



Design Review Committee/
School Building Committee
Meeting

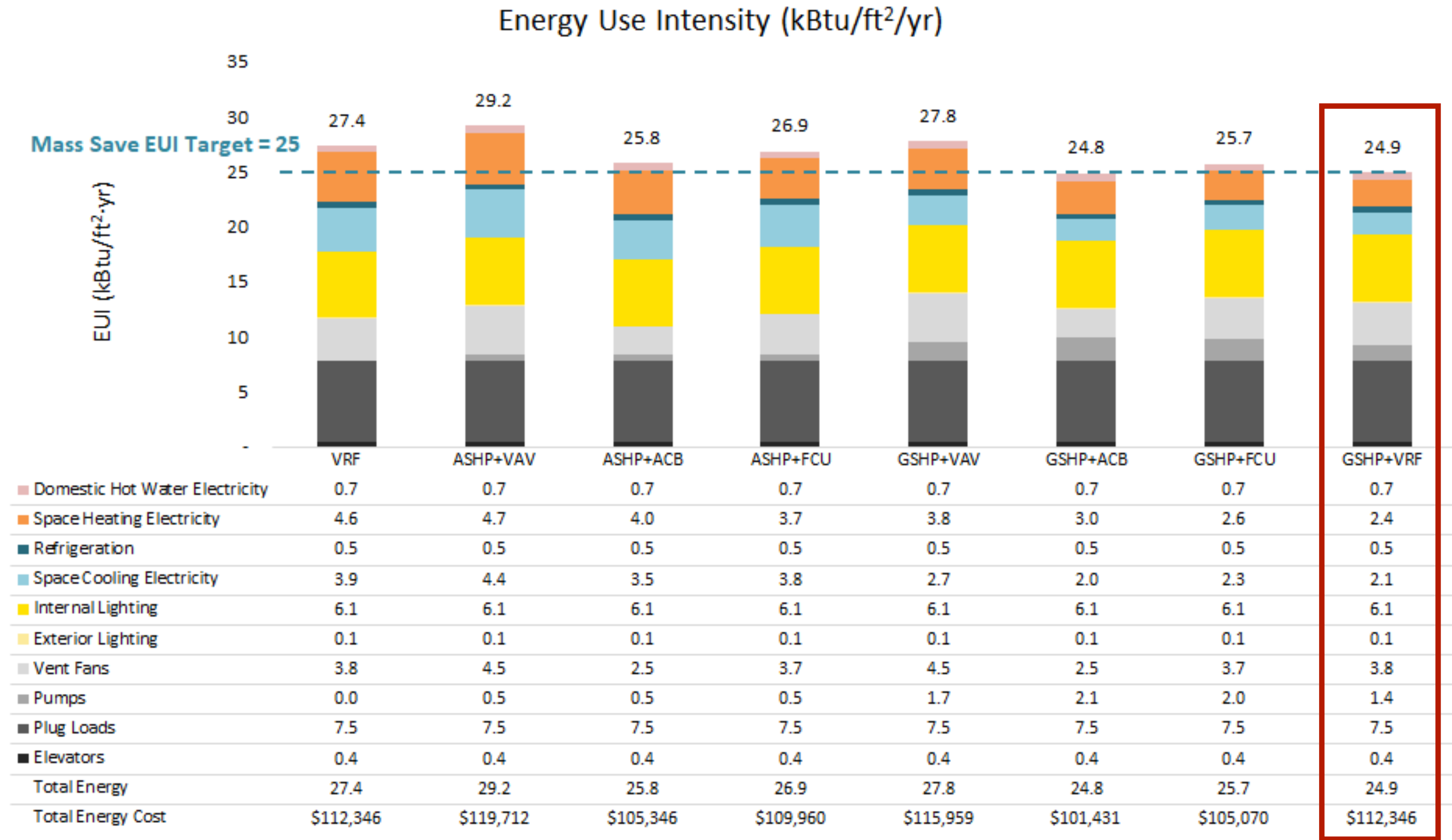
COUNTRYSIDE ELEMENTARY SCHOOL

Newton, MA

Building Systems | HVAC Systems for LCCA

	Central Plant	Air Distribution Side
VRF	Air source VRF outdoor condensing units	ERV with air source VRF fan coil units
ASHP+VAV	Air source heat pump with electric boiler backup	VAV with reheat
ASHP+ACB	Air source heat pump with electric boiler backup	ERV with chilled beams
ASHP+FCU	Air source heat pump with electric boiler backup	ERV with fan coil units
GSHP+VAV	Ground source heat pump	VAV with reheat
GSHP+ACB	Ground source heat pump	ERV with chilled beams
GSHP+FCU	Ground source heat pump	ERV with fan coil units
GSHP+VRF	Ground source heat pump	ERV with water source VRF fan coil units

Building Systems | LCCA Energy Use Intensity



Building Systems | LCCA Summary

System Type	EUI (kBtu/ft ² /yr)	First Cost Before Incentives (\$)	- MassSave Construction Incentives ¹ (\$)	- MassSave Occupancy Incentives ² (\$)	- IRA Tax Credits ³ (\$)	+ Annual Energy Cost (\$)	+ Replacement Cost <i>Net Present Cost</i> (\$)	= 50 yr Life Cycle Cost <i>Net Present Cost</i> (\$)	= Relative LCC compared to VRF <i>Net Present Cost</i> (\$)
VRF*	27.4	\$6,463,230	\$320,281	\$0	\$0	\$112,346	\$19,253,733	\$33,677,041	\$0
ASHP+VAV*	29.2	\$8,242,960	\$207,369	\$0	\$0	\$119,712	\$19,027,531	\$35,886,386	\$2,209,346
ASHP+ACB*	25.8	\$9,179,660	\$244,281	\$0	\$0	\$105,346	\$21,189,751	\$37,889,560	\$4,212,520
ASHP+FCU*	26.9	\$8,992,320	\$244,281	\$0	\$0	\$109,960	\$20,757,307	\$37,609,847	\$3,932,806
GSHP+VAV*	27.8	\$11,666,599	\$947,281	\$0	\$3,499,980	\$115,959	\$17,792,069	\$33,558,080	-\$118,961
GSHP+ACB*	24.8	\$12,339,149	\$1,002,650	\$110,738	\$3,701,745	\$101,431	\$19,101,722	\$34,101,618	\$424,578
GSHP+FCU*	25.7	\$12,153,683	\$947,281	\$0	\$3,646,105	\$105,070	\$18,740,564	\$34,044,949	\$367,909
GSHP+VRF**	24.9	\$9,345,492	\$1,002,650	\$110,738	\$2,803,648	\$101,806	\$13,272,196	\$26,204,171	-\$7,472,870

* Capital costs estimated at Feasibility Study have a design contingency of 15% and escalation of 8.25%

** Capital costs estimated at Schematic Design have a design contingency of 10% and escalation of 7%

1. ASHP+ACB, GSHP+ACB, GSHP+FCU and GSHP+VRF: Pathway 1 (\$2/ft² + HP adder). VRF, ASHP+FCU and GSHP+VAV: Pathway 2 (\$1.25/ft² + HP adder). ASHP+VAV: Pathway 2 (\$0.75/ft² + HP adder).
2. \$1.25/ft² for post occupancy if measured EUI meets target.
3. The 30% Inflation Reduction Act (IRA) federal tax credit for geothermal is an approximation. Newton will need to work with a tax attorney to confirm and secure the federal tax credits.
4. Incentives and EUI are based on an SD conditioned floor area of 73,825 ft².
5. Maintenance cost assumed to be equal in all options (cost neutral).

Design Development | Academic Wing Window Pattern Options



Schematic Design



Design Development | Option 1



Design Development | Option 2 | Preferred Option



Design Development | Option 3

Design Development | Street Entrance Plaza: Option 2



Design Development | Playground Entrance: Option 2



Design Development | Playground Entrance: Option 2



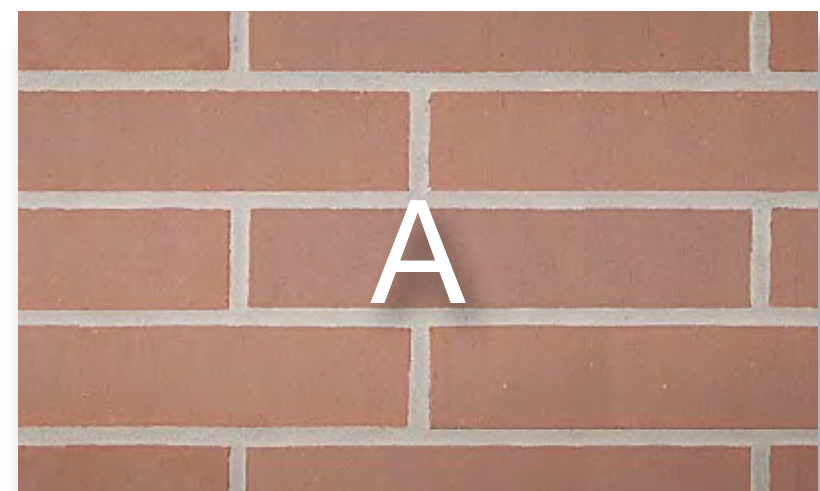
Design Development | Approach from South: Option 2



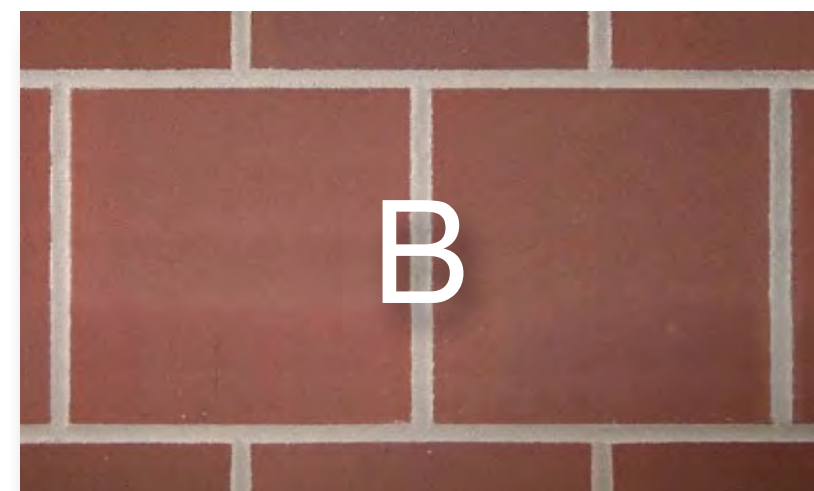
Design Development | Building Overview



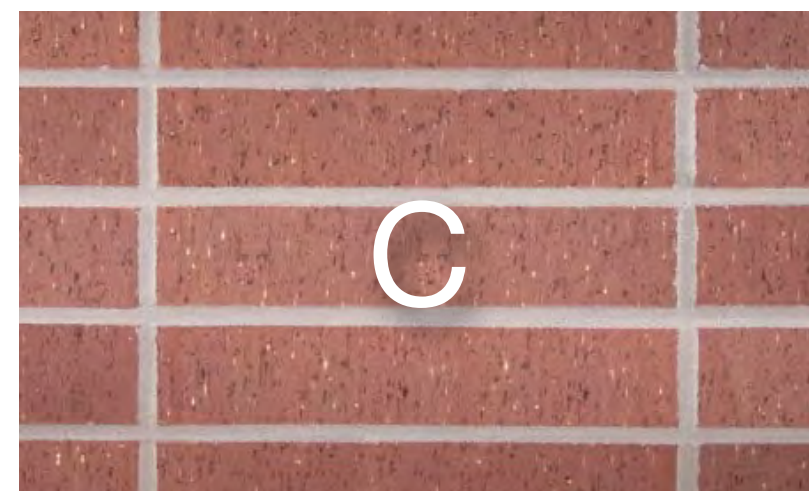
Design Development | Street Entrance Plaza: Building Materials



Norman Brick | Rose Blend



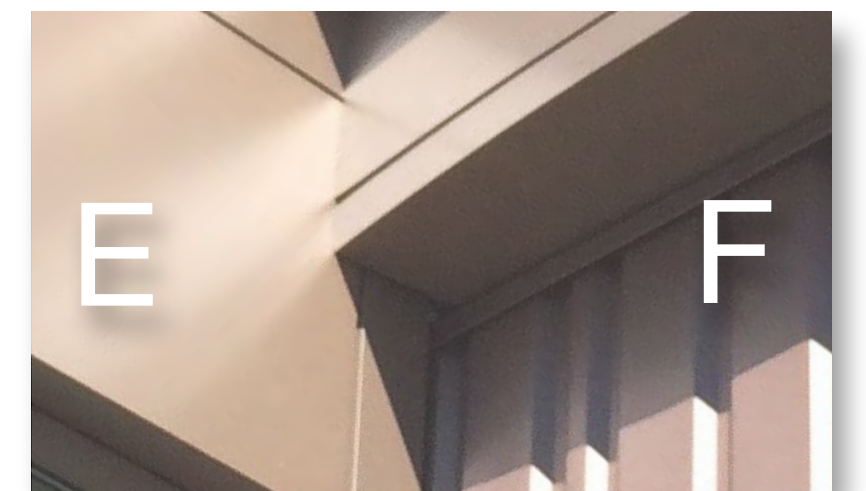
Triple Brick | Burgundy Blend



Norman Brick | Burgundy Velour

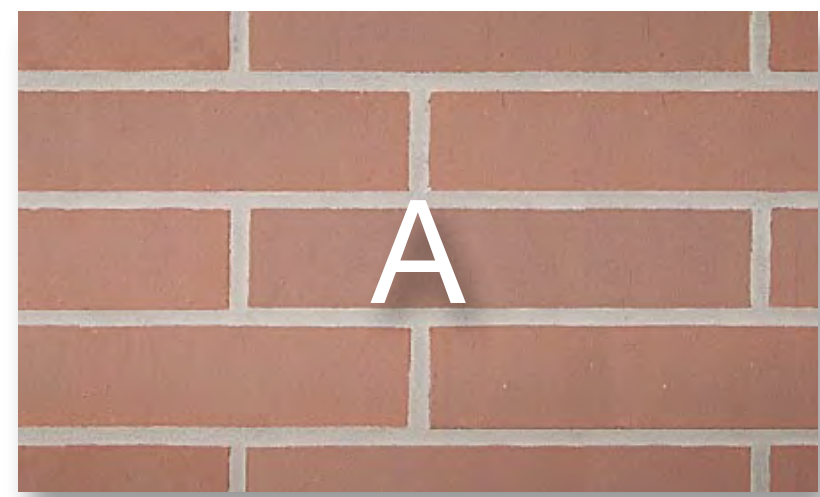


Ground Face CMU | P-107

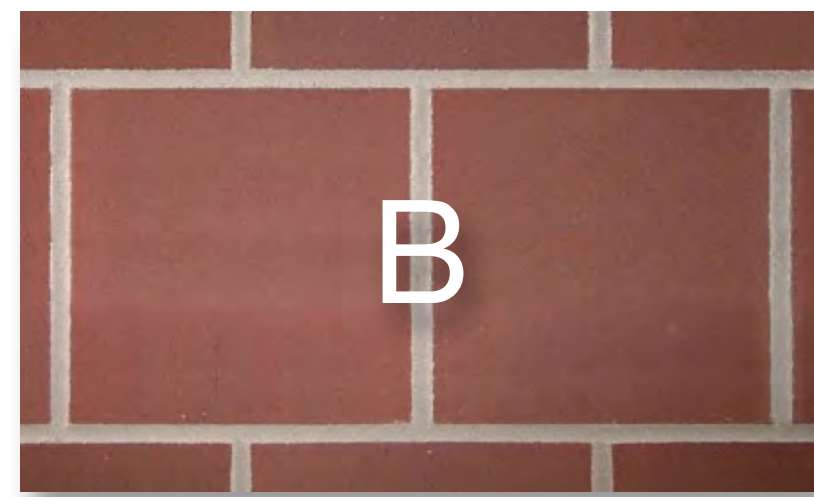


Metal Panel | Champagne Rose

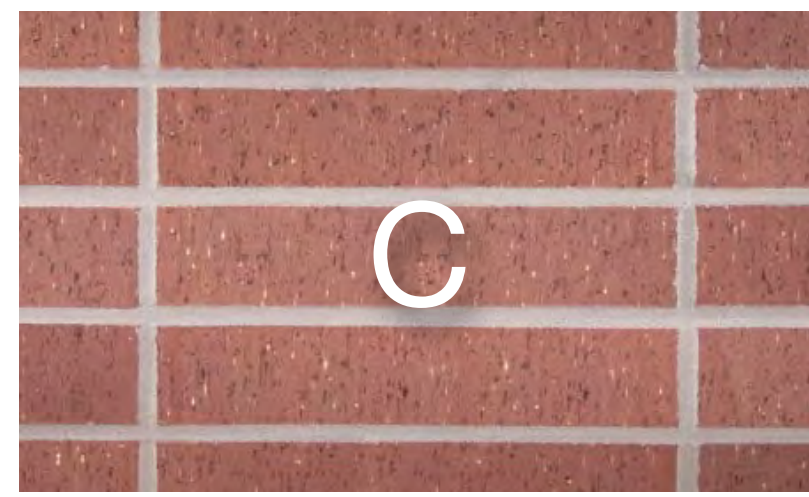
Design Development | Playground Entrance: Building Materials



Norman Brick | Rose Blend



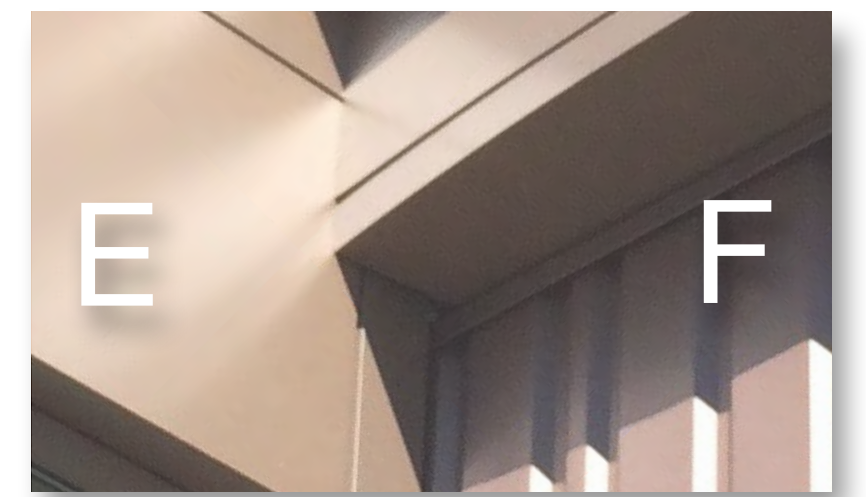
Triple Brick | Burgundy Blend



Norman Brick | Burgundy Velour

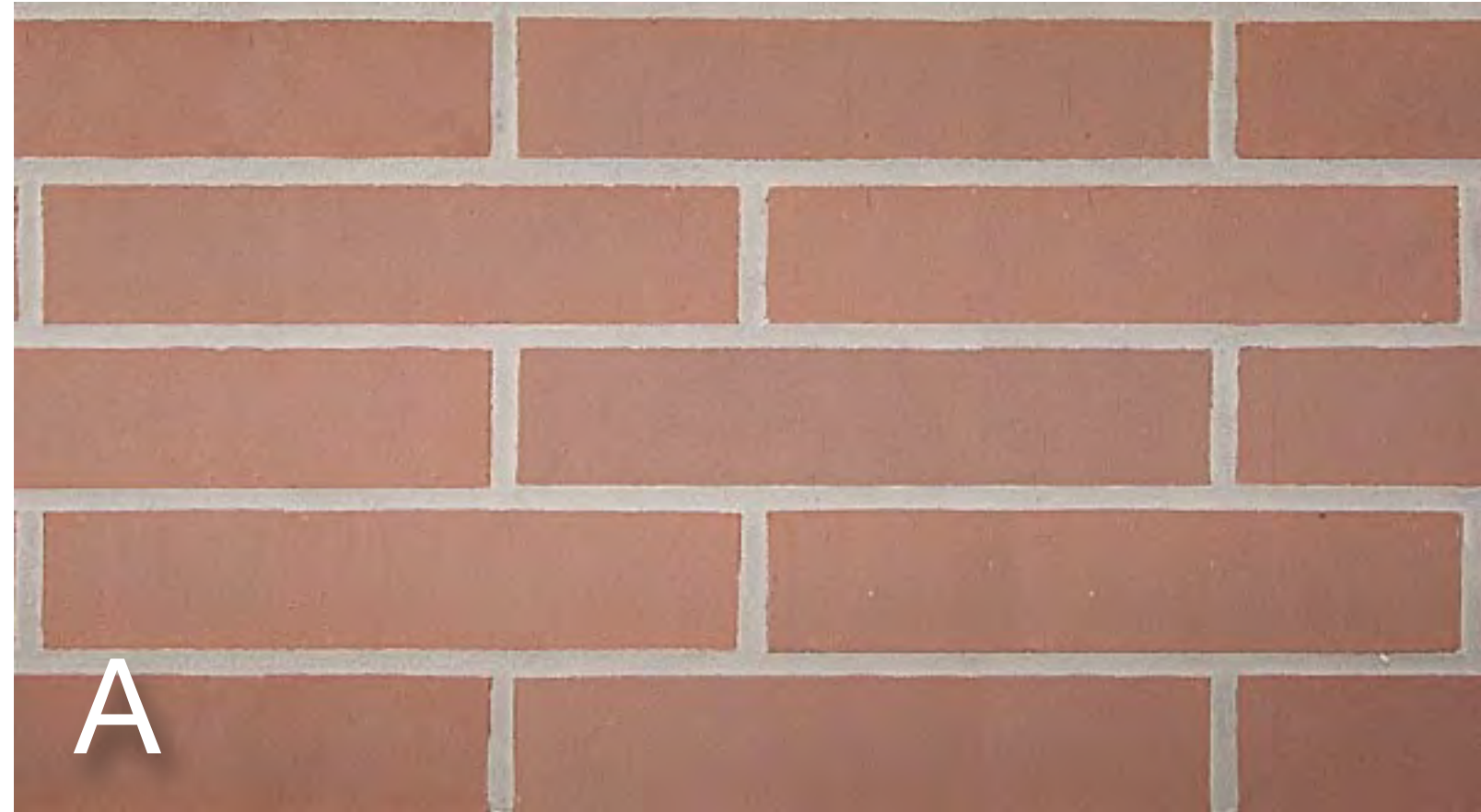


Ground Face CMU | P-107



Metal Panel | Champagne Rose

Exterior Materials | Precedents



Norman-Sized Brick | Endicott Rose Blend Smooth

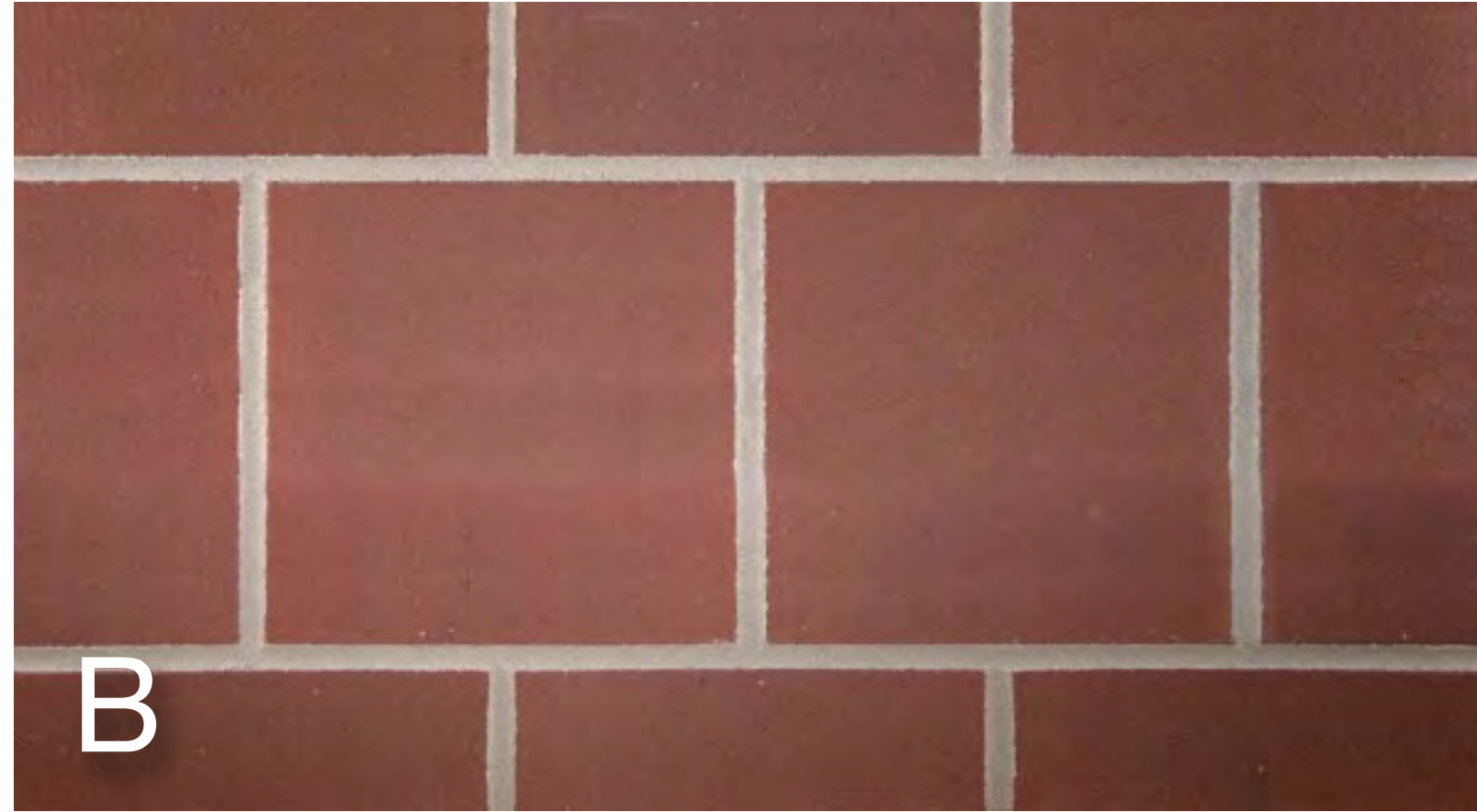


Angier Elementary School | Newton, MA

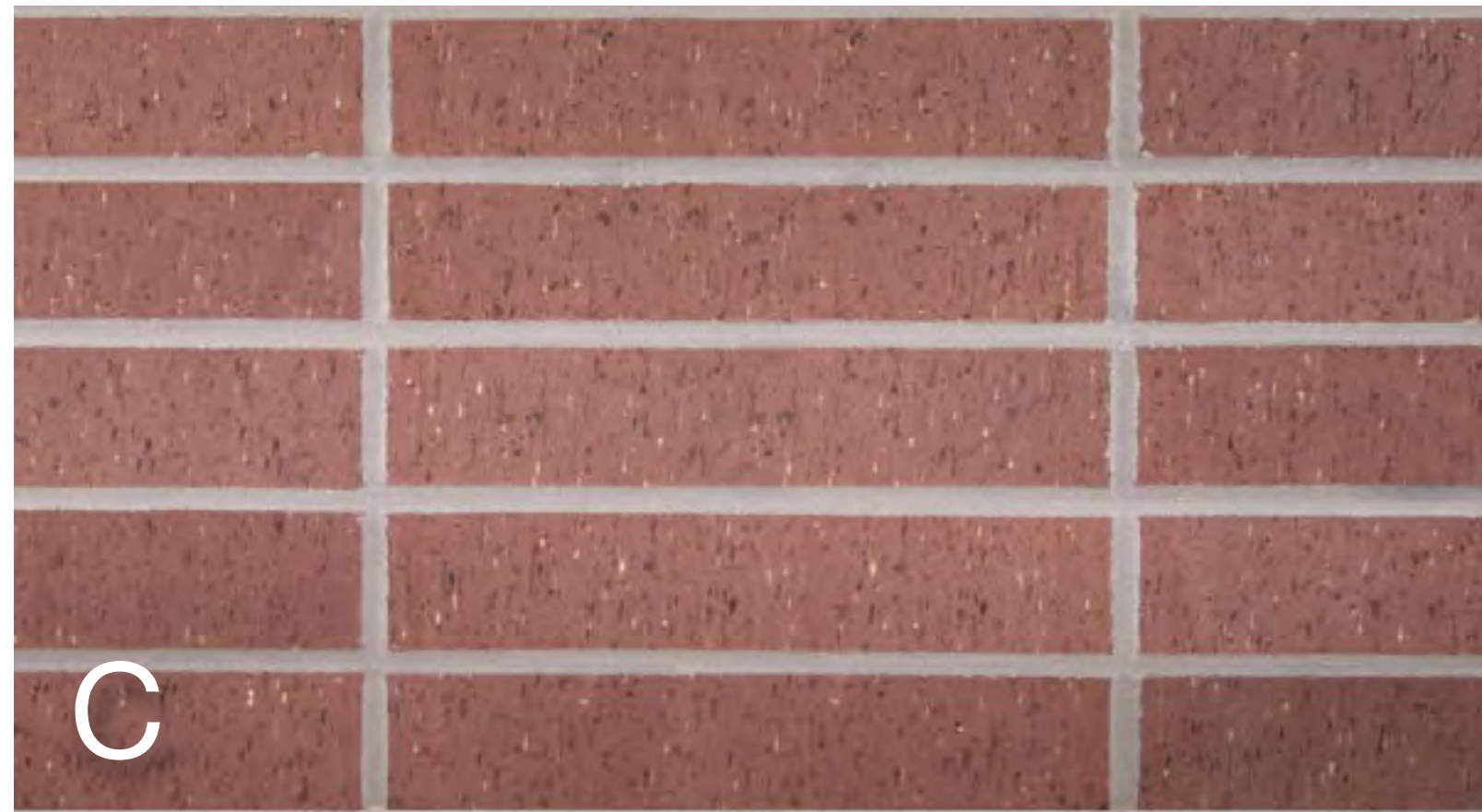


Higgins Middle School | Peabody, MA

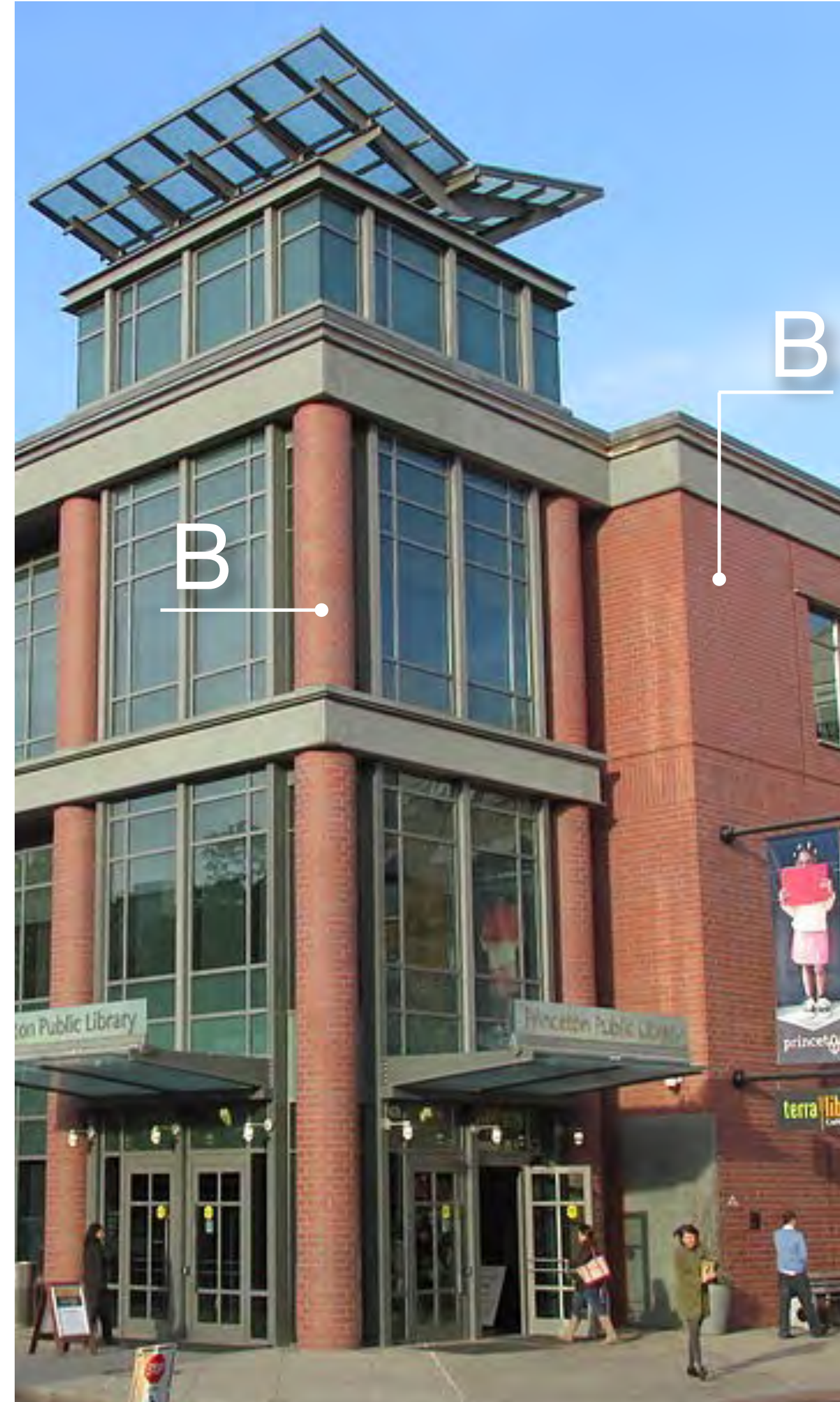
Exterior Materials | Precedents



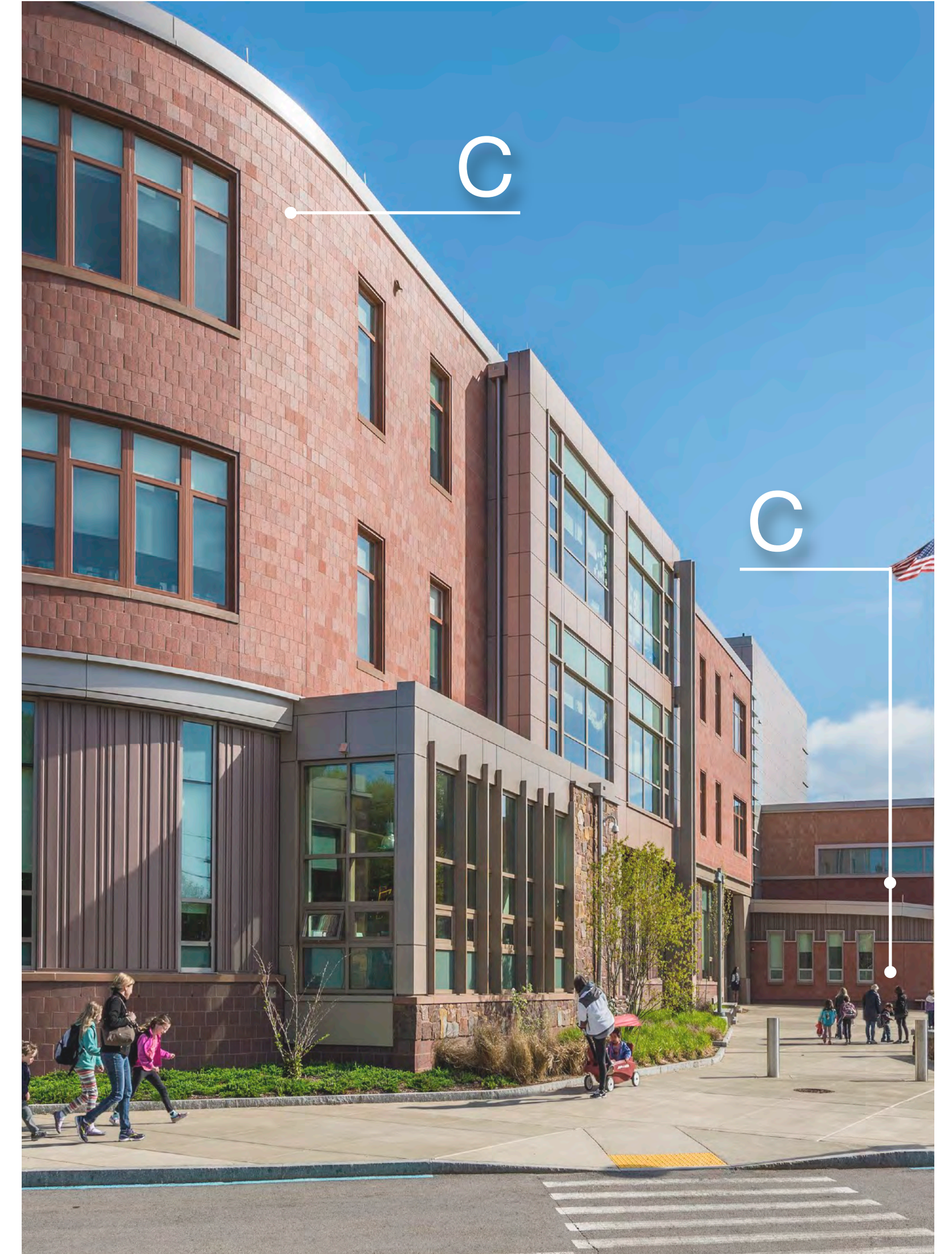
Triple Brick | Endicott Burgundy Blend Smooth



Norman Brick | Endicott Burgundy Blend Velour



Princeton Public Library | Princeton, NJ

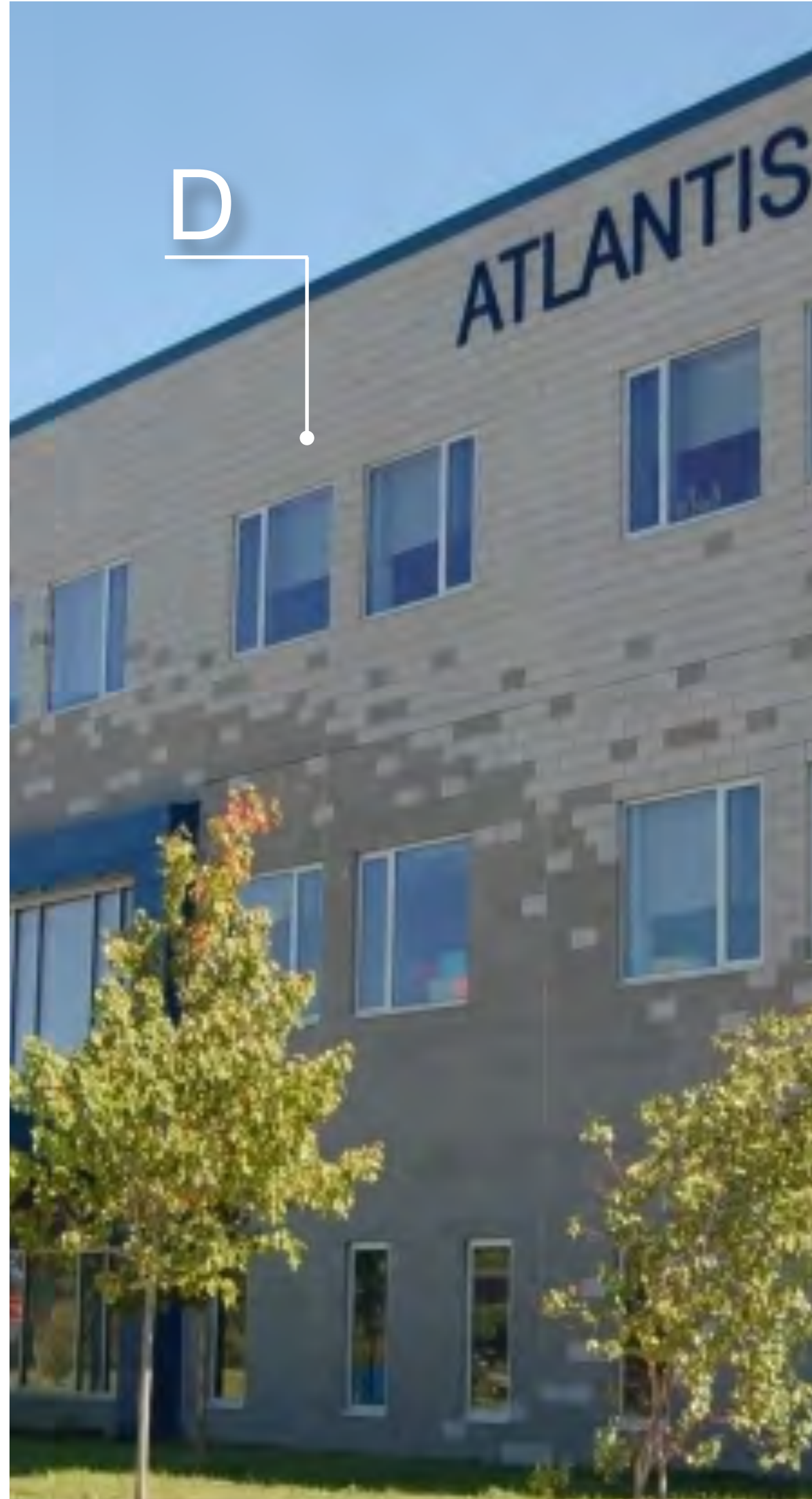


Angier Elementary School | Newton, MA

Exterior Materials | Pattern Precedents



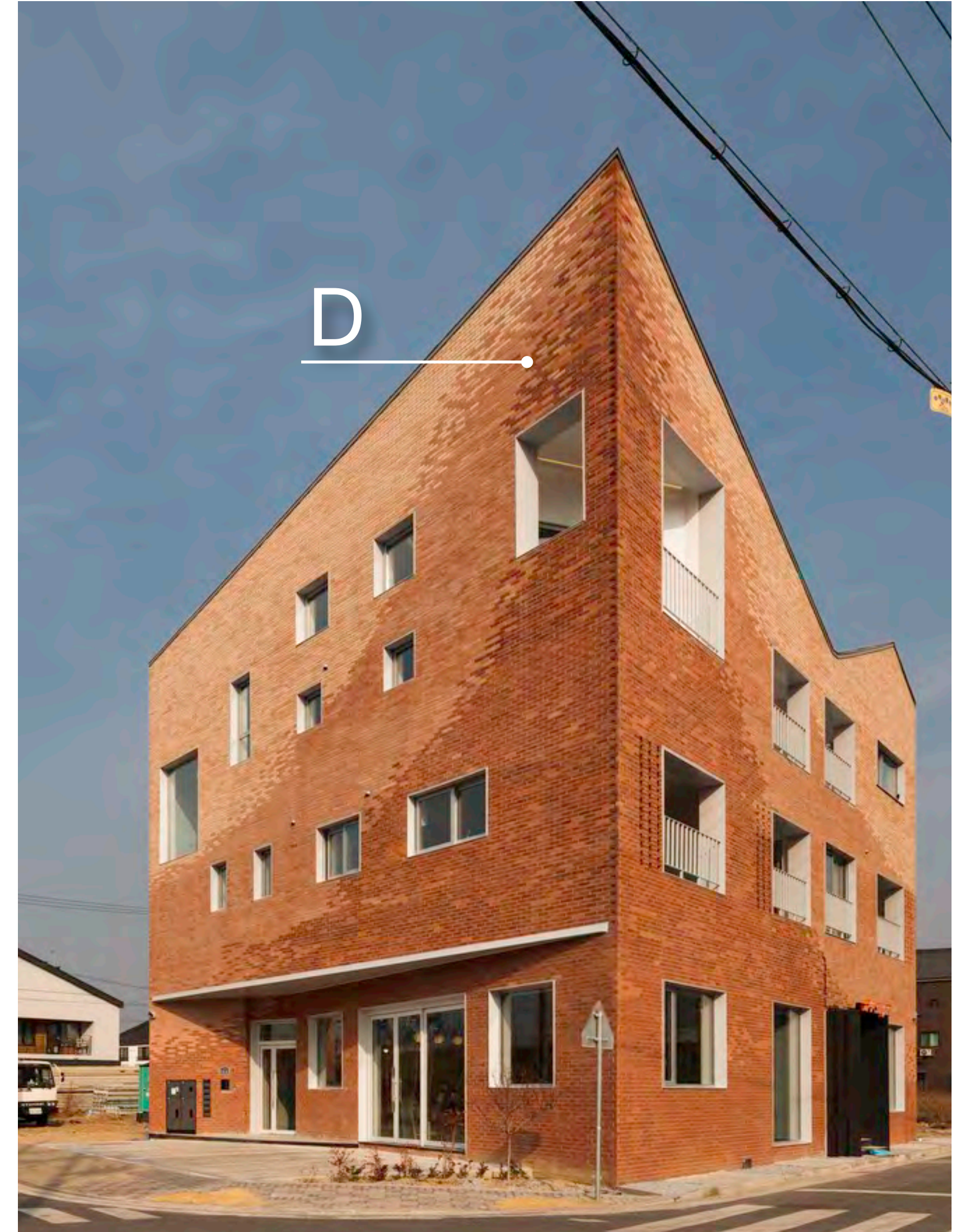
Architectural Ground Face CMU | Jandris P107



Atlantis Charter School | Fall River, MA



Harvard Grad Student Housing | One Western Avenue | Boston, MA



Kinhae Roastery House | Gimhae-Si, South Korea

Exterior Materials | Precedents



Aluminum Composite Metal Panel (E) | Champagne Rose
Single Skin Metal Wall Panel (F) | Champagne Rose



Brightwood-Lincoln Elementary School | Springfield, MA



Angier Elementary School | Newton, MA



Hurd-Wyman Elementary School | Woburn, MA



Design Review Committee/
School Building Committee
Meeting

COUNTRYSIDE ELEMENTARY SCHOOL

Newton, MA