LCi™
Laminated Continuous Wall Insulation

INSTALLATION GUIDE

for New Construction Applications

ThermalStar®
Rigid Insulation

Designing and building instructions for ThermalStar LCi are described in the following manual. General installation, fastening details and instructions must be followed for applicable warranties. Please consult with local building official or code compliance officers for further compliance questions.

NOTE: These instructions do not apply to perforated or fanfold LCi products. Manufactured Housing should refer to in plant installation and transport requirements particular to HUD jurisdiction. Modular home manufacturers may require additional installation details for transport and final home assembly.

ThermalStar LCi was developed to be installed in place of, or over wood sheathing on new construction applications.

SAFETY

Follow all OSHA regulations, safety guidelines and practices. ThermalStar LCi is to be used as exterior sheathing and only as prescribed. Keep away from flame sources and intense heat.

PPE (PERSONAL PROTECTIVE EQUIPMENT) RECOMMENDED

- Safety glasses may be worn to reduce the risk of eye injury or irritation.
- Cut resistant gloves are available to reduce the risk of injury when using knives to cut LCi.
- Respiratory protection is not normally required. If dusts are generated up to 10 times above occupational exposure limits, use a NIOSH-approved particulate respirator (disposable filtering dust mask type) with an efficiency rating of N95 or higher (e.g. 3M's 8210, Moldex 2300).
- LCi is not known to be abrasive or irritating to skin. However, gloves, long sleeved shirt and long pants may be worn, as needed, to prevent skin contact if desired.

STORAGE AND HANDLING

- Standard size product is packaged in 4x8 units. LCi is factory packaged with a plastic shroud and can be stored outside as long as the packaging is intact and free from holes.
- Store LCi elevated from the ground and moist conditions. Do not stack master bundles.

PRODUCT DESCRIPTION & OVERVIEW

ThermalStar LCi is a continuous insulation product with a polymeric film facer on one side, with a reflective facer on the other.

Standard features include:

- LCi is composed of white expanded polystyrene (EPS) bonded to polymeric film facers.
- LCi is available in 15 and 25 psi compressive configurations
- Qualifies as a water resistant barrier with an approved tape and does not typically need an additional layer of felt paper or house wrap.
- LCi is generally installed with standard 3/8" head roofing nails, button cap nails, or wide crown staples flush to outer surface.
- Joint taping is completed with ThermalStar seam tape or equivalent
- Can be considered continuous insulation (ci), either with the walls braced per code, or over OSB sheathing
- LCi is available in 4x8 sheets. Contact Atlas EPS for alternative sizes.
- ThermalStar LCi is 3rd party evaluated for code prescribed water resistant barrier and fire code approvals
- LCi has been tested and approved for use in exterior walls of IBC construction Types I-IV, which may require NFPA285 approval.

LIMITATIONS

- Follow model codes for internal vapor retarder requirements. Class III retarders may require further analysis and adjusted construction assembly.
- Moisture sensitive claddings should be installed with a ventilation gap; this is the best practice for long term cladding durability.
- Install in dry conditions and taped at temperatures above 0°F.
- Hygrothermal evaluations advise the following product R-values per climate zones and residential (IRC) wall construction. See table below:

IRC 2015 Climate Zone	2'x4' Wall Construction				2'x6' Wall Construction			
R-Value	R3	R5	R7.5	R10	R3	R5	R7.5	R10
1, 2, 3 & 4	OK	OK	OK	OK	OK	OK	OK	OK
5	-	OK	OK	OK	-	OK	OK	OK
6	-	OK	OK	OK	-	OK	OK	OK
7 & 8	-	-	-	OK	-	-	-	OK

DESIGNING WITH LCi

- Walls built with LCi should primarily "dry to the inside" as the products are Class II vapor retarders. Class I vapor retarder (<0.1 perm) may be installed on the interior side of the wall system, but this decreases long term ability of the wall to dry should some type of failure occur that allows the cavity to get wet.
- The assembled wall thickness for a 2x4 OSB braced wall built with LCi R5 is 5-1/8" thick when used with a common 2x4 and not including interior gypsum wall board in the calculation.
- Windows can be installed directly over 15 & 25 psi LCi panels following the flashing and nailing details shown in Detail 12. Most window manufacturers can now accommodate continuously insulated wall thicknesses with return jambs for prescribed widths and homes built with drywall returns simply adjust the drywall return dimensions at the site.
- When using full size brick veneer, an 8" thick foundation wall can be used (see Detail 8). Be sure to insulate the interior of the rim joist which will not be covered with LCi, when following this detail.
- With cladding designs that require multiple layers of water resistive barriers such as "3 coat" or traditional hard coat stucco and adhered stone veneers, LCi, when properly taped, may be considered the first layer of two water resistive barriers. Follow all additional flashing directions for the applied exterior cladding.

CONSTRUCTION AND INSTALLATION OF LCi

- Nailers designed to install fasteners flush with foam sheathing are available, or use hand tools for traditional button cap or roofing nails.
- LCi cuts with common circular saws – same as OSB, or more simply with a utility knife.
- The following areas require ThermalStar seam tape or equivalent:
  - Vertical and horizontal seams
  - Vertical and horizontal butt joints
  - All corners
- Large bruises and field damage (cuts in the exterior water resistant barrier) should be repaired with seam tape. Large field damage can be repaired with the application of loose foam secured with seam tape.
- Where a building wrap is used above LCi in the envelope, such as a gable, the wrap should overhang LCi per wrap manufacturer instructions for multi-layer installation, and be taped using wrap manufacturer tape, if required.

BASIC INSTALLATION OVERVIEW

See illustrations for details with siding, brick, decks, stucco and windows

THIS PRODUCT DOES NOT REQUIRE A TRAINED OR CERTIFIED INSTALLER.

Step 1. **Prepare** surface for installation (should be flat, true, dry and clean)
Step 2. **Cut** LCi to size to fit area to be covered.
Step 3. **Fasten** LCi to structure using 3/8″ head galvanized roofing nails, plastic cap nails, or wide crown staples that are long enough to penetrate studs ¾″ minimum when the fastener head is flush with the LCi surface. Space fasteners 12″ OC at the perimeter of LCi, and 16″ OC in the rest of the product. Stud spacing may be 16″ or 24″ OC. Fasteners may be attached to OSB provided OSB is a minimum of 7/16″ thick APA PS2 rated, otherwise fasteners must penetrate to studs ¾″ minimum depth. Fastening thicker products with specialty fasteners is permitted. When installing lathe over the product, the number of LCi fasteners needed may be reduced assuming the lathe fasteners are installed soon after LCi installation.
Step 4. **Seal** edges. Use nominal 3″ width minimum solvent acrylic adhesive backed sheathing tape to seal joints, corners, transitions to adjacent walls, floors, ceilings, or foundation as applicable to area being insulated with LCi. See product approval reports (ULEX R16529.1) and technical bulletins for alternative approved tapes. Gravity lap the tape a few inches, always starting at the bottom of the building envelope and working up the wall. In coastal zones, walls with no internal gypsum, or where LCi is required to resist wind driven rain pressures with no pressure equalization factors provided by other wall layers, fastener penetrations must be taped.
Step 5. **Flash** penetrations. Use flashing tapes such as Grace Vycor, Protectowrap BTXL20, 3M 8067, etc. to flash windows, doorways, pipes, or transitions as needed. Always flash windows by starting with a pan seal of the bottom stud of the sill rough framing to the outside of LCi, then over window flange side jambs, and finally header flashing over window flange (see Detail 12). Gravity lap/terminate thick butyl flashing with thin solvent acrylic adhesive backed sheathing tape such as ThermalStar 007, 3M 8087, Dow Weathermate, etc. Some high pressure windows require caulk under the flange; always respect window manufacturer advice and refer to specific approved LCi assemblies. In most installations, window manufacturer best practices, as typically described for installing the window with building wrap should be observed, with the exception that longer fasteners are used through the flange and foam to the framing, and there will be no flap of housewrap above the header.
Step 6. **Seal** on the interior side for air leakage at all penetrations, especially large penetrations like windows. The best practice for accomplishing this sealing is to use expanding foam sealant or caulk. Air being able to easily move through walls at penetrations allows water to make its way into walls. Air-sealing the interior side of these penetrations helps reduce water intrusion by keeping the wall from being under negative pressure.
Step 7. **Inspect** for damage. Use leftover LCi pieces and tape to repair and seal damage.
Step 8. **Clad** the walls. Select fastener spacing or use furring strips according to manufacturers recommendations and LCi thickness. Refer to section R703.15 of the 2015 IRC for cladding install through LCi.

Application specific installation instructions: Always consult local codes, following are best practices applicable to ThermalStar LCi.

BRACED WALL FRAMING DESIGN

- LCi is not structural like OSB or plywood; walls must be braced using other means such as let-in bracing or structural sheathing. LCi 15 can be used with most mechanical bracing and strapping that is often required for high wind zone and seismic zone design, provided that the instructions for those attachments are followed.

BRICK VENEER

- Brick veneer can be easily installed over LCi. LCi is a water resistive barrier (WRB), but all other flashing details, including weeps and brick ties need to be used as typical without foam sheathing. Brick ties are to be installed per manufacturers instructions (remove LCi layer for direct attachment) or use a brick tie developed specifically for use with a continuous insulation (See Details 6, 7, 8, & 9). In some cases, LCi fasteners can be reduced in lieu of brick tie fasteners.

STUCCO, FAUX STONE

- Traditional or 3 coat stucco, faux thin set stone veneers and other exterior finishes are typically installed with 2 layers of felt paper. This design prescription should be followed and LCi can be considered the first WRB layer. Install a second WRB layer (typically 15# felt or Grade D paper) and metal lathe layers with stone manufacturer prescribed fasteners (see Detail 11).

EXTERIOR INSULATION FINISH SYSTEMS (EIFS, STO, DRYVIT)

- EIFS cannot be applied directly to LCi. EIFS requires a continuous WRB to be installed behind the EPS layer for the warranty to apply. It is suggested that if EIFS is specified on part of a building that uses LCi, un-faced, loose EPS of same thickness can be ordered as a separate sheet and applied over OSB per the installation instructions of the EIFS supplier.

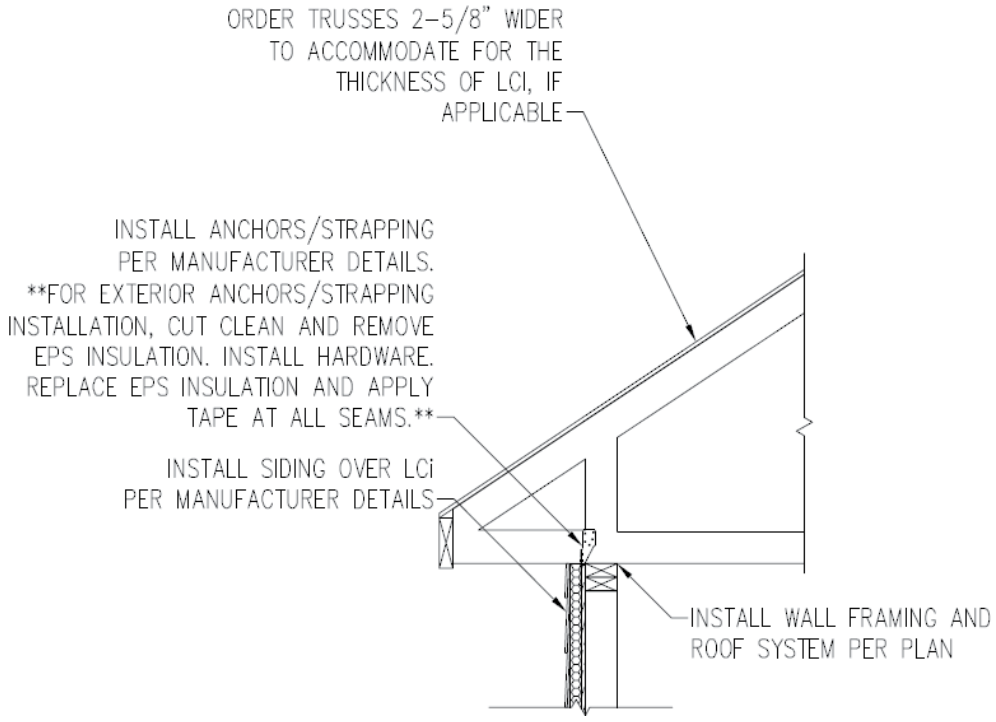
TYPICAL STRUCTURAL ATTACHMENTS (HURRICANE STRAPS, PORTAL FRAMING, LEDGER BOARDS)

- All "structural" attachments require direct contact and attachment to the structural components under the LCi foam sheathing. For these details, remove the LCi where the attachment occurs with a razor knife, secure the attachment, replace the LCi if possible, and seal with tape.

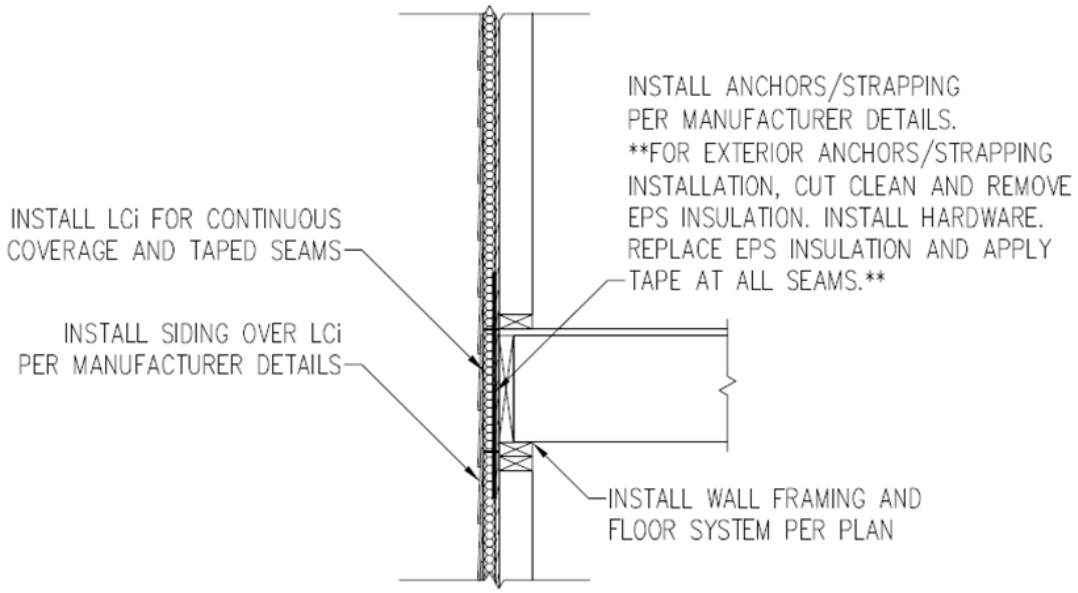
FLUSH DETAILS

- Not all parts of a structure are typically insulated, such as exterior garage walls or a gable attic wall (see Detail 5). In these cases, it is not necessary to install LCi, but it is necessary to provide a flush surface for exterior finishes to mate.

DETAIL 1: **TYPICAL WALL SECTION AT ROOF TRUSS WITH SIDING**



DETAIL 2: **TYPICAL WALL SECTION AT FLOOR DECK WITH SIDING**



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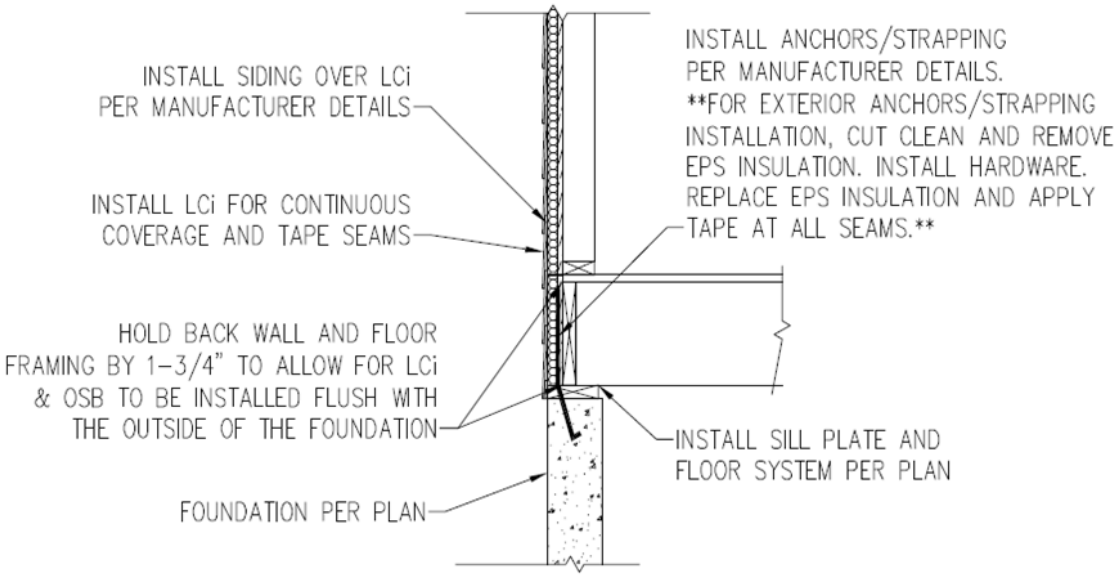
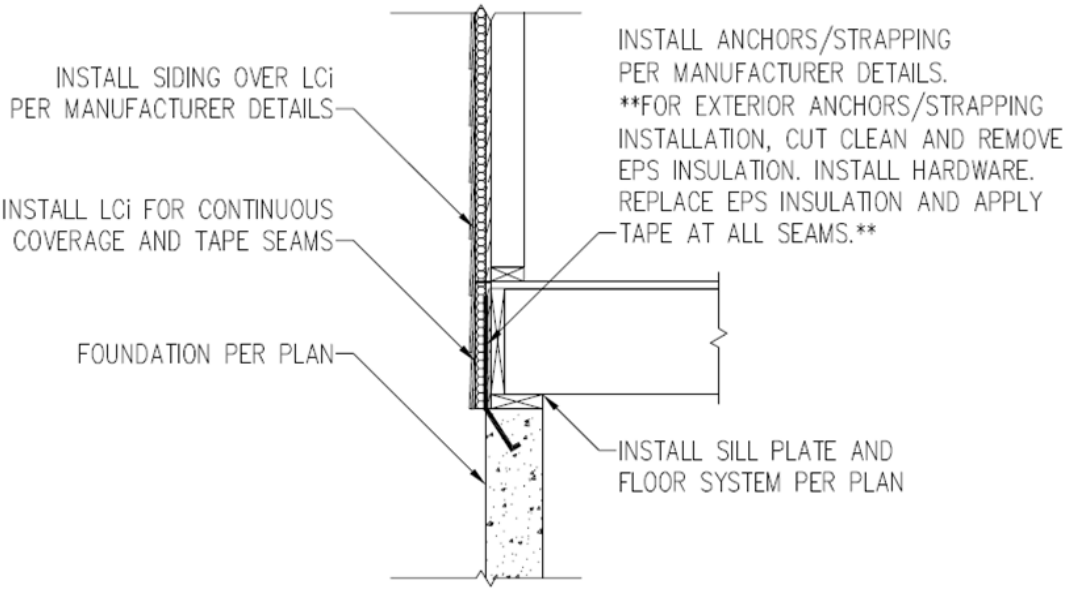
DETAIL 3: **TYPICAL WALL SECTION AT FOUNDATION SIDING FLUSH WITH FOUNDATION**



DETAIL 4: **TYPICAL WALL SECTION AT FOUNDATION WITH SIDING**



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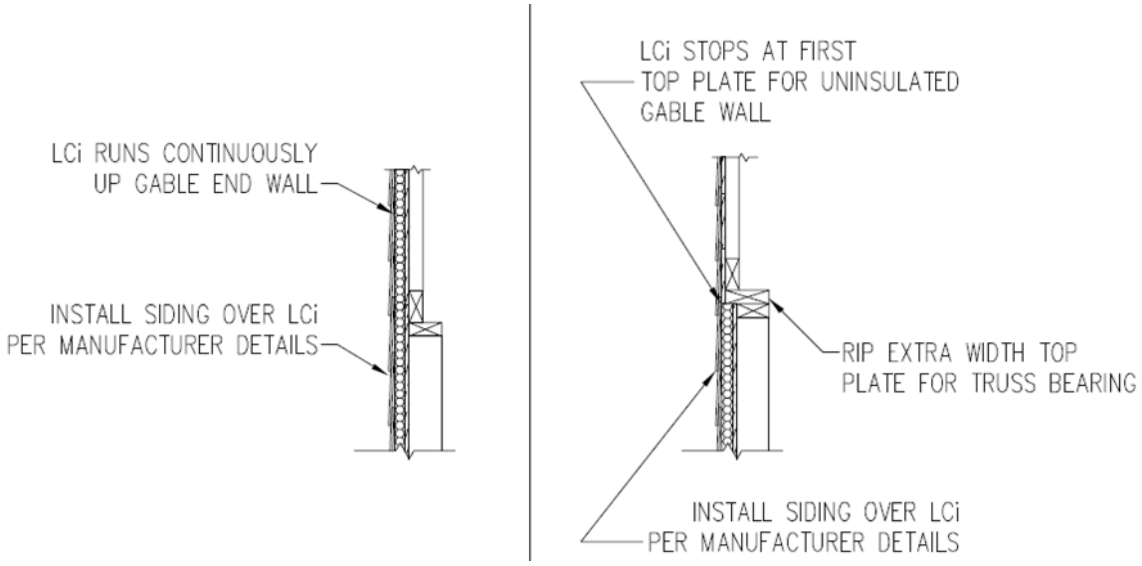
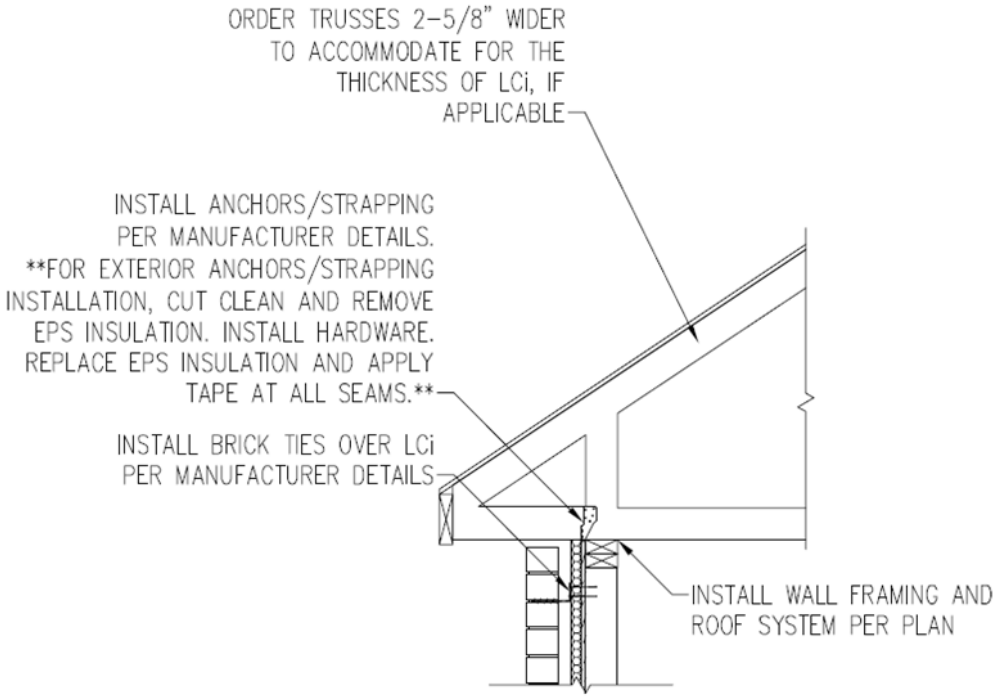
DETAIL 5: OPTIONAL WALL SECTIONS GABLE END WALL AT ROOF TRUSS WITH SIDING



DETAIL 6: TYPICAL WALL SECTION AT ROOF TRUSS WITH BRICK



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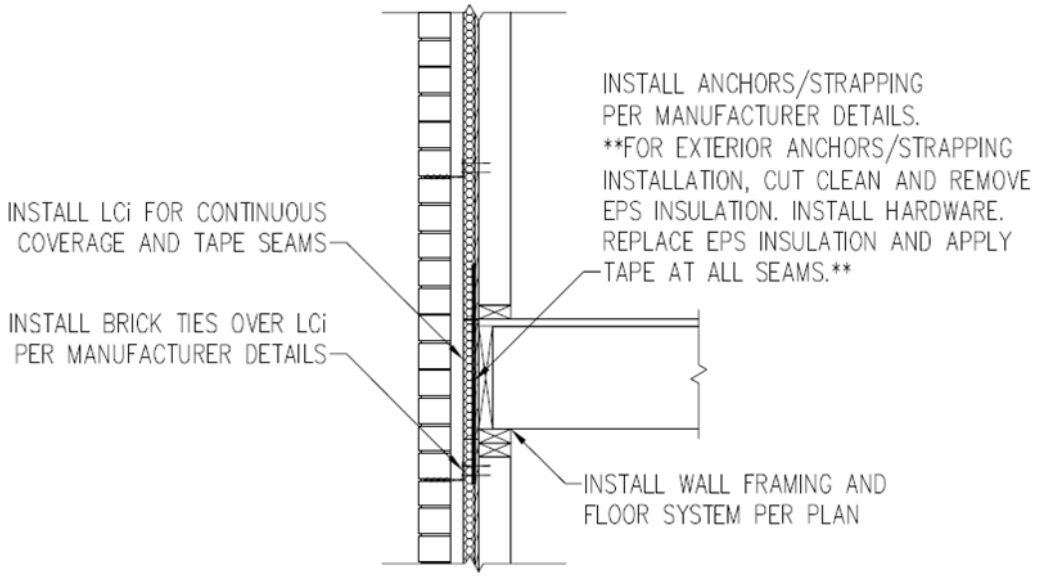
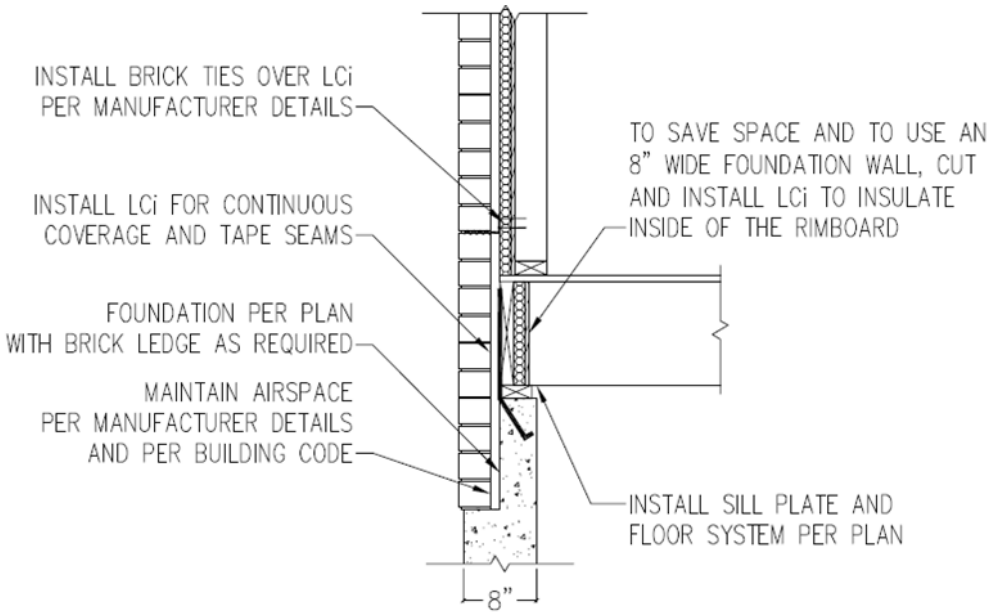
DETAIL 7: **TYPICAL WALL SECTION AT FLOOR DECK WITH BRICK**



DETAIL 8: **TYPICAL WALL SECTION AT 8" FOUNDATION WITH BRICK**



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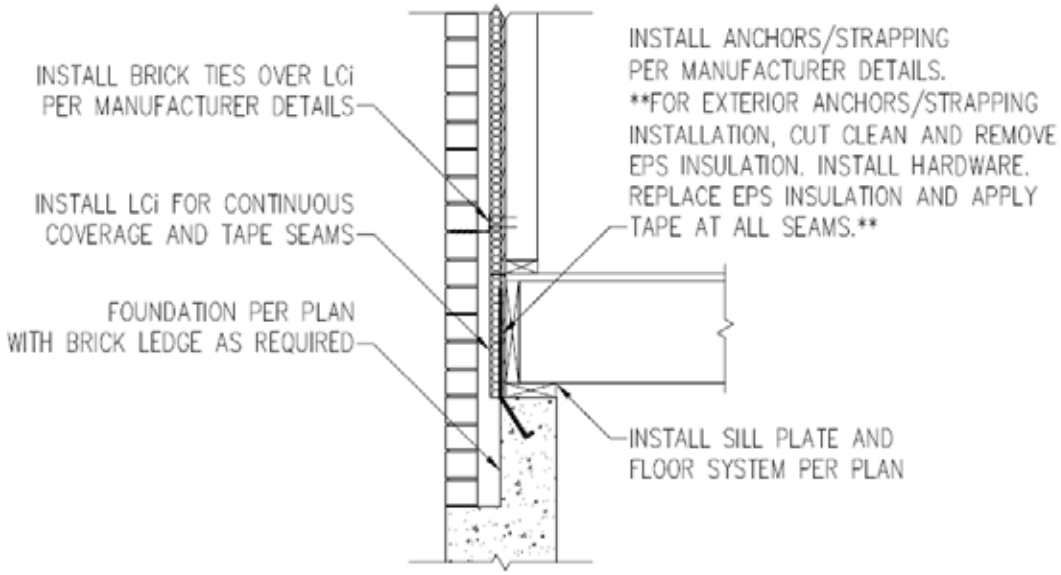
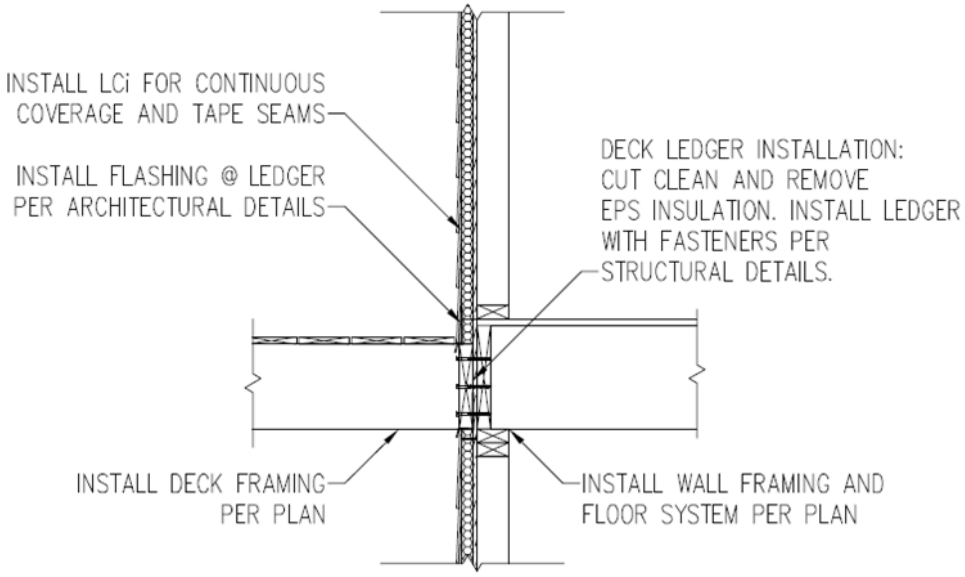
DETAIL 9: **TYPICAL WALL SECTION AT FOUNDATION WITH BRICK**



DETAIL 10: **TYPICAL WALL SECTION AT EXTERIOR DECK**



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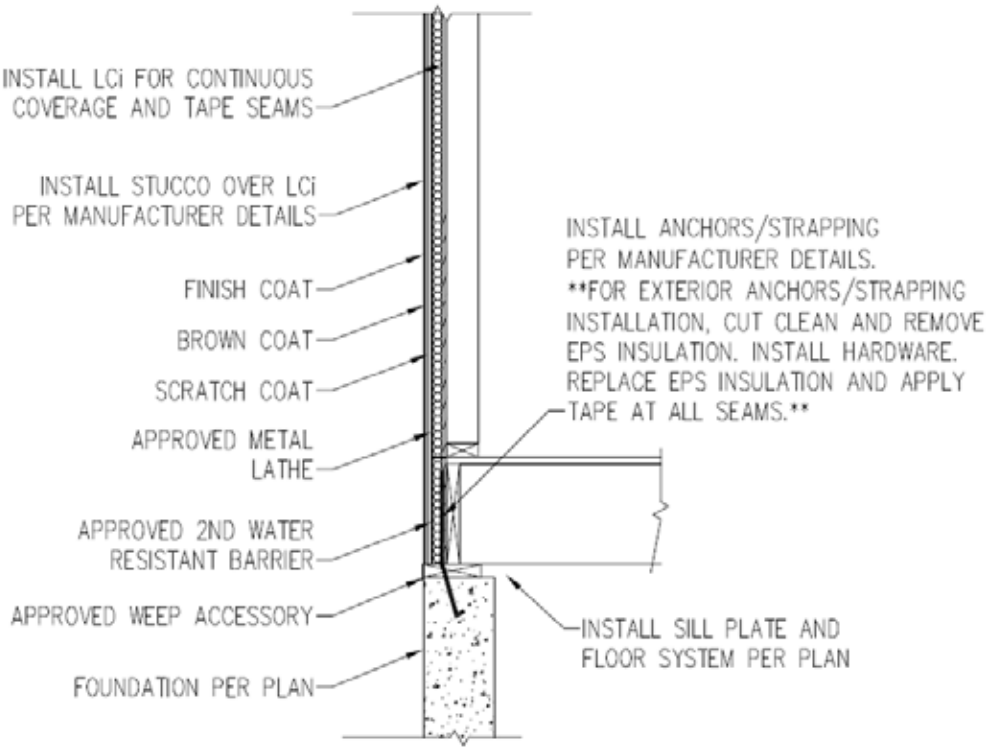
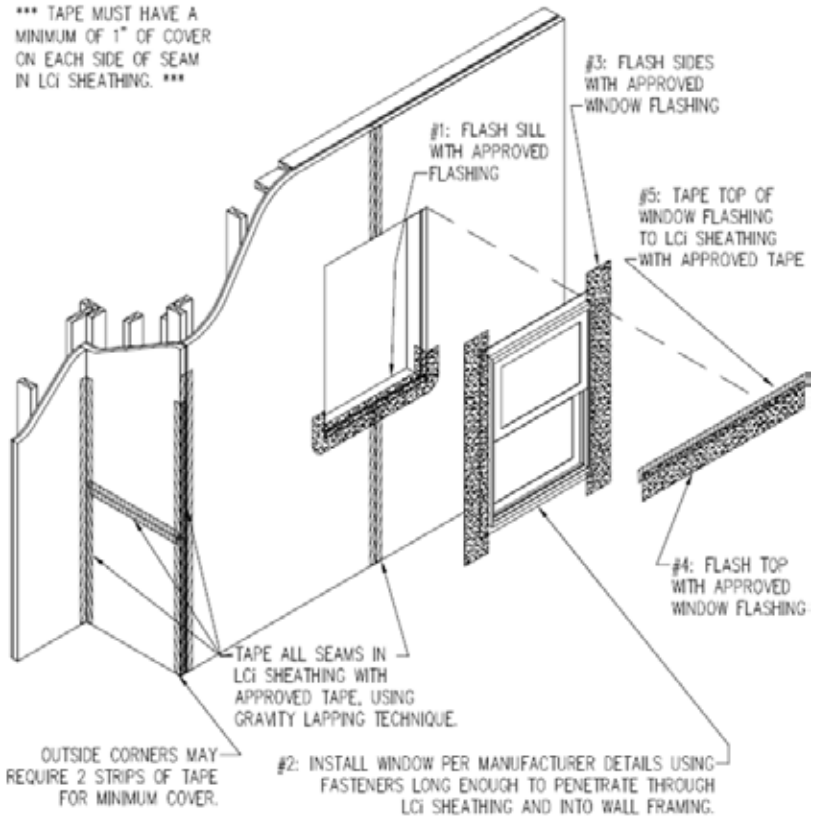
DETAIL 11: **TYPICAL WALL SECTION AT FOUNDATION- 3 COAT STUCCO**



DETAIL 12: **TYPICAL TAPING AND WINDOW INSTALLATION DETAILS**



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WARNING: This product is combustible and will burn. Maximum use temperature is 165°F. Care must be taken to maintain separation distance from heat sources, furnace ducts, chimneys, hot water pipes, etc as provided for combustible materials in the building codes. Consult local code requirements for specific restrictions. This product is a foam plastic product and must be separated from the interior occupied space by an approved thermal barrier such as ½" gypsum sheathing, except as specifically permitted without a thermal or ignition barrier as described in Underwriters Laboratories evaluation report ER.16529-01. Local codes and Authorities Having Jurisdiction (AHJ) should be consulted and have ultimate determination of product fitness for use and restrictions that may apply. The most current version of this document can be found at www.ThermalStar.com/Products.

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