Table 2 provides a starting point for estimating the number of households that should be within an SOD. The minimum recommendation for an elementary school Neighborhood Center SOD is 1000 households, which is based on the necessary population to support a corner retail store (Gibbs, 2008). This is relevant because one of the Compatible Private Development Types for an elementary school Neighborhood Center SOD is a corner store. The increased households necessary for middle and high school-based Neighborhood Center SODs reflect their increasing scale and intensity.

This nearby residential support is also necessary for a vibrant community center that supports all of the public facilities agglomerated on

a Neighborhood Center SOD site. Suggested Compatible Community Uses are, once again, dependent on the age of the children that attend the school on site. For elementary school Neighborhood Center SODs, this means low-intensity uses that are appropriate for the use of young children. This includes services for even younger children, like a daycare and pre-school, but also uses for adults, like continuing education courses. The elementary school site is also recommended for supporting senior activities, because of the mutually beneficial relationships that can be supported between seniors and children (Reisig & Fees, 2006; Davis, Vetere, Francis, Gibbs, & Howard, 2008).

For middle and high schools, Compatible Community Uses are recommended that encourage cultural and educational development among this student set. For example, a performing arts center can be shared between students and the community, allowing both student performances and professional shows that help fund investment. Also, including vocational and community colleges on-site can help motivate young adults to continue their education, as well as offer the opportunity to take post-secondary classes.

The recommended Compatible Private Development Types for Neighborhood Center SODs vary by student ages in a similar pattern. For elementary schools, adding a few basic and convenient uses, like a small grocery, can help support use of the center by local residents. The middle and high school-based sites can tolerate more intense uses, and perhaps

necessitate them. By the time children reach middle school age, they require places to socialize among their peers outside of school, which is why a third place type of establishment, like a café or coffee shop, is recommended.

The mix of private development is most flexible for high school-based Neighborhood Center SODs, which could begin to resemble small college campuses, with more retailers and public spaces. Other suggested private development types, like neighborhood retail and offices, serve different purposes. Neighborhood retail, including everyday services like banks, dry-cleaning, drug stores, and florists, will increase activity on site and help reinforce its function as the central space of the community. Offices can also serve an economic development purpose, bringing employees to the site that will help support restaurants and neighborhood retail. Additionally, the firms that use the offices on a high school-based Neighborhood Center SOD can be resources to high school students, for mentoring, internships, or other career exploration activities.

The last issue that Table 2 addresses is residential development on the school site within a Neighborhood Center SOD. In order to have a complete center, there should be people on site throughout the day and night, giving life to the neighborhood and acting as built-in surveillance. This proposal may be most delicate for elementary schools, where security concerns for young children are the most pronounced. For this reason, less-threatening resident groups are suggested, namely teachers

and seniors. First, teachers are already trusted among students and their parents. And, although veteran teachers with their own families may not be interested in living on the school site, new, young, under-paid and over-worked teachers would be attracted to work at schools that provide subsidized living quarters. Second, seniors would greatly benefit from living close to services and amenities that would be within a Neighborhood Center SOD, and are generally perceived as a group that is compatible with children.

For middle and high school-based Neighborhood Center SODs, housing opportunities are suggested for the general public, including low-income individuals. Especially when an SOD is established in an area that is dominated by single-family detached housing, the incorporation of multi-family housing on an SOD site can provide more variety of socio-economic groups, which supports long-term social resiliency (Joseph & Feldman, 2009).

Returning to the SOD typology of Table 1, the second type is the Family School SOD. Here the relationship between a school and its surrounding community, as explicated by the Tenderloin Community School case study, is less open than the Neighborhood Center SOD. The school provides services like a medical/dental clinic, day care, counseling, and adult education, but rather than opening these services to the entire local community as a Neighborhood Center SOD does, its use is restricted

to students and their families. It is still a community school, but for a more limited subset of the community.

Reasons for creating a Family School SOD rather than a more integrated Neighborhood Center SOD could vary, but there are some notable advantages to this approach in certain contexts. For example, as in the Tenderloin Community School case study, a dense urban area with high crime rates is not compatible with a Neighborhood Center SOD, but requires some restriction of access. The goal of a Family School SOD should be to provide a hospitable center of activity for children and their families that is protected from negative external influences like drug and gang-related activity. As such, this SOD type may be most useful for elementary and middle schools, because younger students are more dependent on parental involvement, but should not be excluded as an option for high schools as well.

A similar example to the Tenderloin Community School, as shown under “Examples” in Table SOD-1 (Table 1), is P.S. 5 Ellen Lurie in New York City. This urban school for kindergarten through sixth grade offers Head Start and Early Head Start for children 0-4 years of age; medical, dental, mental, and preventative health services for students and their families; programs for pregnant women; parent, family, and community engagement and development opportunities including adult education; and after-school programs (Children’s Aid Society, 2011). Parallel to the Tenderloin, the Washington Heights neighborhood in northern Manhattan

where P.S. 5 is located is comprised primarily of new immigrants from the Dominican Republic (Bingler et al, 2003, p.18), making the nurturing approach of a Family School SOD appropriate.

The Family School SOD may also be a useful transition model for a conventional school to move toward becoming a Neighborhood Center SOD. Even in areas that are less urban than New York City or San Francisco, the prospect of integrating schools and neighborhoods to the extent suggested by a Neighborhood Center SOD may seem daunting, overly ambitious, or outright unrealistic. In these cases, a more gradual SOD intervention, like integrating more services at the school for students and their families, can be the first step toward a full-fledged SOD. Whether or not a school evolves from Family School SOD to Neighborhood Center SOD may be less important than the improvements in educational and social service provided by the initial transition from conventional school to Family School SOD.

The third and final SOD type suggested in Table 1 is the Cultural Hub SOD, which is exemplified by the Moore Square Museums Magnet Middle School case study. The relationship between the community and school is one-way, because the community resources serve the school, but the school does not serve the community. For Moore Square Museums Magnet Middle School, this means that visits to nearby museums are built directly into the curriculum, effectively extending the classroom into the community. This SOD type focuses on a

neighborhood's cultural institutions, and the ways that they can partner with schools for educational co-benefits.

This SOD type, however, is still beneficial to the community, albeit indirectly. Whereas the first two SOD types provide direct services and facilities for community residents, the Cultural Hub SOD supports the community by claiming a stake in local institutions. By having students frequent museums, theaters, gardens, laboratories, and other institutions, these cultural facilities receive a steady and dependable flow of patronage. It also stresses the importance of these institutions to younger generations, perhaps cultivating an appreciation of cultural value that can be carried forward as they become the leaders of tomorrow.

The Cultural Hub SOD will vary greatly based on the institutions with which the school is partnered. For example, the School of Environmental Studies in Minneapolis operates in conjunction with the Minnesota Zoological Gardens and the Lebanon Hills Regional Park (Bingler et al, 2003, p. 40), which differs significantly from the urban Raleigh context of Moore Square Museums Magnet Middle School. Another variation of the Cultural Hub SOD is the Henry Ford Academy, a high school in Dearborn, Michigan that is located inside a portion of the Henry Ford Museum, and incorporates the museum's exhibitions into the students' curriculum (Bingler et al, 2003, p. 36). These examples show that a Cultural Hub SOD can be translated as one school that partners

with many nearby institutions, or through partnership with one institution and co-location.

Institutional partnerships may provide broad curriculum integration, or may encourage the development of a magnet school where students can focus on a certain discipline, as in the School of Environmental Studies. A focused curriculum may be most appropriate for high school students, as there is more flexibility in the curriculum after students have learned basics in elementary and middle schools, and should be considered in developing the partnerships for a Cultural Hub SOD.

Civic Zones.

Another issue that the SOD SmartCode Module addresses is the role of Civic Zones within the base code. This is important to the way that SODs would be integrated into both New Community Plans (in Article 3) and Infill Community Plans (in Article 4), because Civic Zones are how the SmartCode deals with educational facilities.

In the base code, Civic Zones are required in both New Community Plans and Infill Community Plans, and are made up of Civic Spaces and Civic Buildings. A Civic Space is defined as, “An outdoor area dedicated for public use. Civic Space types are defined by the combination of certain physical constants including the relationships among their intended use, their size, their landscaping and their Enfronting buildings,” and a Civic Building is defined as “a building operated by not-for-profit organizations dedicated to arts, culture, *education*, [emphasis added] recreation,

government, transit, and municipal parking, or for use approved by the legislative body" (CATS, 2009, p.SC50). This means that a public school is considered a Civic Building in the SmartCode.

The functional goals of Civic Zones, as described in the base code, are similar to SOD goals, especially for the Neighborhood Center SOD type. Civic Zones encourage gathering and a sense of community, especially where elements like trees and natural elements are incorporated (Coley, Sullivan, & Kuo, 1997). This means that an SOD that includes a public space can be an effective substitute for a Civic Zone within a given Community Unit. However, because the SOD must include both Civic Space and Civic Buildings in order to substitute for a Civic Zone, not every SOD would apply. For example, a Family School SOD type that limits public access is not considered an adequate substitute for a Civic Zone.

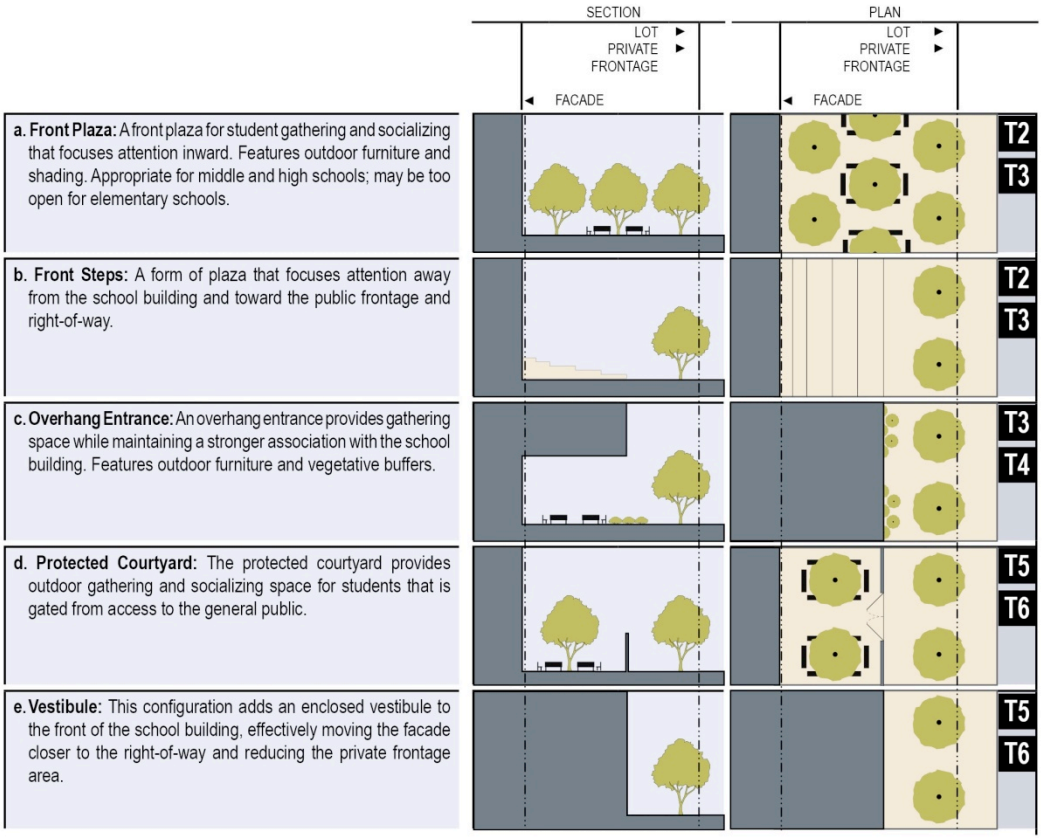
For these reasons, the text of the SOD Module that addresses Civic Zones, in both Article 3 for New Community Plans and Article 4 for Infill Community Plans, amends these sections to allow an SOD to qualify as a Civic Zone if it contains both a Civic Building (the school) and a Civic Space (as described in Table 13 of the base code). The Civic Spaces in the base code are general and inclusive enough to be appropriate for SOD sites, so an additional set of designs for Civic Spaces within SODs was deemed unnecessary.

Private Frontages for School Buildings in SOD.

The way that the school building approaches the public realm is an important aspect of SOD, and is regulated through Table 7X of the SOD SmartCode Module (Table 3). It is labeled “7X” because it is an addendum to Table 7 of the base code that diagrams private frontages of buildings.

Table 3

7X: Private Frontage for School Buildings



The different configurations within this table provide a range from open to protected frontage spaces. These configurations correspond to the varying relationships between the community and school represented in the SOD typology as allocated in Table 1. For example, the Front Plaza assembly creates a public space in front of the school that encourages

student socializing and gathering. It focuses attention into the plaza from across the school frontage and across the right-of-way. The Front Steps configuration is similar, except that the focus here is away from the school and toward the right-of-way. The elevation change created by the steps also raises the school entrance above the street level, making the relationship between the open and closed spaces more distinct.

At the other end of the spectrum are the Protected Courtyard and Vestibule frontage types, which both create a physical barrier between the school space and the public right-of-way. The building materials used in either the vestibule façade or the gate entrance would have a significant effect on whether the private space feels permeable or not. For example, a wrought-iron fence around a Protected Courtyard will be visually much more open to the street than a stone or concrete wall.

Somewhere between these open and closed frontages is the Overhang Entrance. The diagram in Table 3 shows this as a cantilevered second floor, but the same effect can be created using a structured awning. In this type, the frontage space is open, but the dominant overhang conveys a strong sense of ownership of the space by the school. Whereas the Front Steps focus the attention away from the school building, the Overhang Entrance brings the focus back toward the school, though in a somewhat guarded manner.

The annotations for Table 7X (Table 3) in the Module also suggest varying the private frontage types according to the age of the students that

attend the school. Generally, the more open and integrative configurations of the Front Plaza and Front Steps are more appropriate for older students, and may be too open for younger children. On the other hand, the Vestibule and Protected Courtyard options are much more closed, and may be most appropriate for the increased insulation necessary for elementary school-aged students.

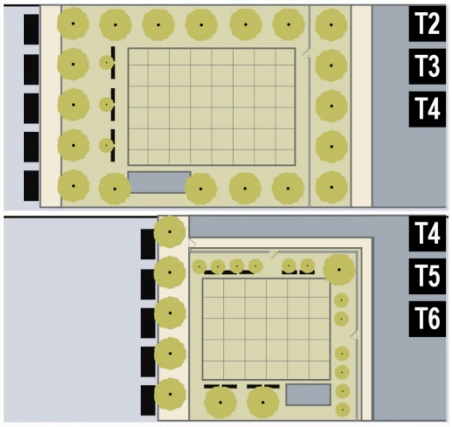
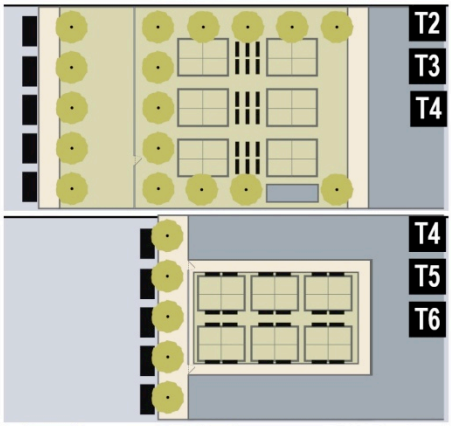
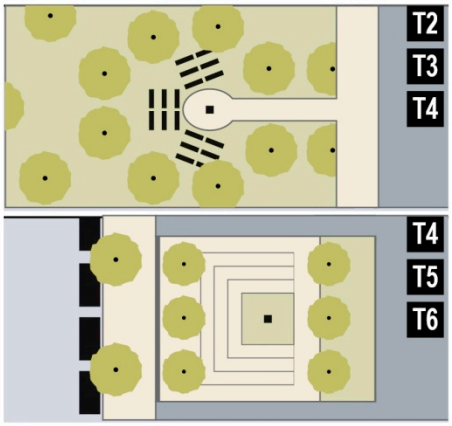
Outdoor Space Elements for SOD.

Apart from playgrounds and Civic Zones, other outdoor space elements are also encouraged for SOD sites, especially because of the importance of exposure to nature in children's development (Hüttenmoser,1995). Table SOD-5 of the SOD Module (Table 4) details options for a few types of outdoor spaces that are appropriate for SOD sites. Design of these types of spaces should emphasize opportunities for students to be exposed to fresh air, sunlight, and natural life during the school day, as research has shown that nature can help restore attention and relieve stress in fatigued students (Tennessen & Cimprich, 1995; Wells & Evans, 2003).

Like the private frontages, the three types of open spaces illustrated in Table 4 correspond to the SOD typology in terms of relationship between school and community. Also, within each of the three types of outdoor elements are two transect-based versions of each element design.

Table 4

SOD-5: Outdoor Space Elements

a. Community Garden: An area of arable land divided into plots that are available for cultivation by local residents. Plots may be reserved for school or student use. A water source or irrigation should be provided for on-site. A shed for storage of gardening supplies and tools should be provided on-site. The garden area should include benches or other amenities that invite congregation. The garden area should be buffered from elementary school buildings with a fence, but open to the street. Community gardens should be designed for primary use by both the school and the local community.	
b. Student Learning Garden: An outdoor learning space that is integrated with students' curriculum and/or after-school program to provide hands-on learning experience. Scale, extent, and division of plots is dependent on student body size, age, and needs. Benches or other seating should be available for students to observe demonstrations. A water source or irrigation should be provided on-site. A shed for storage of gardening supplies and tools may be provided on-site. The garden should be buffered from the street with a fence when adjacent to an elementary school. Student learning gardens should be designed primarily for the use of the school; some plots may be reserved for the personal use of students and/or their families.	
c. Outdoor Classroom: A versatile outdoor learning environment that allows for classroom work in a fresh air setting. Both seating and work surfaces should be included. When possible, outdoor furniture should be moveable, in order to accomodate many different learning situations. For a lecturing configuration, students should not face toward an overly active scene, as this can be easily distracting. The learning space should be buffered from noisy thoroughfares. Impermeable surfaces should be kept to a minimum. Outdoor classrooms should be designed for the exclusive use of the school; they can also be used for after-school and weekend activities conducted by the school.	

The Community Garden element is the most open form, as it is meant for use by both local residents and students. Also, although the garden would be accessible to the public, there is a recommended fence with gates between the school and the garden. Without being too

restrictive, this fence is meant to provide a definite boundary of the students' territory.

The Student Learning Garden, on the other hand, is intended for school use only, making it more restrictive than the Community Garden. Note that for this type, the fence is between the garden and the public right-of-way, rather than between the garden and the school, though this may not be necessary for older children. The idea behind a Student Learning Garden is to provide an outdoor laboratory for students to learn experientially about plant life and cultivation. This hands-on demonstration area could aid many lessons in biology, nutrition, and sustainability. It may also contribute to before or after school programs. Additionally, as in the Family School SOD type, some plots of a Student Learning Garden could be made available for students and their families to use outside of school hours.

The last outdoor space element is the Outdoor Classroom, which is meant to be a more versatile learning environment than the Student Learning Garden. It should be designed primarily for the use of the school, though it may be made available for after-school programs and extra-curricular activities beyond the traditional school day. This makes it the most flexible of the outdoor space elements, and it is potentially compatible with all three SOD types.

Landscaping and other naturalistic elements are important to providing a contrast between this learning space and standard indoor

classrooms. Outdoor Classrooms should also, however, provide a sense of enclosure. In the lower transect zones where more open space is available, a layer of trees or other vegetation can structure the space. This effect may be more difficult to create in a more urban context, but leafy vegetation can still be used at a tighter scale. The two diagrams of the Outdoor Classroom in Table 4 show how these options might work for lower and higher transect zones.

Child-friendly Urban Form

For an SOD to be truly successful, it must cater to the needs of the students. Children are the most vulnerable and dependent group within a population, but design interventions can make the environment safer and more accessible to them. Perhaps the most significant factor of child-friendly form is to promote independent mobility for children, so that they can navigate their world without being driven by an adult. As pedestrians and cyclists, however, they must also be especially protected from vehicular traffic, as their size makes them slower to cross thoroughfares and less visible to drivers (PBIC, 2006, p. 1-5). This section addresses these concerns by proposing design techniques that can make SODs safe and accessible to children, thereby extending the safe haven of a school building. The recommendations of the SOD SmartCode Module are not exhaustive, and should be supplemented by additional measures, such as a Safe Routes to School program. Many of the designs proposed in this section are derived from the Safe Routes to School guide (PIBC, 2006).

Thoroughfare Standards.

The first modification that the SOD SmartCode Module would make for thoroughfare standards comes in Article 3, Section 7.1 of the base code, adding a provision that is specific to areas within an SOD overlay. The section addendum first addresses thoroughfares that are adjacent to the school site, requiring that they: 1)have minimum 5-feet wide Sidewalk on both sides of the Thoroughfare, 2) have a Design Speed of 30 mph or less, and 3) have a Pedestrian Crossing Time of 8 seconds or less. These requirements correspond to attributes of thoroughfares in the base code and the "Complete Streets Thoroughfares Assemblies Module" (Duany Plater-Zyberk & Co., 2009). The most restriction is applied adjacent to the school site, because this is where students' paths would converge and diverge in walking to and from school. More specifically, the five-foot minimum sidewalk would allow children to walk comfortably two-abreast (PIBC, 2007, p. 3-22) without blocking circulation entirely. A design speed of 30 miles per hour or less slows drivers to allow them better visibility of children and increased stopping distance, and has been shown in research to reduce the risk of death to pedestrians involved in car accidents (Lennard, 2000, p. 65). The eight-second crossing time is based on the existing SmartCode thoroughfare assemblies; in this case, a low number was chosen with the assumption that the crossing time is defined for an average-sized person, and that children's crossing time may be longer.

The second part of the Article 3, Section 7.1 addendum addresses thoroughfares within the SOD overlay more generally, and is meant to ensure children's ability to walk safely, without being as restrictive as the regulations adjacent to school sites. These requirements are for thoroughfares to: 1) have minimum 5-feet wide sidewalk on both sides of the Thoroughfare, and 2) have a Pedestrian Crossing Time of 10 seconds or less. The most important provision here is the requirement of sidewalks on both sides of all thoroughfares, as this has been shown to greatly improve rates of children walking to school (PIBC, 2006, p. 3-21).

A related provision, for Article 3, Section 7.2, is: bikeway network standards as described in the SmartCode Bicycling Module should be adopted within all SOD areas. For Elementary School SODs, bikeway types that buffer bike riders from vehicular traffic shall be used (see Table B2 of Bikeways Module). This refers directly to the Bicycling Module (Lydon, Adelson, & Garcia, 2010), which has a range of suggested bikeway assemblies that promote safe bicycling on thoroughfares. Some of these assemblies have bike lanes that are buffered from traffic, for example by landscaping or parking, and these are suggested for SODs with younger children to isolate them from vehicular traffic. The purpose of including this provision is that an adequate bicycling network can greatly increase the extent of an SOD. It is also important that measures are taken during the design process to ensure that bikeways are clear of bus

and private vehicle crossing at school building access points (PIBC, 2006, p. 3-30).

Protected Pedestrian Crossings for SOD.

Additional requirements are proposed for Article 3, Section 7.2 concerning crosswalks for Vehicular Lanes. The first provision of this addendum for the SOD module is: Protected Pedestrian Crossings should be provided at all Thoroughfare intersections within an SOD overlay. The definition provided for “Protected Pedestrian Crossing” in Article 7 is: a marked walkway for pedestrians to cross Thoroughfares, which is controlled by a sign and/or traffic signal. May refer to crossings at intersections or mid-block. This sort of definition is important to making the Module part of an enforceable code.

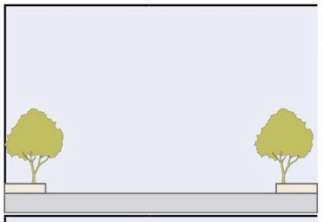
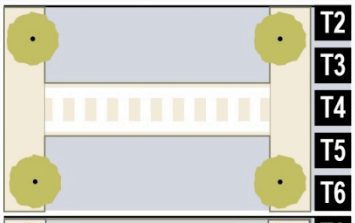
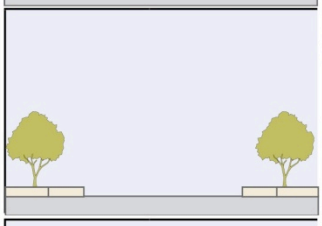
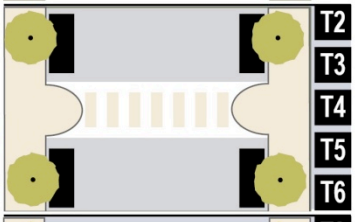
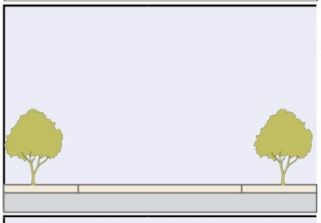
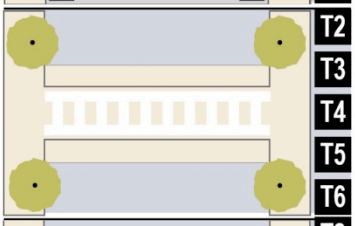
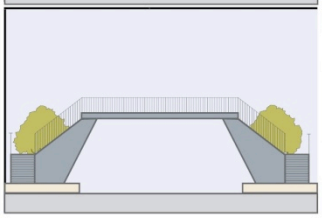
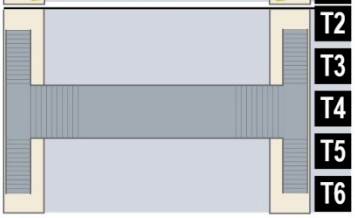
The second provision is specific to the school site, and says: a Protected Pedestrian Crossing shall be provided within 300 feet of a school entrance, and should conform to standards in Table SOD-3. Like the Article 3, Section 7.1 addendums, these requirements are proposed in order to further secure the walkability—of SOD areas in general and school sites in particular—for children. This is especially important because before and after school traffic can pose a threat to children’s safety, and should be carefully controlled adjacent to school building access points (PIBC, 2007).

Table SOD-3 of the Module (Table 5) suggests designs for Protected Pedestrian Crossings, also allocates the Thoroughfare Types

from the base code with which crossing is compatible. They are meant to provide greater visibility of thoroughfares for both pedestrians and drivers, and also encourage drivers to slow down. A simple design technique employed in these designs is paving the crosswalk area similarly to the sidewalk, or with another material that distinguishes it from the asphalt driving surface. In addition to the contrast paving, a bulb-out that gives pedestrians better visibility can be used (PBIC, 2007), as shown in the Bulb-Out Crossing. The third diagram, the Speed-Hump Crossing, raises the crosswalk to sidewalk height with a ramp on either side—like a speed-hump—for vehicles to slow as they move over it. Design interventions such as these have been shown increase the chances that motor-vehicle drivers will yield to pedestrians at crosswalks (Huang & Cynecki, 2001) by increasing visibility.

Table 5

SOD-3: Protected Pedestrian Crossings for School Sites

	THOROUGH-FARE TYPES	SECTION	PLAN
a. Paved Crossing: a crosswalk that is paved similarly to the sidewalk, or in a way that distinguishes it from the asphalt driving surface	DR ST RD		 T2 T3 T4 T5 T6
b. Bulb-out Crossing: a crosswalk where bulb-outs on either side of the road shorten crossing distance and give pedestrians improved visability of oncoming traffic in both directions.	BV AV CS DR ST RD		 T2 T3 T4 T5 T6
c. Speed-hump Crossing: a crosswalk that is raised above the street grade with slopes on either side to slow down traffic and improve visability of the crosswalk for drivers	BV AV CS DR ST RD		 T2 T3 T4 T5 T6
d. Raised Pedestrian Bridge: an alternative to crosswalks that lifts the pedestrian above the right-of-way and out of the path of vehicles	HW BV AV CS		 T2 T3 T4 T5 T6

The last diagram in Table SOD-3 (Table 5), the Raised Pedestrian Bridge (d), differs from the first three because it removes the pedestrian from the thoroughfare entirely. Aesthetically, the design of a pedestrian bridge should fit with the character of the surrounding area. Functionally, the most important element is a staircase, ramp, or elevator that is easily accessed from the pedestrian pathways on either side of the thoroughfare.

Also, though the diagram for Raised Pedestrian Bridge shows an above-grade pedestrian bridge, alternative grading may be considered, such as an at-grade bridge where the thoroughfare is excavated beneath,

or an underground passageway that passes below the thoroughfare. An underground passageway can provide an unsafe loitering zone, and this possibility should be weighed carefully in consideration of local conditions before construction. The relatively high cost of such bridges may mean that they are only practical at the busiest of thoroughfares that are least safe for pedestrian-vehicle interaction (PIBC, 2006, p. 3-36).

Bus Loading Zones for SOD.

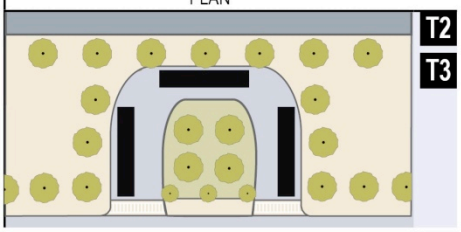
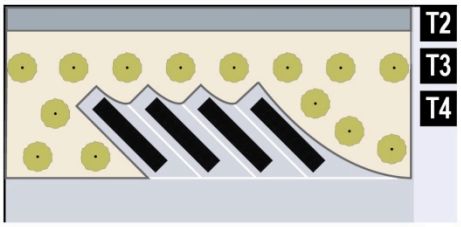
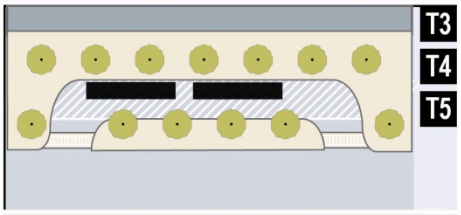
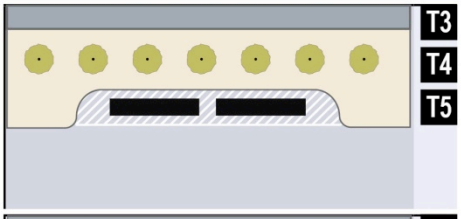
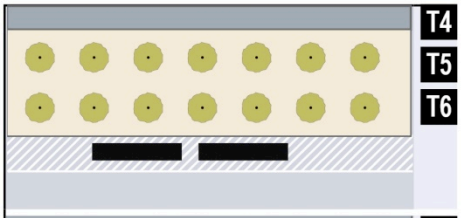
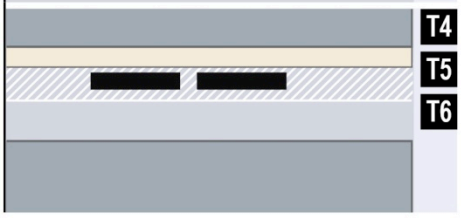
The last circulation element that the SOD SmartCode Module amends is related to Building Configuration in Article 5 of the base code, and adds a provision for bus-loading zones for schools in SODs. Conventional schools tend to designate copious amounts of space in prime locations to bus loading and unloading, because of the size of the bus vehicles and their wide turning radius. The transect-based design suggestions in Table SOD-4 (Table 6) use less space and are less disruptive to pedestrian circulation than conventional loading zones.

Generally, students should have access to the front entrance of the school building from frontage sidewalks that is not impeded by bus-loading zones or other drives (PIBC, 2006, p. 3-27). Bus Loading Zones should be easily accessible to a main school entrance, without dominating the entrance. Position of bus-loading zones should be privileged over private vehicle drop-off areas because, in terms of both VMT-impacts and social development, riding a school bus is a better choice than private vehicle use for conveying children to and from school, although walking or

bicycling is preferable to both (PIBC, 2006, p. 1-10). Options can also be explored during the design process to determine if school bus-loading zone spaces can serve other SOD uses as well, as they are used relatively briefly, before and after school hours on weekdays. Shared uses may include private paid parking or public transit stops. Table SOD-4 (Table 6) also suggests which adjoining Thoroughfare Types from the base code would be most compatible with each Bus Loading Zone configuration.

Table 6

SOD-4: Bus-Loading Zones

	THOROUGH-FARE TYPES	PLAN
a. Loading Circle: A one-way circular driveway with landscaped island that includes sidewalk and crossing designation. Dimensions of driveway must accomodate a school bus's 45-foot turning radius. Queueing for bus-loading takes place on all outer portions of the circle.	BV AV CS	
b. Diagonal Pull-up: A set of head-first pull-in slots for buses with staggered loading platforms. Queueing for bus-loading takes place on all loading platforms. Should only be used where design speed on adjoining thoroughfare is low enough to allow buses to back-out during peak times.	CS DR ST RD	
c. One-Way Slip: A one-way lane that interrupts the sidewalk in two places, creating a sidewalk island that includes crossing designation. Dimensions of slip must accomodate a school bus's 45-foot turning radius. Queueing for bus-loading takes place on passenger side of bus, separated from pedestrian pathway. Length of the slip may be extended as necessary to accomodate bus-loading needs	BV AV CS DR ST	
d. Bus Bay: A loading bay inset in a sidewalk that allows buses to pull in and out head-first. Adjacent sidewalk must be wide enough that bay does not obstruct pedestrian path, and allows room for queueing during loading and unloading.	BV AV CS DR ST RD	
e. Front Bus Lane: A lane (or portion thereof) designated to loading and unloading of buses. Signage can be used to indicate times of day when the Front Bus Lane is open to other uses, such as private vehicle parking.	BV AV CS DR ST RD	
f. Bus Alley: One lane (or portion thereof) of a two-way rear alley or rear lane designated for loading and unloading buses. Buses occupy one direction of the alley during pick-up and drop-off times.	RA RL	

As shown in Table SOD-4 (Table 6), the Loading Circle is scaled-down from its conventional version, and is only permissible in low transect zones where land area is most abundant. It also requires crossing lines

and differentiated sidewalk paving, and is not open to private vehicles. The Diagonal Pull-up uses less space than a loading circle, depending on the number of stalls that it employs. It may be used in a more urban area, but consideration must be given to the design speed of the adjacent street that the bus backs up onto.

Perhaps the most innovative design for school bus-loading zones presented in Table SOD-4 (Table 6) is the One-Way Slip, which was inspired by the parking and transit slips on boulevards in Paris. As such, the slip could be much longer than shown in the diagram, and still provide minimal interruption to pedestrian circulation. This is similar to the next design, the Bus Bay, which is similar to the design of many public bus stops. This also makes it ideal as a space that doubles as a public transit stop.

The Front Bus Lane designates a lane adjacent to the school frontage for bus loading and unloading. This design separates the bus-loading zone entirely from the pedestrian pathway, whereas each of the previous designs are inset within the sidewalk and therefore cut into the pedestrian space. A Front Bus Lane also provides a buffer between the sidewalk and traffic on the adjacent thoroughfare, and can double as a public transit stop or private parking lane. Similarly, a Bus Alley designates one lane of an alley thoroughfare adjacent to a school building for bus loading and unloading. For more intense urban areas with narrower streets, this can be an efficient option.

In summary, the elements of the SOD SmartCode Module address the range of issues that will allow it to work in conjunction with the base code. For this purpose, the administrative procedures that determine the way SOD functions within the Community Units and Transect Zones of the base code provide an important linking mechanism between the two documents. This provides the structure for more specific SOD design guidelines, as related to both an SOD's community-school relationship and the goal of creating child-friendly urban form.

Chapter 5

DISCUSSION

Two main issues require further discussion with regard to the SOD SmartCode Module presented in Chapter 4. The first is related to the development of the Module, including the methodology involved in writing a code, and possible shortcomings and further research needed to test its credibility. The second issue is concerned with the implications of the SOD Module in its current form as a neighborhood-scale planning tool.

Challenges in Writing a Code

Andres Duany (2010), one of the chief architects of the SmartCode, said that writing code is the most purely creative thing that he does. Rather than planning to the peculiarities of a specific site, writing code requires a combination of analysis and synthesis performed with uncanny foresight.

First, one must analyze many projects, at many scales, and try to deduce patterns in the way that they are composed. Beneficial patterns should be differentiated from harmful patterns; this way beneficial patterns can be replicated in a way that excludes the possibility of creating harmful patterns. This part of the process is similar to Christopher Alexander's *A Pattern Language* (1977), which may be a less-structured precursor to the methodology of the SmartCode. For creating the SOD Module, precedents of community schools, like those in the case studies of Chapter 3, were

considered beneficial patterns, and conventional big box school developments were considered harmful patterns.

Next, these patterns must be deconstructed to elemental building blocks that are repeated from one version of the pattern to the next. For the SOD Module, these building blocks include the private frontages of school buildings, outdoor space elements for schools, crosswalks, and bus loading zones. Civic Space is a building block already in the base code that is also part of beneficial community school patterns, and so is incorporated into the SOD Module.

Once the code is written for these elemental building blocks, they become site components that can be assembled in countless permutations, according to a site's unique conditions. Then, guidelines are necessary that ensure that the components are assembled in a way that conforms to a larger order. In the SmartCode, this larger order is mediated by Transect Zones. This means that the SOD components designed for the Module also have to operate according to the Transect.

These analytical steps that make up the methodology for creating the SOD SmartCode Module mean that the result is empirically derived. As with many theoretical pursuits in social science, however, the researcher shapes the results—in this case the SOD Module—which are inherently biased. This research's proposal, of a planning paradigm and supporting urban design guidelines, should be considered only a preliminary step in exploring the possibilities of such a strategy.

The next step may be a testing phase, in which the design theory of the SOD SmartCode Module is applied—either hypothetically or in earnest—and the results are evaluated. Inevitably this process would lead to alterations, additions to, and deletions from the Module as it is presented here. This testing and revision of the Module, including its underlying theories and assumptions, could lead to a proven and potent model for future planning.

Beyond refinement as a regulatory document, the SOD SmartCode Module proposed in this research could serve several purposes in promoting SOD as a neighborhood planning strategy. For one, the SOD typology frames the idea of school-community integration in a new way that could assist planners in explaining this type of development idea to local stakeholders. Rather than just showing examples of SOD communities, the typology provides a nuanced overview that shows different options for the role a school could have in the neighborhood.

Additionally, the different elements of SOD sites and range of diagrams could function like a best practices manual or sample catalog that makes demonstrative suggestions for site design. This could also help involve neighborhood stakeholders in the development process by showing site component possibilities in an easy-to-read, tabular format.

Issues of Scale: Building, Neighborhood, and Region

In the realm of urban planning, SOD has the potential to be a powerful new perspective for neighborhood-scale planning. The

SmartCode, however, addresses planning at three scales: building, community, and region. The discussion in this section examines decisions made in creating the SOD SmartCode Module at the community/ neighborhood scale, and what this implies for the building and regional scales.

Building Scale.

One principle of previous SOD-like proposals, as discussed in Chapter 2, is the need for a small school building. The intent of this principle is to encourage small, neighborhood schools that are within existing communities, rather than “big-box” schools on the exurban edge. The SOD SmartCode Module addresses this concern because it is, by definition, a neighborhood-based planning strategy. There are, however, no guidelines providing specific maximums for either the number of students or square footage allowed for an SOD school. This tends to be the purview of a state’s department of education, which establishes standards for the number of square feet required per student in public schools.

As such, the base code and the Module speak to the way that a building should be oriented on a site and how it should fit with the surrounding urban character via Transect Zones, but not specifically how much space should be allocated per student. While the literature suggests that many conventional state standards mandate too much space per student (CEFPI & EPA, 2004; Bingler et al, 2006), and therefore tend to

promote “sprawl schools,” further research into this specific question would be required in order to make new recommendations.

Neighborhood Scale.

The SOD SmartCode Module is meant to operate at the neighborhood scale, which is synonymous with the Community Unit in the SmartCode. However, most of the design interventions suggested in the Module are specific to the school site, and do not extend to the full neighborhood scale. The exception to this is the Thoroughfare Standards addendums, which seek to ensure walkability throughout the SOD overlay by requiring sidewalks and low design speeds on all streets (see the provision in Article 3, Section 7.1 of Appendix I).

The reason for this focus on the school site is the fundamental distinction between SOD and conventional education planning, which is a deliberate integration of the school into the community. Research and pilot projects should be conducted in order to seek further successful practices for the areas of an SOD beyond the school site. But, for this research, the design of the school site as a useful, full-service center was deemed the most important.

Regional Scale.

Although SOD is presented as a neighborhood-scale planning strategy, its utilization of public primary and secondary schools gives it a strong basis for linking neighborhoods to the municipal and regional scales, because this is the level at which most school districts, and

therefore school planning, takes place. This may be especially applicable in retrofit planning, because the distribution of these schools can provide a basis for organizing neighborhoods or districts that become focal nodes for infill development.

A network of SODs can also be related to a regional transit plan, as they could provide the density to support nodes in a transit corridor. In this way, SOD can become a precursor to TOD, with the added stipulation of child-friendly urban form, which, though not specified in TOD, can leverage the TOD goal of accessibility to all stakeholders.

In summary, the SOD SmartCode Module is not the only result of this research; the process of writing the code, and the way that this code will be used, may have as much implication as the Module itself. Studying the SmartCode, the underlying logic seems intuitive and the diagrams are deceptively simple. However, the act of creating a SmartCode Module adds new levels of understanding to the code, both in the way that it was written and the forms that it translate into when applied to a real place.

Chapter 6

CONCLUSIONS AND RECOMMENDATIONS

The most significant contribution that this research makes to the urban planning field is a new way to conceptualize neighborhood-scale development. Beyond the design recommendations of the SOD SmartCode Module, the SOD typology begins an important conversation about the varying relationships that can occur between a school and its surrounding community. The typology itself is based on real schools characterized in a novel fashion that can aid further SOD concept development.

An important point is that the three SOD types proposed in Chapter 4 should not be considered mutually exclusive, but could be combined to make additional types. For example, a Neighborhood Center SOD could include museums on-site that make it a Cultural Hub SOD as well. Rather than using the typology as a categorical tool, it should be viewed as a starting point for further exploration.

Another important contribution is the involvement of child-friendly design in the discussion of neighborhood planning. The traditional idea of a neighborhood includes various types of households and housing forms, so the explicit consideration of child-friendliness in neighborhood planning seems appropriate. This should not be viewed as privileging one segment of the population over others, but rather as using this segment—the most

vulnerable segment—as a standard. As UNICEF's Child-Friendly Cities Initiative (2009) says: if it is safe for children, then it is safe for everyone.

Perhaps the most critical shortcoming of the research presented is the lack of active case studies to test the proposals of the SOD SmartCode Module. As discussed in Chapter 5 in relation to the challenge of writing a code, this would certainly be the next step in continuing to develop an SOD planning paradigm.

Also, both the number and scope of case studies of existing community school sites should be expanded for a more thorough review of best and worst practices. This should include field visits and interviews with major actors to better understand the process of creating a community school. It should also entail an evaluation of the students' opportunities and benefits that have resulted from the community school development, especially in terms of academic achievement. The planning and construction of an SOD would rely on both public and private funding, but either way, hard evidence would be necessary to convince decision makers that SOD is a worthy and beneficial investment.

In this regard, the aim of the research presented here is not an exhaustive review of precedents, but rather a synthesis of the theories that resulted from these precedents. The ideas for a School-Oriented Development urban planning theory seem to exist already, and the task was to unify them into a single, coherent method, without a pretext of critical examination.

Another area for future research is to explore the possibilities of using other types of schools, beyond public elementary, middle and high schools, as the basis of SOD. Private schools could be studied for ways that they can serve the communities that they inhabit in a more inclusive way. Also, as was mentioned before, many college and university campuses—merely by virtue of being campuses and not sites—act as SODs that support their surrounding communities. Further investigation of the patterns in the built environments of these campuses that makes them successful could contribute to evolution of the SOD theories presented here.

The development of an SOD SmartCode Module is supported by a typology that reframes the role of schools as an integral part of neighborhoods. This research should be viewed as a theoretical proposal for a neighborhood planning process that respects the role that education plays in society, passing the accumulated discoveries of each generation to the next.

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APPENDIX A

COMPLETE SOD SMARTCODE MODULE

School-Oriented Development SmartCode Module

Prepared by Carolyn Reid

It is the one conspicuous governmental edifice that is found in every local community, and because of its importance it deserves a dignified site.

Clarence Perry

These annotations are advisory only. The SmartCode itself appears only on the right side of each spread.

SCHOOL-ORIENTED DEVELOPMENT SMARTCODE MODULE

School-Oriented Development (SOD) is a neighborhood-scale planning strategy that uses a School site as the community center. The objective of an SOD is to integrate education within a community to advance the educational mission of the School and create collaborative opportunities between the School and the community. An SOD can take many forms, depending on the type of School and neighborhood context. The two principle themes of SOD are an integrated relationship between the School and its surrounding community, and a child-friendly urban form.

This SOD Module is transect-based. All or part of it may be adopted with a customized SmartCode as regulatory, advisory, or merely permissive ("shall," "should" or "may") or it may be provided as an auxiliary set of guidelines for developers and/or municipalities. Any mandatory regulations must be activated by the sections on the next two facing pages or similar language.

If any part of this Module is used, the appropriate definitions should be added to Article 7 during calibration.

1.4 PROCESS

1.4.X

The success of SOD is highly dependent on a synergistic relationship between the local education authority (i.e. school district, school board) and the municipal planning body. The primary goal of SOD should always be to enhance the educational mission of the School. However, this is not limited to traditional measures of academic performance, like test scores. Instead, the augmentation of School Children's experiences as part of a community can also be considered to enhance the educational mission of the school.

3.3. COMMUNITY UNIT TYPES

3.3.X.

An SOD functions the same way as a TOD in the SmartCode, and is allowed through the establishment of an overlay within a Community Unit. The scale of the SOD overlay is generally dependent on the extent of the Pedestrian Shed for children who attend the School around which a particular SOD is centered. This may be up to half a mile for older children, or a quarter mile for younger children. Other factors which should be considred in determining the scale of the SOD overlay include the attendance area of the School, and the presence of arterials, highways, or other obstacles that limit children's access to the School by walking or biking.

3.5 CIVIC ZONES

3.5.1.X

The functional goals of Civic Zones, as described in the base code (see Section 3.5) are similar to SOD goals, especially for the Neighborhood Center SOD type (see Table SOD-1). This means that an SOD can be an effective substitute for a Civic Zone within a given Community Unit. Note that the SOD must include both Civic Space and Civic Buildings in order to substitute for a Civic Zone. For example, a Family School SOD (see Table SOD-1) that limits public access is not considered an adequate substitute for a Civic Zone.

3.7 THOROUGHFARE STANDARDS

3.7.1.X

Strict regulations for Thoroughfares are required adjacent to the school site and within the designated SOD overlay area in order to assure a safe pedestrian environment for children, and encourage walking to and from School as a safe option.

3.7.2.X.i

Before and after school traffic can pose a threat to children's safety, and should be carefully controlled adjacent to School building access points.

3.7.2.X.iii

An adequate bicycling network, which is appropriately buffered from vehicles for younger children, can greatly increase the reach of an SOD. Measures should be taken in the design process to ensure that bikeways are clear of bus and private vehicle crossing at School building access points.

SMARTCODE MODULE

Municipality

ARTICLE 1. GENERAL TO ALL PLANS

1.4 PROCESS

1.4.X School-Oriented Development projects may be subject to supplementary review by the local education authority.

ARTICLE 3. NEW COMMUNITY PLANS

3.3 COMMUNITY UNIT TYPES

3.3.X **School-Oriented Development (SOD)**

a. Any CLD, TND or RCD that contains an existing or projected school use may be redesignated in whole or in part as an SOD community type.

b. The use of an SOD overlay requires approval by Variance.

3.5 CIVIC ZONES

3.5.1 **General**

x. Any SOD overlay areas that includes both a Civic Space Zone (CS) and a Civic Building Zone (CB), as described in Sections 3.5.3 and 3.5.4, shall be considered equal to a Civic Zone for a Community Unit.

3.5.3.X **Civic Space (CS) Specific to SOD overlays**

x. Civic Spaces within SOD overlay areas shall be generally designed as described in Table 13, their type determined by the surrounding or adjacent Transect Zone in a process of public consultation subject to the approval of the Legislative Body.

i. Civic Spaces within SOD overlay areas that include a School with children aged ten or younger should include a playground. See Table 13.e.

3.7 THOROUGHFARE STANDARDS

3.7.1 **General**

x. **Specific to areas within an SOD overlay**

i. Thoroughfare assemblies (as found in Table 4C) adjacent to a school site shall:

1) have minimum 5-feet wide Sidewalk on both sides of the Thoroughfare,

2) have a Design Speed of 30mph or less, and

3) have a Pedestrian Crossing Time of 8 seconds or less.

ii. Thoroughfare assemblies (as found in Table 4C) within an SOD overlay shall:

1) have a minimum 5-feet wide Sidewalk on both sides of the Thoroughfare,

2) have a Pedestrian Crossing Time of 10 seconds or less.

3.7.2 **Vehicular Lanes**

x. **Specific to areas within an SOD overlay**

i. Protected Pedestrian Crossings should be provided at all Thoroughfare intersections within an SOD overlay.

ii. A Protected Pedestrian Crossing shall be provided within 300 feet of a school entrance, and should conform to standards in Table SOD-3.

ii. Bikeway network standards as described in the SmartCode Bicycling Module should be adopted within all SOD areas. For Elementary School SODs, bikeway types that buffer bike riders from vehicular traffic shall be used (see Table B2).

These annotations are advisory only. The SmartCode itself appears only on the right side of each spread.

4.2. COMMUNITY UNIT TYPES

4.2.X.

SODs require the same procedure for designating Community Unit Types for Infill Community Plans as for New Community Plans. Refer to the annotation for Section 3.3.X.

4.4 CIVIC ZONES

4.4.1.X

SODs require the same provisions for Civic Zones for Infill Community Plans as for New Community Plans. Refer to annotation for Section 3.5.1.X.

4.4.2.X

Refer to annotation for Section 3.5.3.X

5.7 BUILDING CONFIGURATION

5.7.1.x

Students should have access to the front entrance of the school building from frontage Sidewalks that is not impeded by Bus Loading Zones or other drives

5.7.X

Bus Loading Zones should be easily accessible to a main school entrance. Position of Bus Loading Zones should be privileged over private vehicle drop-off areas. In terms of both VMT and social development, riding a school bus is a better choice than private vehicle use for conveying children to and from school.

5.8 BUILDING FUNCTION

5.8.X

The goals of SOD development mean that it is potentially appropriate in all Transect Zones, albeit in varied forms. The decision by local officials to create an SOD, then, should negate the base code distinction of restricting most educational functions to Special Districts, as described in Table 12.f.

ARTICLE 4. INFILL COMMUNITY SCALE PLANS

4.2 COMMUNITY TYPES

4.2.X **INFILL SOD (SCHOOL ORIENTED DEVELOPMENT)**

a. Any Infill CLD, TND or RCD that contains an existing or projected School use may be redesignated in whole or in part as an SOD community type.

b. The use of an SOD overlay requires approval by Variance.

4.4 CIVIC ZONES

4.4.1 **GENERAL**

x. Any SOD overlay areas that includes both a Civic Space Zone (CS) and a Civic Building Zone (CB), as described in Sections 3.5.3 and 3.5.4, shall be considered equal to a Civic Zone for a Community Unit.

4.4.2 **CIVIC SPACE ZONES (CS)**

x. Civic Spaces within SOD overlay areas shall be generally designed as described in Table 13, their type determined by the surrounding or adjacent Transect Zone in a process of public consultation subject to the approval of the Legislative Body.

i. Civic Spaces within SOD community and overlay areas that include a school with children aged ten or younger should include a playground. See Table 13.e.

ARTICLE 5. BUILDING SCALE PLAN

5.7 BUILDING CONFIGURATION

5.7.1. **SPECIFIC TO AREAS WITHIN AN SOD OVERLAY**

x. School building Private Frontages should be designed as shown in Table 7X.

5.7.X **SPECIFIC TO AREAS WITHIN AN SOD OVERLAY**

a. Bus Loading Zones for School Children shall be provided within 100 feet of a School building entrance.

b. Bus Loading Zones for School Children shall be generally designed as described in Table SOD-4.

c. Outdoor Space Elements shall be generally designed as described in Table SOD-5.

5.8 BUILDING FUNCTION

5.8.x **SPECIFIC TO AREAS WITHIN AN SOD OVERLAY**

a. Permission for an SOD overlay (as described in Section 3.3.X), overrides the specifications for locations of education as described in Table 12.f. Educational facilities shall be allowed by an SOD Variance in T2, T3, T4, T5, and T6 zones.

SMARTCODE ANNOTATED

These annotations are advisory only. The SmartCode itself appears only on the right side of each spread.

TABLE SOD-1

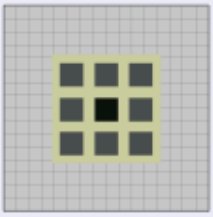
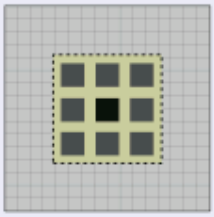
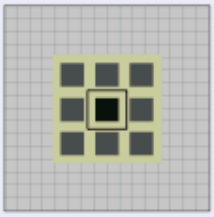
This table describes the three main types of School-Oriented Development (SOD), focusing on the relationship between the school and the surrounding community. Each of these SOD types can take many forms depending on the unique site, school, and neighborhood for which it is developed. For this reason, the SOD types are not transect-based, but can be interpreted to any transect context (with the exception of the T1 Natural Zone).

Characteristics: The traits described here are meant to be general, and are by no means exclusive or exhaustive.

Private Frontages: Suggests the type and design of private frontages of school buildings that are compatible with each SOD type. See Table 7X

Outdoor Space Elements: Suggests the type and design of outdoor spaces that are compatible with each SOD type. See Table SOD-5

TABLE SOD-1: TYPES OF SCHOOL-ORIENTED DEVELOPMENT. This table defines, characterizes, and gives examples of three types of SOD. It is for advisory purposes only.

	NEIGHBORHOOD CENTER	FAMILY SCHOOL	CULTURAL HUB
Description	 Community uses are integrated on the School site, so that the School serves community interests while additional facilities augment the services that the School can provide to students. Serves as, or contributes to, the central Civic Space for a community.	 Includes uses on site that cater to the students as well as their families, providing before and after School options for students, their siblings, and parents. Has support services for families only, and is not open to the general public.	 Partnerships with nearby cultural facilities like museums and theaters provide active learning experiences which are built into students' curriculum. Can be based on co-location with one institution or proximity to several institutions
Community-School Relationship	• two-way • unrestricted	• two-way • restricted	• one-way • unrestricted
Characteristics	• provides the basis for a complete community • is the most inclusive SOD type, in terms of catering to the full range of community stakeholders • can be adapted to large or small scales • co-located uses must be sensitive to age of students that attend the school	• can supplement social services for underserved populations including low-income and immigrant families • exclusivity can benefit high-crime or high-intensity urban areas by providing a safe haven for children and families • may be most appropriate for elementary and middle schools, since younger students are more dependent on parental involvement	• will tend to locate in city centers where cultural institutions cluster • can serve as opportunity for magnet school that focuses on arts or sciences particularly (depending on institutional partnerships) • may be most appropriate for smaller scale if curriculum is specialized
Private Frontages	Front Plaza Front Steps Overhang Entrance	Vestibule Private Courtyard	Front Steps Overhang Entrance
Outdoor Space Elements	Outdoor Classroom Community Garden	Outdoor Classroom Student Learning Garden	Outdoor Classroom Student Learning Garden
Examples	Inderkum High School (Sacramento, CA) City Heights K-16 Educational Collaborative (San Diego, CA) Neptune Community School (Neptune, NJ)	Tenderloin Community School (San Francisco, CA) PS 5, The Ellen Lurie School (New York, NY)	Moore Square Museums Magnet Middle School (Raleigh, NC) School of Environmental Studies (Minneapolis, MN) Henry Ford Academy (Dearborn, MI)

These annotations are advisory only. The SmartCode itself appears only on the right side of each spread.

TABLE SOD-2

This table suggests several compatible elements of the Neighborhood Center SOD at the Elementary School, Middle School, and High School level.

Pedestrian Shed: Each School type serves a different student age demographic, and therefore creates the basis of a different neighborhood size and character. Elementary Schools serve fewer students in a more immediate neighborhood, and form the basis of a smaller neighborhood than a Middle School or a High School.

Households: To properly support the mix of uses in the SOD, a minimum number of households is suggested within the Pedestrian Shed.

Compatible Community Uses: In Neighborhood Center-SODs, the School site serves the entire range of stakeholders in the neighborhood. Additional uses included at the School site must support the educational mission of the School by providing amenities that promote a balanced, healthy lifestyle. Compatible community uses are dependent on the age of the School Children, ranging from less intense uses for Elementary Schools to more intense uses for High Schools.

Compatible Private Development Types: Introducing private development to an SOD site can help finance community uses, and also draw more use of the SOD site in general.

On-Site Residential: When School site size permits, multi-family housing should be developed on site to promote 24-hour site use, surveillance, and vibrancy. Consider giving preference to households with members employed on the School site or with children that attend the School.

Housing Types: Specifies the form of housing for on-site residential.

TABLE SOD-2: Neighborhood Center SOD Details This table suggests standards for the size, support, and compatible uses for a Neighborhood Center SOD that is oriented around an Elementary School,Middle School, or High School. It is for advisory purposes only.

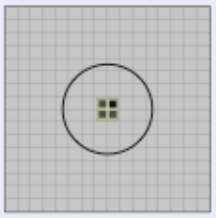
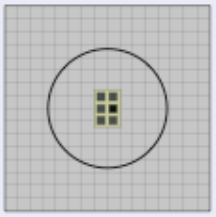
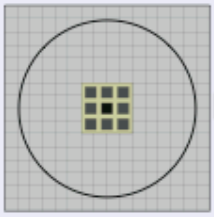
	ELEMENTARY SCHOOL	MIDDLE SCHOOL	HIGH SCHOOL
			
Student Grades **Student Ages**	Kindergarten - 5th grade 5 - 10	6th - 8th grade 11 - 13	9th - 12th grade 14 - 18
Pedestrian Shed	1/4 mile	1/4 mile - 1/2 mile	1/2 mile
Number of Households	1000	1000 - 3000	3000+
Compatible Community Uses	Library media center Health/dental clinic Park Community garden After-school program Adult continuing education Daycare Pre-school Senior center	Library media center Health/dental clinic Park Community garden After-school program Adult continuing education Recreation/fitness center Performing arts center	Library media center Health/dental clinic Park Community garden Adult continuing education Recreation/fitness center Performing arts center Community college Vocational school
Compatible Private Development Types	Corner store Small grocery	Corner store Small grocery Cafe/coffee shop	Corner store Small grocery Cafe/coffee shop Restaurant Neighborhood retail Office
On-site Residential	Teacher housing Senior housing	General multi-family Low-income multi-family	General multi-family Low-income multi-family
Housing Types	Rowhouse Apartment building	Rowhouse Apartment building	Apartment building Loft building

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TABLE SOD-3 - PROTECTED PEDESTRIAN CROSSINGS

This table suggests designs for Protected Pedestrian Crossings and for which Thoroughfare types they are most compatible. These designs are meant to provide greater visibility of Thoroughfares for both pedestrians and drivers, and also encourage drivers to slow down. The exception to this is the Raised Pedestrian Bridge (d), which removes the pedestrian from the Thoroughfare entirely.

Aesthetically, the design of a pedestrian bridge should fit with the character of the surrounding area. Functionally, the most important element is a staircase/ramp/elevator that is easily accessed from the pedestrian pathways on either side of the Thoroughfare.

Also, though the graphic shows an above-grade pedestrian bridge, alternative grading may be considered, such as an at-grade bridge where the Thoroughfare is excavated beneath, or an underground passageway that passes beneath the Thoroughfare. An underground passageway can provide an unsafe loitering zone, and this possibility should be weighed carefully in consideration of local conditions before construction. The relatively high cost of such bridges may mean that they are only practical at the busiest of Thoroughfares that are least safe for pedestrian-vehicle interaction.

TABLE SOD-3: Protected Pedestrian Crossings for School Sites This table suggests designs for Protected Pedestrian Crossings in front of School buildings, and compatible Thoroughfare tyes.

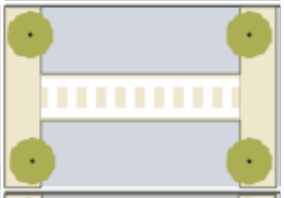
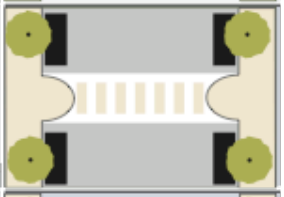
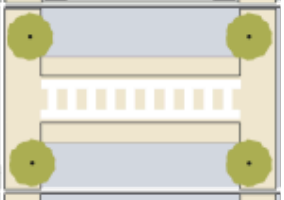
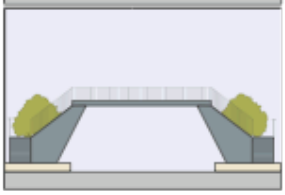
	THOROUGH-FARE TYPES	SECTION	PLAN
a. Paved Crossing: a crosswalk that is paved similarly to the Sidewalk, or in a way that distinguishes it from the asphalt driving surface.	DR ST RD		
b. Bulb-out Crossing: a crosswalk where bulb-outs on either side of the road shorten crossing distance.	BV AV CS DR ST RD		
c. Speed-hump Crossing: a crosswalk that is raised above the street grade with slopes on either side to slow traffic.	BV AV CS DR ST RD		
d. Raised Pedestrian Bridge: an alternative to crosswalks that lifts the pedestrian above the right-of-way and out of the path of vehicles.	HW BV AV CS		

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TABLE 7X - PRIVATE FRONTAGE FOR SCHOOL BUILDINGS IN SOD

This table regulates the Private Frontage area in front of School buildings for SODs. The different configurations provide a range from open to protected frontage spaces. These configurations correspond with the SOD typology, which suggests three different roles for schools within a neighborhood (see Table SOD-1). These roles are reflected in the interplay between school and public space in the Private Frontage configurations.

In addition to the Transect Zone designations for the Private Frontage types, an additional distinction should be made according to the age of the students that attend the school. Generally, the more open and integrative configurations of the Front Plaza and Front Steps are more appropriate for older students, and may be too open for younger children. On the other hand, the Vestibule and Protected Courtyard options are much more closed, and may be most appropriate for the increased security needs of Elementary School-aged students.

TABLE 7X: Private Frontage for School Buildings in SOD: This table regulates the private frontage for School buildings, which is the area between the School building Facade and the Lot line.

a. Front Plaza: A front plaza for student gathering and socializing that focuses attention inward. Features outdoor furniture and shading.	T2 T3
b. Front Steps: A stepped plaza that encourages student gathering and socializing while focusing attention away from the School building and toward the Public Frontage and right-of-way.	T2 T3
c. Overhang Entrance: A structured awning or cantilevered building provides a sheltered gathering space while maintaining a strong association with the School building. Features outdoor furniture and vegetative buffers.	T3 T4
d. Protected Courtyard: The protected courtyard provides outdoor gathering and socializing space for students that is gated from access to the general public.	T5 T6
e. Vestibule: This configuration adds an enclosed vestibule to the front of the School building, effectively moving the facade closer to the right-of-way and reducing the Private Frontage area.	T5 T6

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TABLE SOD-4 - SCHOOL BUS LOADING ZONES

This table designates School Bus Loading Zones that use space efficiently, minimize interaction between School Buses and pedestrians, and do not dominate School building frontages. It also suggests adjoining Thoroughfare types for which each School Bus Loading Zone is compatible.

Note that the Loading Circle (a) is scaled-down from its conventional version, and is only permissible in low Zransect zones where land area is most abundant. It also requires crossing lines and differentiated Sidewalk paving, and is not open to private vehicles.

Depending on the time requirements for the School's use of these zones for loading and unloading children, they may double as public transit stops or private parking controlled by signage.

TABLE SOD-4: Bus-Loading Zones This table shows general design characteristics of School Bus Loading Zones that are appropriate for SOD sites.

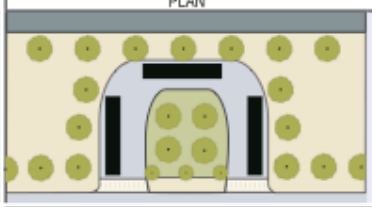
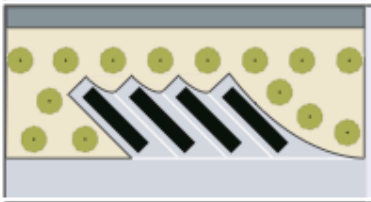
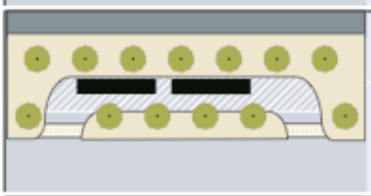
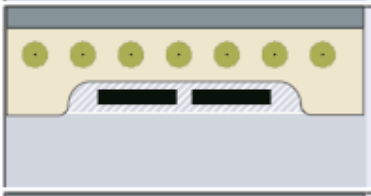
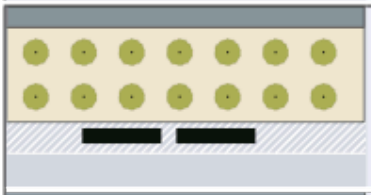
	THOROUGH-FARE TYPES	PLAN
a. Loading Circle: A one-way circular driveway with landscaped island that includes Sidewalk and crossing designation. Dimensions of driveway must accomodate a School Bus's 45-foot turning radius. Queueing for School Bus loading takes place on all outer portions of the circle.	BV AV CS	 T2 T3
b. Diagonal Pull-up: A set of head-first pull-in slots with staggered loading platforms for School Bus loading and unloading. Queueing for School Bus loading takes place on all loading platforms. Should only be used where Design Speed on adjoining Thoroughfare is 35 mph or less.	CS DR ST RD	 T2 T3 T4
c. One-Way Slip: A one-way lane that interrupts the Sidewalk in two places, creating a Sidewalk island that includes crossing designation. Dimensions of slip must accomodate a School Bus's 45-foot turning radius. Queueing for School Bus loading takes place on passenger side of School Bus, separated from pedestrian pathway. Length of the slip may be extended as necessary to accomodate School Bus loading needs.	BV AV CS DR ST	 T3 T4 T5
d. Bus Bay: A loading bay inset in a Sidewalk that allows buses to pull in and out head-first. Sidewalk must be at least 5-feet wide adjacent to inset to allow queueing during loading and unloading.	BV AV CS DR ST RD	 T3 T4 T5
e. Front Bus Lane: A lane (or portion thereof) designated to loading and unloading of School Buses. Signage may be used to indicate times of day when the Front Bus Lane is open to other uses, such as private vehicle parking.	BV AV CS DR ST RD	 T4 T5 T6
f. Bus Alley: One lane (or portion thereof) of a two-way Rear Alley (RA) or Rear Lane (RL) designated for loading and unloading School Buses. School Buses occupy one direction of the alley during pick-up and drop-off times.	RA RL	 T4 T5 T6

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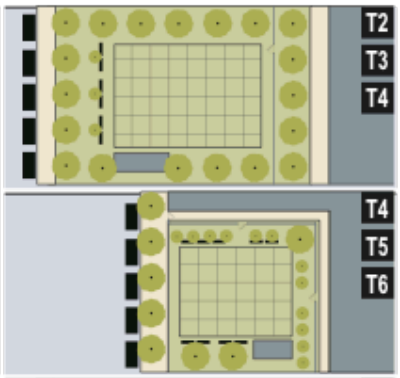
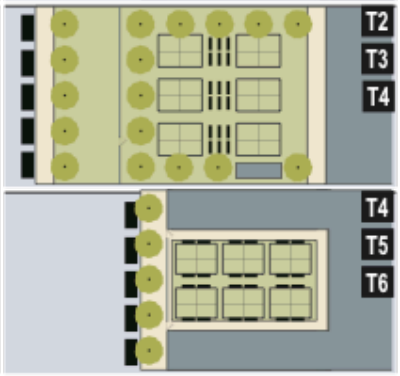
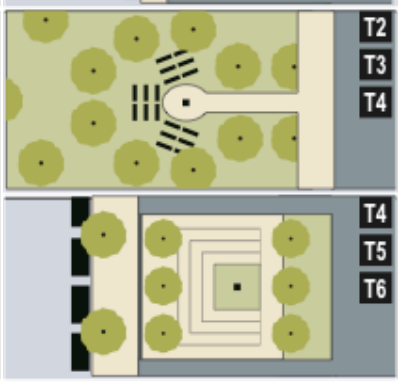
TABLE SOD-5 - OUTDOOR SPACE ELEMENTS

This table details options for a few types of outdoor spaces that are appropriate for SOD sites. Design of these spaces should emphasize opportunities for students to be exposed to fresh air, sunlight, and natural life during the school day.

The three types of open spaces illustrated in Table SOD-5 correspond to the SOD typology, in terms of relationship between school and community (see Table SOD-1).

TABLE SOD-5: Outdoor Space Elements for SOD This table suggests outdoor elements to include on SOD sites. It can be used alone or in conjunction with the SOD typology, and can also be calibrated to the local climate.

a. Community Garden: An area of arable land divided into plots that are available for cultivation by local residents. Plots may be reserved for School or student use. A water source or irrigation should be provided for on-site. A shed for storage of gardening supplies and tools should be provided on-site. The garden area should include benches or other amenities that invite congregation. The garden area should be buffered from Elementary School buildings with a fence, but open to the street. Community gardens should be designed for primary use by both the school and the local community.	
b. Student Learning Garden: An outdoor learning space that is integrated with students' curriculum and/or after-school program to provide hands-on learning experience. Scale, extent, and division of plots is dependent on student body size, age, and needs. Benches or other seating should be available for students to observe demonstrations. A water source or irrigation should be provided on-site. A shed for storage of gardening supplies and tools may be provided on-site. The garden should be buffered from the street with a fence when adjacent to an elementary school. Student learning gardens should be designed primarily for the use of the school; some plots may be reserved for the personal use of students and/or their families.	
c. Outdoor Classroom: A versatile outdoor learning environment that allows for classroom work in a fresh air setting. Both seating and work surfaces should be included. Outdoor furniture should be moveable, in order to accomodate many different learning situations. For a lecturing configuration, students should not face toward an overly active scene, as this can be easily distracting. The learning space should be buffered from noisy thoroughfares. Impermeable surfaces should be kept to a minimum. Outdoor classrooms should be designed for the exclusive use of the school; they can also be used for after-school and weekend activities conducted by the school.	

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ARTICLE 7. DEFINITIONS OF TERMS FOR SCHOOL-ORIENTED DEVELOPMENT

These definitions may be reconciled or revised during local calibration, to match local, regional, or national usage. Standards such as measurements or assigned types should not be mixed with definitions, but should be added to the code text.

If the term does not appear in the calibrated code, it should not be included in the glossary.

ARTICLE 7. DEFINITIONS OF TERMS
SCHOOL-ORIENTED DEVELOPMENT

Bulb-Out Crossing: a type of Protected Pedestrian Crossing in which a bulb-out on either side of a crosswalk shortens the crossing distance. *See Table SOD-3.*

Bus Bay: a School Bus Loading Zone configuration meant to serve School buildings in SOD developments in which a loading bay is inset in a Sidewalk that allows buses to pull in and out head-first. *See Table SOD-4.*

Bus Alley: a School Bus Loading Zone configuration meant to serve School buildings in SOD developments in which one lane (or portion thereof) of a two-way Rear Alley (RA) or Rear Lane (RL) is designated for loading and unloading School Buses. School Buses occupy one direction of the alley during pick-up and drop-off times. *See Table SOD-4.*

Community Garden: an outdoor space element for Schools in SODs in which an area of arable land divided into plots is available for cultivation by local residents and students. *See Table SOD-5.*

Cultural Hub SOD: a type of School-Oriented Development in which partnerships with nearby cultural facilities like museums and theaters provide active learning experiences for students which are built into the curriculum. Can be based on co-location with one instiution or proximity to several instiutions.

Diagonal Pull-up: a School Bus Loading Zone configuration meant to serve School buildings in SOD developments in which a set of head-first pull-in slots with staggered loading platforms is provided for School Bus loading and unloading. *See Table SOD-4.*

Elementary School: a School that serves children aged 5 to 10, usually including kindergarten through fifth grades. Known also as a primary school.

Family School SOD: a type of School-Oriented Development which includes uses on site that cater to the students as well as their families, providing before and after school options for students, their siblings, and parents. Has support services for families only, and is not open to the general public.

Front Bus Lane: a School Bus Loading Zone configuration meant to serve School buildings in SOD developments in which A lane (or portion thereof) is designated to loading and unloading of School Buses. *See Table SOD-4.*

Front Plaza: a Private Frontage type for School buildings in SODs in which A front plaza for student gathering and socializing focuses attention inward. *See Table 7X.*

Front Steps: a Private Frontage type for school buildings in SODs in which a stepped plaza encourages student gathering and socializing while focusing attention away from the School building and toward the Public Frontage and right-of-way. *See Table 7X.*

High School: a School that serves children aged 14 to 18, usually including ninth through twelfth grades.

Loading Circle: a School Bus Loading Zone configuration meant to serve School buildings in SOD developments in which a one-way circular driveway with landscaped island that includes Sidewalk and crossing designation allows School Bus loading and unloading. *See Table SOD-4.*

Middle School: a School that serves children aged 10 to 14, usually including sixth through eighth grades. Known also as a junior high school.

Neighborhood Center SOD: a type of School-Oriented Development in which community uses are integrated on the School site, so that the School serves community interests while additional facilities augment the services tha thte School can provide to students. Serves as, or contributes to , the central Civic Space for a community.

One-Way Slip: a School Bus Loading Zone configuration meant to serve School buildings in SOD developments in which a one-way lane interrupts the Sidewalk in two places, creating a Sidewalk island that includes crossing designation. *See Table SOD-4.*

Overhang Entrance: a private frontage type for School buildings in SODs in which a structured awning or cantilever building provides a sheltered gathering space while maintaining a strong association with the School building. *See Table 7X.*

Outdoor Classroom: an Outdoor Space Element for Schools in SODs in which a versatile outdoor learning environment allows for classroom work in a fresh air setting. *See Table SOD-5.*

Outdoor Space Elements: outdoor space configurations for SODs that are compatible with School sites. *See Table SOD-5.*

Pedestrian Crossing Time: the time that it takes for a pedestrian to walk across a thoroughfare. *See Table 4C.*

Protected Courtyard: a Private Frontage type for School buildings in SODs in which an outdoor portion of the Private Frontage provides outdoor gathering and socializing space for students that is gated from access to the general public. *See Table 7X.*

Paved Crossing: a type of Protected Pedestrian Crossing in which a crosswalk is paved similarly to the sidewalk, or in a way that distinguishes it from the asphalt driving surface. *See Table SOD-3.*

Protected Pedestrian Crossing: a marked walkway for pedestrians to cross thoroughfares, which is controlled by a sign and/or traffic signal. May refer to crossings at intersections or mid-block. *See Table SOD-3.*

Raised Pedestrian Bridge: a type of Protected Pedestrian Crossing in which an alternative to crosswalks lifts the pedestrian above the right-of-way and out of the path of vehicles. *See Table SOD-3.*

School: an educational institution around which a School-Oriented Development (SOD) may be planned, including but not limited to Elementary Schools, Middle Schools, and High Schools.

School Bus: a bus with the primary function of carrying students to school in the morning and home from school in the afternoon.

School Bus Loading Zone: an area within 100 feet of a School building entrance where School Buses park for students to board and deboard the School Bus. Includes a pedestrian area for students to queue when boarding the School Bus.

School Children: the students who attend a School. Within an SOD, School Children are considered primary stakeholders.

School-Oriented Development (SOD): a neighborhood-scale planning strategy that uses a School site as the community center. The objective of an SOD is to integrate

education within a community to advance the educational mission of the School and create collaborative opportunities between the School and the community. An SOD can take many forms, depending on the type of School and the neighborhood context

Speed-Hump Crossing: a type of Protected Pedestrian Crossing in which a cross-walk is raised above the street grade with slopes on either side that slow traffic. *See Table SOD-3.*

Student Learning Garden: an Outdoor Space Element for Schools in SODs in which an outdoor learning space that is integrated with students' curriculum and/or after-school program provides hands-on learning experience. *See Table SOD-5.*

Vestibule: a private frontage type for school buildings in SODs in which an enclosed vestibule is added to the front of the School building, effectively moving the facade closer to the right-of-way and reducing the Private Frontage area. *See Table 7X.*