HIGH PERFORMANCE ATTRIBUTES

- Architectural
- Structural
- Energy
- Fire
- Sound
- Moisture
- Air

FOR ADDITIONAL INFORMATION ON HIGH PERFORMANCE ATTRIBUTES OF MASONRY WALLS, SEE "MASS BENEFITS"

INDEX – 8" SINGLE WYTHE CMU

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A-13 INSULATION OPTIONS FOR INTERIOR SURFACE OF EXTERIOR WALL
A-14 UPPER WALL / LOW ROOF FLASHING DETAIL

NOTES

1) MOISTURE MANAGEMENT: THIS SET OF DETAILS CALLS FOR THE USE OF AN INTEGRAL WATER REPELLENT (IWR) ADDED TO BOTH THE UNITS AND THE MORTAR. ADDITIONALLY, AFTER CLEANING A COMPATIBLE, BREATHABLE, FIELD-APPLIED WATER REPELLENT SHALL ALSO BE FIELD APPLIED.

2) JOINT TOOLING SHOULD BE PERFORMED ONLY WHEN THE MORTAR IS "THUMBPRINT HARD". THE TIME OF TOOLING IS ESPECIALLY IMPORTANT FOR MORTAR AND UNITS CONTAINING INTEGRAL WATER REPELLENTS.


4) THIS SET OF DETAILS WILL RESULT IN A WALL WITH THREE CONTROL LAYERS: THERMAL, AIR AND MOISTURE. (SEE SHEETS A-12 AND A-13 FOR ADDITIONAL INFORMATION). MOST DETAILS SHOWN IN THIS SET ARE FOR A "SEMHEATED BUILDING" DEPICTING ONLY CELL FILL INSULATION. IN CONTRAST, SHEETS A-8.1 AND A-8.2 DEPICT RIGID INSULATION AT THE INTERIOR SURFACE OF THE MASONRY WALL, WHICH CAN BE PART OF A COMPLIANCE OPTION FOR HEATED BUILDINGS.

5) FOR PLACING CONTROL JOINTS (CJs), TWO OPTIONS ARE AVAILABLE:
A) AWAY FROM THE OPENINGS (PREFERRED): SEE SHEETS A-10.1, AND A-10.2

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TOOL MORTAR JOINT TO A CONCAVE PROFILE

INTEGRAL WATER REPELLENT (IN CMU AND MORTAR) AND A POST-CLEANING FIELD APPLIED WATER REPELLENT

INSULATION (FOAM, LOOSE FILL OR INSERTS)

PAINT (CAN FUNCTION AS AN AIR BARRIER, SEE SHEET A-12.1, NOTE #2)

LADDER-TYPE HORIZONTAL JOINT REINFORCEMENT SPACED @ 16" O.C.

EXPANSION JOINT MATERIAL

CONCRETE SLAB

DRAINAGE MATERIAL

PAN FLASHING SYSTEM (WEEP INSTALLED FLUSH)

CMU GROUTED SOLID BELOW GRADE

SLOPE

NOTE: TOP OF CONCRETE SLAB TO BE ABOVE PAN FLASHING, BOTH OF WHICH ARE TO BE ABOVE FINISH GRADE.
NOTES:
1) LINTEL UNITS AND OPEN BOTTOM UNITS ARE NOT AVAILABLE WITH SPLIT-FACE CMU, THEREFORE
   THE DETAIL SHOWS A SMOOTH FACE UNIT.

2) UNPROTECTED ALUMINUM DOOR AND WINDOW FRAMES CAN INTERACT WITH CEMENT-BASED
   MATERIALS AND INCUR DAMAGE, SEE PCA
   "ALUMINUM FRAMES IN MASONRY WALLS"
   FOR RECOMMENDATIONS.
   http://www.cement.org/for-concrete-books-
   learning/materials-applications/masonry/
   construction/aluminum-frames-in-masonry-walls

ISOMETRIC VIEW

SECTION VIEW

SHORT SPAN
MASONRY LINTEL
(PREFERRED DETAIL)
NOTES:
1) CONTINUE PAN FLASHING SYSTEM A MINIMUM OF ONE CELL BEYOND BOTH JAMB EDGES OF THE OPENING.
2) UNPROTECTED ALUMINUM DOOR AND WINDOW FRAMES CAN INTERACT WITH CEMENT-BASED MATERIALS AND INFLICT DAMAGE. SEE PCA “ALUMINUM FRAMES IN MASONRY WALLS” FOR RECOMMENDATIONS.

ISOMETRIC VIEW

SECTION VIEW

8" CMU

LADDER-TYPE HORIZONTAL JOINT REINFORCEMENT
SPACED @ 16" O.C. AND IN 1ST AND 2ND BED JOINTS
ABOVE PAN FLASHING FROM C.J. TO C.J. (SEE SHEET A-10.2)

PAINT (CAN FUNCTION AS AN AIR BARRIER, SEE SHEET A-12.2, NOTE #2)

DRAINAGE MATERIAL

GROUT CORES AND HEAD JOINTS SOLID

INSULATION (FOAM, LOOSE FILL OR INSERTS)

SHORT SPAN DOUBLE ANGLE STEEL LINTEL

Galvanized Double Angle Steel Lintel

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NOTES:
1) NOTCH ENDS OF PRECAST LINTEL AS REQUIRED FOR VERTICAL REINFORCEMENT.
NOTES:

1) UNI-TL UNITS AND OPEN BOTTOM UNITS ARE NOT AVAILABLE WITH SPLIT-FACE CMU. THEREFORE THE DETAIL SHOWS A SMOOTH FACE UNIT.

2) UNPROTECTED ALUMINUM DOOR AND WINDOW FRAMES CAN INTERACT WITH CEMENT-BASED MATERIALS AND INFER DAMAGE. SEE PCA "ALUMINUM FRAMES IN MASONRY WALLS" FOR RECOMMENDATIONS.

8" CMU

LADDER-TYPE HORIZONTAL JOINT REINFORCEMENT SPACED @ 16" O.C.

PAN FLASHING SYSTEM

GROUT SOLID (IN ONE-LIFT) TOTAL NUMBER OF COURSES REQUIRED PER STRUCTURAL DESIGN (2 COURSES DEPICTED IN THIS DETAIL) (NOTE #1)

PAINT (CAN FUNCTION AS AN AIR BARRIER, SEE SHEET A-12.2, NOTE #2)

INSULATION (FOAM, LOOSE FILL OR INSERTS)

DRAINAGE MATERIAL

LINTEL UNIT (W/ REINF, PER STRUCTURAL DESIGN)

NOTE: MASONRY UNI-TL MAY BE PRECAST OR FIELD ASSEMBLED

SECTION VIEW

ISOMETRIC VIEW

LONG SPAN MASONRY UNI-TL
(PREFERRED DETAIL)

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NOTES:
1) CONTINUE PAN FLASHING SYSTEM A MINIMUM OF ONE CELL BEYOND BOTH JAMB EDGES OF THE OPENING.

ISOMETRIC VIEW

SECTION VIEW

LONG SPAN WIDE FLANGE 8” STEEL LINTEL (W8 SERIES)

NOTE: WITH THIS DETAIL, SOAPS REQUIRE NOTCHING.
NOTES:
1) CONTINUE PAN FLASHING SYSTEM A MINIMUM OF ONE CELL BEYOND BOTH JAMB EDGES OF THE OPENING.
2) UNPROTECTED ALUMINUM DOOR AND WINDOW FRAMES CAN INTERACT WITH CEMENT-BASED MATERIALS AND INCUR DAMAGE. SEE PCA "ALUMINUM FRAMES IN MASONRY WALLS" FOR RECOMMENDATIONS.

LADDER-TYPE HORIZONTAL JOINT REINFORCEMENT
SPACED @ 16" O.C. AND IN 1ST. AND 2ND. BED JOINTS ABOVE PAN FLASHING FROM C.J. TO C.J. (SEE SHEET A-10.2)

8" CMU

INSULATION (FOAM, LOOSE FILL OR INSERTS)

PAN FLASHING SYSTEM

GROUT SOLID (INCLUDING HEAD JOINTS)

FLEXIBLE MEMBRANE FLASHING, FULLY ADHERED

TWO-PIECE FLASHING

SEE ENLARGED DETAIL 6B/A-7

DRAINAGE MATERIAL

PAINT (CAN FUNCTION AS AN AIR BARRIER, SEE SHEET A-12.2, NOTE #2)

SOAPS-NOTCHED AROUND FLANGE (BOTH SIDES)

TWO-PIECE FLEXIBLE ANCHOR IN EACH HEAD JOINT IN EACH SOAP COURSE RECEIVER COMPONENT MECHANICALLY FASTENED THROUGH FULLY ADHERED MEMBRANE FLASHING ON EXTERIOR SIDE OF LINTEL

STEEL BEAM LINTEL ASSEMBLY (CORROSION RESISTANT)

STEEL PLATE

TURN UP FLEXIBLE MEMBRANE FLASHING AS END DAMS (BEYOND)

LONG SPAN WIDE FLANGE 16" STEEL LINTEL
(WS16 SERIES)

NOTE: WITH THIS DETAIL SOAP REQUIRED NOTCHING.
NOTES:

1) CONTINUE PAN FLASHING SYSTEM A MINIMUM OF ONE CELL BEYOND BOTH JAMB EDGES OF THE OPENING.

2) UNPROTECTED ALUMINUM DOOR AND WINDOW FRAMES CAN INTERACT WITH CEMENT-BASED MATERIALS AND INCUR DAMAGE. SEE PCA "ALUMINUM FRAMES IN MASONRY WALLS" FOR RECOMMENDATIONS.
NOTES:
CAUTION SHOULD BE USED WHEN USING EXPOSED METAL DRIP EDGES AT LOCATIONS WITHIN PEDESTRIAN REACH. SEE M.I.M. "EXPOSED METAL FLASHING" BULLETIN FOR ADDITIONAL INFORMATION.

SEALANT FILLET BEAD AT JAMB/SILL INTERFACE

SEALANT AT JAMB/SILL INTERFACE

METAL SILL W/ HEMMED DRIP (BY OTHERS)

TURN UP METAL SILL AT JAMBS (CONCEALED)

PAINT (CAN FUNCTION AS AN AIR BARRIER, SEE SHEET A-12.2, NOTE #2)

GROUT CORES AND HEAD JOINTS SOLID

LADDER-TYPE HORIZONTAL JOINT REINFORCEMENT SPACED @ 16" O.C.

INSULATION (FOAM, LOOSE FILL OR INSERTS)

WINDOW FRAME

SEALANT OVER BACKER ROD

SECTION VIEW

ISOMETRIC VIEW

METAL SILL
ENLARGED FLASHING DETAIL
AT WIDE FLANGE STEEL LINTELS

ENLARGED FLASHING DETAIL
AT NARROW FLANGE STEEL LINTELS

NOTE: THIS DETAIL PERTAINS TO
STEEL LINTELS W/ FLANGE WIDTHS
OF 5 1/4" TO 5 1/2". FOR NARROW
FLANGE WIDTHS, SEE DETAIL 6A.

NOTE: TURN UP FLEXIBLE MEMBRANE
FLASHING AS END DAMS AT
BOTH ENDS OF STEEL BEAM

(CMU NOT SHOWN FOR CLARITY)

FLEXIBLE MEMBRANE
FLASHING, FULLY ADHERED

ANCHOR (SHOWN ON THIS
SIDE ONLY FOR CLARITY)

RECEIVER COMPONENT
OF TWO-PIECE FLEXIBLE
ANCHOR MECHANICALLY
FASTENED THROUGH FULLY
ADHERED MEMBRANE
FLASHING ON EXTERIOR FACE

1 1/2" MINIMUM LAP

6B
A-5

METAL Drip
w/ HEMMED
EDGE

SEALANT

ENLARGED TWO-PIECE FLASHING DETAIL

FLEXIBLE MEMBRANE
FLASHING, FULLY ADHERED

METAL Drip
w/ HEMMED
EDGE

1 1/2" MINIMUM LAP

6C
A-5

ANCHOR (SHOWN ON THIS
SIDE ONLY FOR CLARITY)

RECEIVER COMPONENT
OF TWO-PIECE FLEXIBLE
ANCHOR MECHANICALLY
FASTENED THROUGH FULLY
ADHERED MEMBRANE
FLASHING ON EXTERIOR FACE

6A
A-5
1) This detail only applicable to a reinforced wall due to flashing/bond break concerns.
MASONRY CONTROL JOINT - MICHIGAN DETAIL

CONTINUOUS HORIZONTAL STEEL REINFORCEMENT

CONTROL JOINT

GRAFT BOND BEAM UNITS SOLID, CONTINUOUS

RAKE JOINT TO RECEIVE SEALANT, BOTH SIDES

BOND BEAM UNITS (OMIT C.J. AT BOND BEAM)

MASONRY CONTROL JOINT @ CONTINUOUS BOND BEAM DETAIL (PER STRUCTURAL REQUIREMENTS)

DISCONTINUE HORIZONTAL JOINT REINFORCEMENT @ CONTROL JOINT

#15 FELT BOND BREAKER, FIT TIGHT TO CORE FACE

GROUT OR MORTAR

CONTROL JOINT

RAKE JOINT TO RECEIVE SEALANT, BOTH SIDES

MASONRY CONTROL JOINT - ALTERNATE DETAIL

DISCONTINUE HORIZONTAL JOINT REINFORCEMENT @ CONTROL JOINT

PREFORMED CONTROL JOINT

CONTROL JOINT

LEAVE JOINT OPEN TO RECEIVE BACKER ROD AND SEALANT, BOTH SIDES

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NOTES:

1) TRADITIONALLY, CONTROL JOINTS HAVE TYPICALLY BEEN LOCATED AT OR VERY CLOSE TO THE SIDES OF UNREINFORCED OPENINGS. HOWEVER IT IS THE MIM'S PREFERENCE FOR CONTROL JOINTS TO BE LOCATED AWAY FROM THE EDGE OF OPENINGS AND TO ADD REINFORCEMENT AROUND THE OPENING.

2) FOR BEST PERFORMANCE, THE VERTICAL REINFORCEMENT SHOULD BE PREFERABLY PLACED IN THE CELL IMMEDIATELY ADJACENT TO THE OPENING. HOWEVER IF THIS CELL IS CONGESTED, THE VERTICAL REINFORCEMENT MAY BE PLACED IN THE 2nd CELL FROM THE OPENING.

3) ON LONG SPAN OPENINGS IT IS RECOMMENDED TO GROUT BOTH THE 1st AND 2nd CELLS FROM THE OPENING TO PROVIDE ADDITIONAL RESISTANCE FOR ATTACHING THE DOOR OR WINDOW FRAME.

4) FOR CONTROL JOINT DETAILS SEE SHEET A-9.

5) FOR ADDITIONAL INFORMATION ON CONTROL JOINT SPACING/Locations, SEE NCMA TEK 10-3.
REINFORCED MASONRY OPENING & ASSOCIATED CONTROL JOINT DESIGN FOR STEEL LINTELS

NOTES:

1) TRADITIONALLY, CONTROL JOINTS HAVE TYPICALLY BEEN LOCATED AT OR VERY CLOSE TO THE SIDES OF UNREINFORCED OPENINGS. HOWEVER, IT IS THE MI MASONRY'S PREFERENCE FOR CONTROL JOINTS TO BE LOCATED AWAY FROM THE EDGE OF OPENINGS AND TO ADD REINFORCEMENT AROUND THE OPENINGS.

2) FOR BEST PERFORMANCE, THE VERTICAL REINFORCEMENT SHOULD BE PREFERABLY PLACED IN THE CELL IMMEDIATELY ADJACENT TO THE OPENING. HOWEVER, IF THIS CELL IS CONGESTED, THE VERTICAL REINFORCEMENT MAY BE PLACED IN THE 2nd CELL FROM THE OPENING.

3) ON LONG SPAN OPENINGS IT IS RECOMMENDED TO GROUT BOTH THE 1st AND 2nd CELLS FROM THE OPENING TO PROVIDE ADDITIONAL RESISTANCE FOR ATTACHING THE DOOR OR WINDOW FRAME.

4) FOR CONTROL JOINT DETAILS SEE SHEET A-9.

5) FOR ADDITIONAL INFORMATION ON CONTROL JOINT SPACING/LOCATIONS, SEE NCMA TEK 10-3.
NOTE: 6" BEARING IS SHOWN AND IS TYPICAL, BUT SHOULD BE INCREASED IF NECESSARY BASED ON STRUCTURAL BEARING CALCULATIONS

STEEL REINFORCEMENT IN SOLID GROUTED CELLS

CONTROL JOINT (BACKER ROD AND SEALANT)

NOTE: EVEN FOR FIELD ASSEMBLED MASONRY LINTELS, DO NOT OVERLAP/INTERLOCK THE LINTEL REINFORCING WITH THE WALL REINFORCING. NO REINFORCING (VERTICAL OR HORIZONTAL) SHALL PASS THROUGH THE CONTROL JOINT.

GROUT SOLID (IN ONE LIFT) TOTAL NUMBER OF COURSES REQUIRED PER STRUCTURAL DESIGN (3 COURSES DEPICTED IN THIS DETAIL)

LINTEL STEEL REINFORCEMENT

MASONRY LINTEL (MAY BE PRE-CAST OR FIELD ASSEMBLED)

SLIP PLANE W/ BOND BREAK MATERIAL BETWEEN MASONRY LINTEL AND MASONRY BEARING. BACKER ROD AND SEALANT ON ALL THREE EXPOSED FACES.

GROUT SOLID UNDER LINTEL BEARING AS REQUIRED

PREFORMED CONTROL JOINT GASKET (SEE SHEET A-9)

BACKER ROD AND SEALANT ON BED JOINT ON ALL THREE EXPOSED FACES

BOND BREAKER MATERIAL

JAMB OPENING FACE

ELEVATION VIEW

ISOMETRIC VIEW

SLIP PLANE/CONTROL JOINT @ LONG SPAN MASONRY LINTEL

NCMA RECOMMENDS WIRE: 24" LONG HORIZONTAL JOINT REINFORCEMENT AT LINTEL BEARING AND TWO COURSES BELOW LINTEL BEARING

10A

A-11.1
PLAN OF LINTEL/BEARING PLATE

STEEL REINFORCEMENT IN SOLID GROUTED CELLS

CONTROL JOINT (BACKER ROD AND SEALANT)

NOTE: 8" BEARING IS SHOWN AND IS TYPICAL, BUT SHOULD BE INCREASED IF NECESSARY BASED ON STRUCTURAL BEARING CALCULATIONS

BEARING PLATE

BOTTOM FLANGE (AND WEB) OF LINTEL BEAM

SLOTTED HOLES IN BEAM FLANGES (NO WELDS)

"J" ANCHORS W/ THREADED PROJECTIONS. DO NOT FULLY TIGHTEN NUTS TO ALLOW FOR IN-PLANE MOVEMENT

NOTE: NO REINFORCEMENT (VERTICAL OR HORIZONTAL) SHALL PASS THROUGH THE CONTROL JOINT.

STEEL BEARING PLATE WITH "J" ANCHORS (THREADED ON PROJECTION ABOVE BEARING PLATE)

BACKER ROD AND SEALANT ON BED JOINT ON ALL THREE EXPOSED FACES

FACE SHELL AND GROUT NOT SHOWN TO REVEAL BEARING PLATE AND ANCHORS

OPENING

NCMA RECOMMENDS WIRE: 24" LONG HORIZONTAL JOINT REINFORCEMENT AT LINTEL BEARING AND TWO COURSES BELOW LINTEL BEARING

SLIP PLANE/CONTROL JOINT @ LONG SPAN WIDE FLANGE STEEL LINTEL

ISOMETRIC VIEW

NOTE:
1) DO NOT WELD STEEL BEAM LINTEL PLATE TO BEARING PLATE (TYPICAL BOTH SIDES).
2) STEEL BEAM TO HAVE SLOTS ON BOTTOM FLANGES TO ALLOW FOR IN-PLANE MOVEMENT.

STEEL BEAM AND LINTEL PLATE (WITH FACE SHELL SOAP) WITH FLEXIBLE FLASHING MEMBRANE AND DRIPE EDGE, TERMINATE W/ END DAMS

SLIP PLANE W/ BOND BREAK MATERIAL BETWEEN STEEL BEAM AND BEARING PLATE. BACKER ROD AND SEALANT ON BED JOINT ON ALL THREE EXPOSED FACES.

GROUT SOLID UNDER LINTEL BEARING AS REQUIRED

JAMB OPENING FACE

10B

A-11.2

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NOTES:
1) DO NOT WELD STEEL BEAM LINTEL PLATE TO BEARING PLATE (TYPICAL BOTH SIDES).

NOTE:
NO REINFORCEMENT (VERTICAL OR HORIZONTAL) SHALL PASS THROUGH THE CONTROL JOINT.

PLAN OF LINTEL/BEARING PLATE

BEARING PLATE
L3-1/2"x3-1/2" CLIP WELDED TO BOTTOM END (EACH END) OF HSS LINTEL
SLOTTED HOLES IN ANGLE (NO WELDS)

HSS (16"x4") STEEL LINTEL
"J" ANCHORS W/ THREADED PROJECTIONS. DO NOT FULLY TIGHTEN NUTS TO ALLOW FOR IN-PLANE MOVEMENT

LINTEL PLATE

STEEL REINFORCEMENT IN SOLID GROUTED CELLS
CONTROL JOINT (BACKER ROD AND SEALANT)

ELEVATION VIEW
NCMA RECOMMENDS WIRE: 24" LONG HORIZONTAL JOINT REINFORCEMENT AT LINTEL BEARING AND TWO COURSES BELOW LINTEL BEARING

OPENING

SLIP PLANE/CONTROL JOINT @ LONG SPAN HSS STEEL LINTEL
10C A-11.2

ISOMETRIC VIEW

JAMB OPENING FACE
FACE SHELL AND GROUT NOT SHOWN TO REVEAL BEARING PLATE AND ANCHORS
BACKER ROD AND SEALANT ON BED JOINT ON ALL THREE EXPOSED FACES
STEEL BEARING PLATE WITH "J" ANCHORS (THREADED ON PROJECTION ABOVE BEARING PLATE)
SLIP PLANE W/ BOND BREAK MATERIAL BETWEEN HSS BEAM AND BEARING PLATE. BACKER ROD AND SEALANT ON BED JOINT ON ALL THREE EXPOSED FACES.
GROUT SOUD UNDER LINTEL BEARING AS REQUIRED

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"CONTROL LAYER" INFORMATION

1) THERMAL CONTROL LAYER OVERVIEW:

   COMPLIANCE OPTIONS:

   1) FOR "SEMI-HEATED" BUILDINGS SEE NOTE 1A BELOW AND SHEET A-12.3.
      (CONVENTIONAL UNITS – PRESCRIPTIVE METHOD, COMCHECK NOT REQUIRED).

   2) FOR "HEATED" BUILDINGS:
      A) FOR SINGLE WYTHE WALLS EXPOSED ON THE EXTERIOR AND FULLY INSULATED ON THE INTERIOR
         FACE, SEE NOTE 1B BELOW AND SHEET A-13.
         (CONVENTIONAL UNITS – PRESCRIPTIVE METHOD, COMCHECK NOT REQUIRED).
      B) FOR SINGLE WYTHE WALLS EXPOSED ON THE EXTERIOR AND PARTIALLY INSULATED ON THE INTERIOR
         FACE, SEE NOTE 1BB BELOW AND SHEETS A-12.4 THRU A-12.7 (CONVENTIONAL UNITS – COMCHECK METHOD).
      C) FOR SINGLE WYTHE WALLS EXPOSED ON THE EXTERIOR AND EXPOSED ON THE INTERIOR
         FACE (USING SPECIAL ENERGY UNITS), SEE NOTE 1BC BELOW AND SHEET A-12.8
         (SPECIALITY ENERGY UNITS – PRESCRIPTIVE METHOD, COMCHECK NOT REQUIRED).

1A) THERMAL CONTROL LAYER – "SEMI-HEATED" BUILDINGS/SPACES:
   A) ASHRAE 90.1–2013 PRESCRIPTIVE COMPLIANCE REQUIREMENTS FOR MASS WALLS FOR CLIMATE ZONES 5, 6, & 7; AND ALTERNATE INSULATION OPTION:

   WALLS ABOVE GRADE

<table>
<thead>
<tr>
<th>ZONE</th>
<th>CONTINUOUS INSULATION METHOD (Rc1 MINIMUM)</th>
<th>Umax METHOD (Umax OF ENTIRE WALL ASSEMBLY)</th>
<th>ALTERNATE INSULATION OPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>Rc1 ≥ 5.7</td>
<td>Uassembly ≤ 0.151</td>
<td>ASTM C390 CONCRETE BLOCK WALLS, UN-GROUTED OR PARTIALLY GROUTED AT 32°F OR LESS ON CENTER VERTICALLY AND 48°F OR LESS ON CENTER HORIZONTALLY, WITH ALL UN-GROUTED CORES FILLED WITH MATERIAL HAVING A MAXIMUM THERMAL CONDUCTIVITY OF 0.44 BTU-in/ft²-°F. COMPLY PER SECTION 5.5.3.2 EXCEPTION (SEE SHEET A-12.3)</td>
</tr>
<tr>
<td>6</td>
<td>Rc1 ≥ 5.7</td>
<td>Uassembly ≤ 0.151</td>
<td>NOT APPLICABLE</td>
</tr>
<tr>
<td>7</td>
<td>Rc1 ≥ 7.6</td>
<td>Uassembly ≤ 0.123</td>
<td></td>
</tr>
</tbody>
</table>

   TABLE NOTES:
   1) MICHIGAN RANGES FROM ZONE 5 IN THE SOUTH TO ZONE 7 IN THE NORTH.
   2) SEE NCMA TEK 06–02C, TABLE 5, FOR R–VALUES AND U–FACTORS OF SINGLE WYTHE CONCRETE MASONRY WALLS, AND ADDITIONAL THERMAL DATA INFORMATION.

   B) IN ORDER TO USE THE PRESCRIPTIVE PROVISIONS OF REFERENCED ENERGY CODE, WALL OPENINGS ARE LIMITED TO A MAXIMUM 40% OF GROSS WALL AREA, AND SKYLIGHTS ARE LIMITED TO A MAXIMUM 5% OF THE GROSS ROOF AREA.

1B) THERMAL CONTROL LAYER – "HEATED" BUILDINGS/SPACES:
   A) FOR OCCUPANCIES SUCH AS OFFICE, RETAIL, ASSEMBLY, ETC.; WHERE THE EXTERIOR WALLS ARE COMMONLY FINISHED ON THE INTERIOR SIDE
      WITH FURRING AND INSULATION, SEE SHEET A-13 FOR EXAMPLES OF INSULATION OPTIONS.

   B) FOR INDUSTRIAL WAREHOUSE OCCUPANCIES, IT IS POSSIBLE TO HAVE EXPOSED CMU ON THE LOWER PART OF THE WALL (FOR SUPERIOR DURABILITY), AND
      DIRECT APPLY RIGID FOAM INSULATION ON THE UPPER PART OF THE WALL. SEE SHEETS A-12.4 THRU A-12.7 FOR
      GUIDANCE ON USING "COMCHECK" TO ACHIEVE ENERGY CODE COMPLIANCE USING THIS APPROACH.

   C) SPECIAL ENERGY UNITS (PROPRIETARY) PROVIDE ANOTHER OPTION. SEE SHEET A-12.8 FOR ADDITIONAL INFORMATION.
"CONTROL LAYER" INFORMATION (CONTINUED)

2) AIR CONTROL LAYER:
A) THE AIR CONTROL LAYER IS OFTEN REFERRED TO AS AN "AIR BARRIER" (SYSTEM). SEVERAL PRODUCTS AND OPTIONS (SUCH AS LIQUID OR MEMBRANE APPLIED PROPRIETARY SYSTEMS) ARE AVAILABLE, WITH DIFFERING LEVELS OF COST AND COMPLEXITY. SEE NOTE # 2 ON SHEET A-13.1 FOR MORE COMMENTS ADDRESSING AN AIR CONTROL LAYER.

B) THIS SET OF DETAILS REFLECTS AN AIR BARRIER SYSTEM ACHIEVED WITH SPECIFIC MASONRY DETAILING/CONSTRUCTION AND NON-PROPRIETARY COATINGS DESCRIBED IN NOTE C BELOW.

C) THE FOLLOWING NON-PROPRIETARY COATINGS ARE CONSIDERED TO MEET AN AIR LEAKAGE OF LESS THE 0.04 CFM/SQ. FT. @ 75 Pa. (SEE NCMA TEK 6-14A FOR ADDITIONAL INFORMATION).
   1) PRESCRIPTIVE COMPLIANCE:
      - FULLY GROUTED CMU
      - CMU WALL WITH ONE APPLICATION OF BLOCK FILLER AND TWO APPLICATIONS OF A PAINT OR SEALER COATING
      - CMU WALL WITH A PORTLAND CEMENT/SAND PARGE, STUCCO OR PLASTER WITH A MINIMUM THICKNESS OF 1/2".

2) BY LABORATORY TESTING:
   - 12" CMU SEALED WITH AT LEAST (2) COATS OF COMMERCIAL-GRADE LATEX PAINT.
   - 8" CMU COATED WITH A SINGLE COAT OF HIGH QUALITY LATEX PAINT.
   - 8" CMU COATED WITH A SINGLE COAT OF MASONRY BLOCK FILLER.

3) MOISTURE CONTROL LAYER:
A) SINGLE WYTHE WALL ASSEMBLIES DESIGNED AND CONSTRUCTED IN ACCORDANCE WITH THESE DETAILS PROVIDE PROTECTION AGAINST WATER PENETRATION, ESPECIALLY FOR LOW-RISE BUILDINGS. FOR IMPROVED PROTECTION, CONSIDER THE DRAINAGE WALL ASSEMBLIES SHOWN IN M.I.M. DETAIL SET CW.8 (8" CAVITY WALL). SEE NOTE #3 ON SHEET A-13 FOR MORE COMMENTS ADDRESSING A VAPOR CONTROL LAYER.
SEMI-HEATED BUILDING W/ CONVENTIONAL UNITS
(PRESCRIPTIVE METHOD, COMCHECK NOT REQUIRED)
ALTERNATE INSULATION OPTION

![Diagram of wall construction with grout and insulation]

- Bond Beam
- Grout: ≥48" O.C.
- Insulation: Maximum Thermal Conductivity of 0.44 Btu-in/H-Ft² °F
(See NCMA TEK 6-2C, Table 5)

≥32" O.C. Grouted Cells
HEATED BUILDING W/CONVENTIONAL UNITS
(COMCHECK METHOD)

- Exposed on the Exterior
- Partially Insulated on the Interior

Select $U_T$

Select $U_B$

See Sheet A-12.5 for Cell Fill

<table>
<thead>
<tr>
<th>DENSITY</th>
<th>polyisocyanurate, HD (interior face)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2&quot;</td>
</tr>
<tr>
<td>105</td>
<td>0.061</td>
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<tr>
<td>115</td>
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</tr>
<tr>
<td>125</td>
<td>0.062</td>
</tr>
<tr>
<td>135</td>
<td>0.062</td>
</tr>
</tbody>
</table>

$B = H \left( \frac{U_{max} - U_T}{U_B - U_T} \right)$

SAMPLE WALL FOR COMCHECK EXAMPLE
HEATED BUILDING W/CONVENTIONAL UNITS
(COMCHECK METHOD)
• Exposed on the Exterior
• Partially Insulated on the Interior

<table>
<thead>
<tr>
<th>Density</th>
<th>POLYURETHANE</th>
</tr>
</thead>
<tbody>
<tr>
<td>8&quot; CMU</td>
<td>BAR SPACING, polyurethane formed-in-place, R=5.0 per in. (cell fill)</td>
</tr>
<tr>
<td>8&quot;</td>
<td>16&quot;</td>
</tr>
<tr>
<td>105</td>
<td>0.529</td>
</tr>
<tr>
<td>115</td>
<td>0.539</td>
</tr>
<tr>
<td>125</td>
<td>0.549</td>
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</table>

<table>
<thead>
<tr>
<th>Density</th>
<th>PERLITE</th>
</tr>
</thead>
<tbody>
<tr>
<td>8&quot; CMU</td>
<td>BAR SPACING, perlite, R=3.12 per in. (cell fill)</td>
</tr>
<tr>
<td>8&quot;</td>
<td>16&quot;</td>
</tr>
<tr>
<td>105</td>
<td>0.529</td>
</tr>
<tr>
<td>115</td>
<td>0.539</td>
</tr>
<tr>
<td>125</td>
<td>0.549</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Density</th>
<th>VERMICULITE</th>
</tr>
</thead>
<tbody>
<tr>
<td>8&quot; CMU</td>
<td>BAR SPACING, vermiculite, R=2.2 per in. (cell fill)</td>
</tr>
<tr>
<td>8&quot;</td>
<td>16&quot;</td>
</tr>
<tr>
<td>105</td>
<td>0.529</td>
</tr>
<tr>
<td>115</td>
<td>0.539</td>
</tr>
<tr>
<td>125</td>
<td>0.549</td>
</tr>
</tbody>
</table>

Conventional Unit w/Insert* (Typical U-values range from 0.17 to 0.25)

*NOTES:
1) This is a proprietary product, consult the manufacturer for U-values and technical information and guidance for structural design.
2) Basis of design for Conventional Units with inserts is “Korfil ICON.”

CONVENTIONAL CMU’S "UB" VALUES

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### COMCHECK STEPS #1–#3

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STEP 4: Enter Wall Area
STEP 5: Select U-Factors from Tables and enter
STEP 6: Select Heat Capacity from NCMA TEK 6-16A

COMCHECK STEPS #4–#6

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HEATED BUILDING W/SPECIALTY ENERGY UNITS
(PRESCRIPTIVE METHOD, COMCHECK NOT REQUIRED)

- Exposed on the Exterior
- Exposed on the Interior

Specialty Energy Unit

Special Energy Unit #1*
(Typical U-values range from 0.049 to 0.052)

Special Energy Unit #2*
(Typical U-values range from 0.11 to 0.15)

*NOTES:
1) These are proprietary products, consult the manufacturer for U-Values and technical information and guidance for structural design
2) Basis of design for Special Energy Unit #1 is "Omniblock." Basis of design for Special Energy Unit #2 is "Korfil HiR."

<table>
<thead>
<tr>
<th>U_{\text{max}}</th>
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</thead>
<tbody>
<tr>
<td>Zone 5</td>
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<tr>
<td>0.090</td>
</tr>
</tbody>
</table>

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NOTES:

THE THREE OPTIONS SHOWN ABOVE:

1) ARE JUST A FEW REPRESENTATIVE SAMPLES OF THE MULTITUDE OF AVAILABLE INTERIOR INSULATION SYSTEMS:
   A) RIGID BOARD — EXTRUDED OR EXPANDED POLYSTYRENE, OR POLYISOCYANURATE
   B) CLOSED-CELL SPRAY POLYURETHANE FOAM
   C) CELLULAR GLASS
   D) FIBROUS BATT
   E) FIBROUS BLOW-IN

2) DO NOT ADDRESS A VAPOR CONTROL LAYER, AND HAVE VARYING LEVELS OF VAPOR PERMEABILITY. THE DEGREE OF VAPOR PERMEABILITY AND INTERIOR SPACE HUMIDITY SHOULD BE CAREFULLY EVALUATED (DEWPOINT ANALYSIS) IN ORDER TO ACHIEVE PROPER CONDENSATION CONTROL.

3) HAVE NOT BEEN ANALYZED FOR AIR CONTROL LAYER PERFORMANCE. THE OTHER DETAILS IN THIS SET REFLECT AN AIR BARRIER SYSTEM ACHIEVED WITH SPECIFIC MASONRY DETAILING/CONSTRUCTION AND NON-PROPRIETARY COATINGS APPLIED DIRECTLY TO THE CMU (SEE SHEET A-12.2. NOTE #2). IF AN INTERIOR WALL INSULATION SYSTEM IS INCLUDED IN THE DESIGN, THE USER MAY WISH TO CONSIDER OTHER AIR BARRIER SYSTEMS (PERHAPS EVEN UTILIZING COMPONENTS OF THE INTERIOR WALL INSULATION SYSTEM, IF APPLICABLE).

INSULATION OPTIONS FOR INTERIOR SURFACE OF EXTERIOR WALL

A-13
NOTES:
1) THIS DETAIL ONLY APPLICABLE TO A REINFORCED WALL DUE TO FLASHING/BOND BREAK CONCERNS.

NOTE:
VERTICAL REINFORCEMENT NOT SHOWN FOR CLARITY

8” CMU

INSULATION (FOAM, LOOSE FILL OR INSERTS)

PAINT (CAN FUNCTION AS AN AIR BARRIER, SEE SHEET A-12.2, NOTE #2)

DRAINAGE MATERIAL

REMOVABLE FASTENERS BY ROOFING CONTRACTOR

BUILDING INTERIOR

8” BOND BEAM (W/ REINF.)

LADDER-TYPE HORIZ. JOINT REINFORCEMENT SPACED @ 16” O.C.

BUILDING INTERIOR

BUILDING INTERIOR

INTEGRAL WATER REPELLENT (IN CMU AND MORTAR) AND A POST-CLEANING FIELD-APPLIED BREATHABLE WATER WATER REPELLENT

PAN FLASHING SYSTEM DIRECTLY OVER THE METAL FLASHING

28 Ga. STAINLESS STEEL FLASHING W/ 2” VERTICAL LEG, HEMMED, NO DRIP, HORIZONTAL LAP 4” (MIN.) W/ NON-SKINNING BUTYL SEALANT (BY MASON CONTRACTOR)

1 1/2” — 2” W/ 1/2” HEM

1 1/4” x 1/8” CONTINUOUS TERMINATION BAR W/ REMOVABLE FASTENERS @ 16” O.C. (MIN.) (BY ROOFING CONTRACTOR)

COMPATIBLE METAL COUNTER FLASHING, HEMMED, WITH DRIP, LAP 4” (MIN.) W/ NON-SKINNING BUTYL SEALANT (BY ROOFING CONTRACTOR)

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