1. Work this index with the Noise Wall Data Tables and Wall Control Drawings in the Plans.
   A. Prestressed concrete posts with equivalent strength resistance may be substituted for conventionally reinforced precast posts shown in this standard, when approved as part of a Producer’s Quality Control Plan.
   B. Producer shop drawings for prestressed concrete post designs must be approved by the State Structures Design Office prior to inclusion in the Quality Control Plan.
2. Construct Noise Walls in accordance with the requirements of Specification Section 534, and Augers Cast Piles in accordance with Specification Section 455.
3. Field verify the location of all overhead and underground services shown in the Wall Control Drawings.
4. Wall Height is the nominal height of the walls above finished grade. The Wall Embedment Depth for design is 1'-0". The actual embedment depth may vary plus or minus 6" along the length of the wall.
5. Post Spacing in this Index are nominal, and are measured from centerline to centerline of the auger cast piles. Actual post spacing may vary as shown in the Wall Control Drawings.
6. Panels:
   A. The sum of the individual stacked panel heights is the Wall Height plus 1'-0" (embedment depth).
   B. Where special graphics are required, locate the horizontal panel joints outside of the graphics. Where possible, hold horizontal panel joints at a constant elevation.
   C. Side Installed Panels are only permitted when reduced overhead clearance between posts prohibits installing panels from the top.
   1. For Flush Face panels, install panel into posts from the roadway (front face) of the wall. Recessed panels may be installed from the back face of the wall.
   2. After panels are installed and centered between posts, grout between both panel ends and the adjoining posts (see Sheets 4 and 5 for details).
   D. Individual panel heights should be between 6'-0" and 12'-0" tall. The minimum panel height is 4'-0" and may be used where overhead clearance is limited, or where graphic panels are required on shorter walls.
7. Concrete and Grout:
   A. Concrete Class and Compressive Strength for:
      1. Precast Panels, Posts, and Post Caps: Class IV
      2. Cast-In-Place Collars: Class IV
   B. Minimum Compressive Strength for form removal and handling of posts and panels:
      1. 2,500 psi for horizontally cast post and panels
      2. 2,000 psi for vertically cast panels or when tilt-up tables are used for horizontally cast panels.
   C. Grout for Auger Cast Piles:
      1. Maximum Working Compressive Strength = 2,000 psi
      2. Minimum 28 day strength = 5,000 psi
8. Reinforcing Steel:
   A. In addition to the requirements of Specification Section 415, tie post and pile stirrups at the following locations as a minimum:
      1. Post Stirrups Tie at all four corner bars and at every third interior bar intersection.
      2. Pile Stirrups Tie to the main vertical reinforcing at alternate intersections for circular configurations and at the four corners and at every third interior bar intersection for rectangular configurations.
   B. Provide 2" concrete cover unless noted otherwise.
9. Casting Tolerances for precast panels and posts:
   A. Overall Height and Width: +/- 1/8".
   B. Thickness: +/- 1/8".
   C. Plane of side mold: +/- 1/16".
   D. Openings: +/- 1/8".
   E. Out of Square: 1/8" per 6 ft., but not more than 3/8"total along any side.
   F. Warp: 1/16" per foot distance to nearest corner.
   G. Bowing: 1/240 panel dimension.
   H. Surface Smoothness for Type "A" Smooth Surface Texture Option: +/- 1/16".
10. Provide Plain or Fiber Reinforced Bearing Pads meeting the requirements of Specification Section 932 for Ancillary Structures.
   A. For Collar Bearing Points provide:
      1. 4" x 4" x ½" Fiber Reinforced Pads;
      2. Plain Pads may be substituted for Fiber Reinforced Pads when sufficient bearing area is available on the concrete collar for the following:
         a. 10' Post Spacing: 4" x 4" x ½"
         b. 20 Post Spacing and Wall Height < 17 feet: 4" x 4" x ½"
         c. 20 Post Spacing and Wall Height ≥ 17 feet: 4" x 5" x ½"
   B. At panel bearing points between stacked panels, use Plain or Fiber Reinforced Bearing Pads.
Running Bond Block:
12" x (12", 14", 16" & 12")   (1st course)
6" x (21", 10" & 23")        (2nd course)
12" x (9", 10", 21" & 14")    (3rd course)
6" x (16", 14" & 24")        (4th course)

1:15 Min.
Bevel
Ɓ
Mortar
Joint
ƈ
Amplitude
4" o.c.
1" o.c.
Typ.
ƀ
Random 3/8" - 3/8"
Gravel Texture

Random 3/8" - 3/8"
Gravel Texture

Type “A”  
SMOOTH

Type “B”  
ASHLAR STONE

3/8" Back Face
1/4" Front Face
Varies
3/8" to 1/2"

Type “C”  
SPLIT FACE RUNNING BOND BLOCK

3/8" Mortar Joint
3/8" Amplitude
8" x 16" Running Bond Block

Type “D”  
FRACTURED GRANITE

3/8" Depth

Type “E”  
WIRE-CUT BRICK

1/4" Depth

Type “F”  
PEA GRAVEL

Random 3/8" - 3/8"
Gravel Texture

Type “G”  
VERTICAL FRACTURED FIN

3/4" o.c.
1/2" o.c.
Typ.
1:15 Min.
Bevel

Type “H”  
TRAPEZOID VERTICAL FINS W/ FRACTURED FACE (COLORADO DRAG AGGREGATE)

4" o.c.
1/2" o.c.
Typ.
1:15 Min.
Bevel

Type “I”  
CUT CORAL BLOCK (RUNNING BOND)

Running Bond:
12" x (12", 14", 16" & 12")
6" x (21", 10" & 23")
12" x (9", 10", 21" & 14")
6" x (16", 14" & 24")

1st course
2nd course
3rd course
4th course

NOTES:
1. Surfaces shall be formed, rolled, or pressed using form liners in accordance with the Plans and Specifications for Class 3 Surface Finish.
2. See Noise Wall Data Tables for project aesthetic requirements.
HALF ELEVATION
(Front Face Post and Panel Texture Type "H" shown)
(Graphic Type SE-2 shown)
(Two stacked panels shown, three stacked panels similar)

NOTES:
1. Submit specific form liner samples for approval by the Engineer.
2. Textures and graphics shown are for demonstration purposes only. See Noise Wall Data Tables in the plans for project specific texture and graphic requirements.
**TYPICAL PANEL ELEVATION**

*In lieu of utilizing the standard pick-up points below, panels may be cast vertically or cast horizontally then tilted upright using tilt-tables prior to lifting from form. In this case, pick points must be placed in the top of panels only and transported maintaining the vertical orientation. If these criteria are met, the vertical steel may be reduced to #4 Bars @ 1'-3" (As=0.16 in.²/ft.).*

**STANDARD PICK UP POINTS FOR PANELS**

(Panels shall be rotated about long axis only)

**SECTION D-D**

(Showing Recessed Type Panel)

Texture
Non-Roadway
Face (Back Face)

Continuous V-Groove
(Not required for Bottom Panel)

1½ Chamfer (Typ.)

2 Sp. @ ½ = 1½
2 Sp. @ 2½ = 5½

Max.
Max.

**SECTION D-D**

(Showing Flush Type Panel)

Texture
Front Face

**DETAIL A** - SIDE-INSTALLED

(Typical both ends)

Max.
Max.
Max.

**DETAIL B** - TOP-INSTALLED

(Typical both ends)

Max.
Max.
Max.

Notes:
1. See Sheet 3 for allowable methods of applying textures.
2. See plans for panel type and aesthetic requirements.
3. For equal post spacing, side-installed panel length will be shorter than top-installed Panel length.
NOTE: The shop drawings shall include specific pivoting details of panel ends at locations where the deflection angle (2Δ°) between panels exceeds 7°.

NOTE: The shop drawings shall include specific pivoting details of panel ends at locations where the deflection angle (2Δ°) between panels exceeds 20°.

TYPICAL PANEL DETAILS

PIVOTING DETAILS
(Flush Type Panel)

PIVOTING DETAILS
(Recessed Type Panel)
**DRAINAGE HOLES TYPES A, B, C & D**
*(Front Face of Wall Shown)*
(Two Holes Shown, One Hole Similar)

*Hole Types A, B, C and D refer to distance from bottom of panel to center of opening. See Wall Control Drawings in the plans.*

**DRAINAGE HOLES DETAILS**

1. Grating shall be ASTM A36 steel welded in accordance with the current edition of ANSI/AWS D1.1 Steel Welding Code. Hot-dip galvanize grate after fabrication in accordance with Specification Section 962.
2. Expansion Anchors: Use 1⁄4" Ø x 2" min. corrosion resistant (zinc/aluminum alloy or stainless steel) expansion anchors to connect grates to panels.
3. Grating mounted to back face of wall.
4. Blockout textured concrete surface for a strip 2" wide around hole for drainage grate placement.

**GRATING DETAIL**

**BAR BENDING DETAILS (#3 Bars)**

**SECTION G-G**

**SECTION F-F**

**GRADE BEHIND WALL TO DRAIN TO HOLES.**

**BAR BENDING DETAILS (#3 Bars)**

**DRAINAGE HOLE DETAILS**
TYPICAL POST SECTION

STANDARD POST REINFORCEMENT
(Standard Post Shown, 45° Corner Posts Similar)

LOW CLEARANCE OPTION
* Extend Post 2" above top of high side wall panel when post caps are shown in plans. See Sheet 4, "ELEVATION STEP AT TOP OF WALL".

STANDARD POST DETAILS

NOTES:
1. For Post Reinforcing see Sheets 15 and 16.
2. For Pile Lengths Tables see Sheets 15 and 16.
**POST PLACEMENT & PILE REINFORCING STEEL DETAILS**

**TYPICAL POST**

STANDARD POST PLACEMENT IN AUGER CAST PILE

(H-Post Shown, 45° Corner Posts Similar)

**LOW CLEARANCE OPTION**

EXPOSED PRECAST POST REINFORCEMENT (Typ.)

- 10 - #9 Bars (Typ.), See Section P-P

---

**NOTE:**

1. For Pile Length Tables, see Sheets 15 and 16.

---

**SECTION M-M**

LOW CLEARANCE OPTION

- 10 - #9 Bars spread equally around Bar P3 (Typ.)

---

**SECTION N-N**

**POST PLACEMENT & PILE REINFORCING STEEL DETAILS**
SECTION H-H
(45° Corner Post)

SECTION K-K
(Collar Section, 45° Corner Post)

SECTION L-L
(45° Corner Post)

SECTION N-N
(45° Corner Post)

45° POST NOTES:
1. Reference Sheets 8 & 9 for location of Sections.
   Space Bars P7 as shown for Bars P1.
   Space Bars P8 as shown for Bars P2.
2. Match texture thickness with appropriate Panel face.
3. For Post Reinforcing, see sheets 15 & 16.
4. For Pile Length Tables, see sheets 15 & 16.

45° POST DETAILS

45° POST PLACEMENT IN AUGER CAST PILE

PRECAST NOISE WALLS
**Typical Post**

- Begin Bars B
- Top of C-L-P Collar (Elev. A)
- Bars A and Bars B
- Bars P5 (Pairs)

**Section S-S**

- Bars P4 @ 1'-0" Max.
- Bars P4 @ 1'-0" Max.
- Bars P4 @ 1'-0" Max.

**Section R-R**

- Top of Auger Cast Pile (Elev. A)
- Bars A and Bars B
- Top of Wall & Pile

**Low Clearance Option**

- Extend Post 2" above top of high side wall panel when post caps are shown in plans. See Sheet 4, "ELEVATION STEP AT TOP OF WALL".

**90° Corner Post Reinforcement**

(Post Surface Features Not Shown For Clarity)

**90° Corner Post Details**

1. For Post Reinforcing, see Sheets 15 and 16.
2. For Pile Length Tables, see Sheets 15 and 16.
3. Reduce typical panel length or adjust pile spacing at each 90° Corner Post.
4. Match texture thickness with appropriate Panel Face.
NOTES:
1. For Pile Length Tables, see Sheets 15 and 16.
2. Trowel finish top of Collar to allow placement of Bearing Pads.
* Extend Post 2" above top of high side wall panel when post caps are shown in plans. See Sheet 4, "ELEVATION STEP AT TOP OF WALL".

SECTION T-T
C-I-P COLLAR

SECTION U-U

90° CORNER TYPICAL POST PLACEMENT DETAILS
**NOTES:**

1. For Pile Length Tables, see Sheets 15 and 16.

2. Trowel Finish top of auger cast pile to allow placement of Bearing Pads.

* Extend Post 2" above top of high side wall panel when post caps are shown in plans. See Sheet 4, "ELEVATION STEP AT TOP OF WALL".
<table>
<thead>
<tr>
<th>WALL HEIGHT (Feet)</th>
<th>POST LENGTHS</th>
<th>10'-0&quot; POST SPACING</th>
<th>20'-0&quot; POST SPACING</th>
<th>SOIL 1</th>
<th>SOIL 2</th>
<th>SOIL 1</th>
<th>SOIL 2</th>
<th>SOIL 1</th>
<th>SOIL 2</th>
<th>SOIL 1</th>
<th>SOIL 2</th>
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<tr>
<td></td>
<td>WITH CAP</td>
<td>BARS A</td>
<td>BARS B</td>
<td>BARS C</td>
<td>BARS D</td>
<td>BARS E</td>
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**TABLE NOTE:**
1. Bars D and Bars E are for 48" Corner Posts only.
2. See Contract Plans for project wind speed.
   Soil 2 = Medium Dense Granular Soil, N = 10 to 40.
PLAN (BRIDGE MOUNTED RAILING/NOISE WALL SHOWN, WALL OR FOOTING MOUNTED RAILING/NOISE WALL SIMILAR) (Reinforcing Steel not shown for clarity)

ELEVATION OF INSIDE FACE OF RAILING/NOISE WALL (BRIDGE MOUNTED RAILING/NOISE WALL SHOWN, WALL OR FOOTING MOUNTED RAILING/NOISE WALL SIMILAR) (Reinforcing Steel not shown for clarity)

* On Bridges see Superstructure and Approach Slab Sheets for actual dimensions and joint orientation. Open Railing/Noise Wall Joints at Deck Expansion Joint locations shall match the dimensions of the Deck Joint. For treatment of Railing/Noise Walls on skewed bridges see Index 420. Deck Joint at Begin Bridge or End Bridge shown. Deck Joint at ¶ Pier or Intermediate Bent, Junction Slab or Footing similar.

** ½" Intermediate Open Joints shall be constructed plumb and provided at:
1. Superstructure supports where slab is continuous.

CROSS REFERENCE:
For Detail "B" and V-Groove Lettering Detail see Sheet 2.
For Section C-C and Detail "A" see Sheet 5.
For Railing/Noise Wall and Wall shown on Roadway Plans see Index 5213 (T-Shaped), 5214 (L-Shaped) or 5215 (Trench).

*** 3" Intermediate Open Joints shall be constructed plumb and provided at:
1. Superstructure supports where slab is continuous.

On Bridges see Superstructure and Approach Slab Sheets for actual dimensions and joint orientation. Open Railing/Noise Wall Joints at Deck Expansion Joint locations shall match the dimensions of the Deck Joint. For treatment of Railing/Noise Walls on skewed bridges see Index 420. Deck Joint at Begin Bridge or End Bridge shown. Deck Joint at ¶ Pier or Intermediate Bent, Junction Slab or Footing similar.
**TRAFFIC RAILING/NOISE WALL NOTES**

**CONSTRUCTION REQUIREMENTS:** The Traffic Railing/Noise Wall and joints shall be constructed plumb; they shall not be constructed perpendicular to the roadway surface.

**CONCRETE:** For Railing/Noise Wall on bridges see General Notes. For Wall and Footing mounted Railing/Noise Wall, concrete shall be Class II for slightly aggressive environments and Class IV for moderately or extremely aggressive environments.

**NAME, DATE AND BRIDGE NUMBER:** For Railing/Noise Wall on bridges, the name and Bridge Number shall be placed on the Traffic Railing so as to be seen on the driver's right side when approaching the bridge. The Date shall be placed on the driver's left side when approaching the bridge. The Name shall be shown in the General Notes in the Structures Plans. The Date shall be the year the bridge is completed. For a widening when the existing railing is removed, use both the existing date and the year of the widening. Black plastic letters and figures 3" in height may be used, as approved by the Engineer, in lieu of the letters and figures formed by V-Grooves. V-Grooves shall be formed by preformed letters and figures.

**BARRIER DELINEATORS:** Barrier Delineators shall meet Specification Section 993. Install Barrier Delineators 2'-4" above the riding surface at the spacing shown in the table below. Barrier Delineator color (white or yellow) shall match the color of the near edgeline. The cost of the Barrier Delineators shall be included in the Contract Unit Price for the Traffic Railing/Noise Wall.

---

**BILL OF REINFORCING STEEL**

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<thead>
<tr>
<th>MARK</th>
<th>SIZE</th>
<th>LENGTH</th>
</tr>
</thead>
<tbody>
<tr>
<td>P</td>
<td>5</td>
<td>5'-7&quot;</td>
</tr>
<tr>
<td>R</td>
<td>5</td>
<td>7'-9&quot;</td>
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<td>S1</td>
<td>5</td>
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<td>S2</td>
<td>5</td>
<td>7'-3&quot;</td>
</tr>
<tr>
<td>V (Bridge and Wall)</td>
<td>5</td>
<td>5'-1&quot;</td>
</tr>
<tr>
<td>V (Footings)</td>
<td>5</td>
<td>7'-7&quot;</td>
</tr>
</tbody>
</table>

---

**REINFORCING STEEL BENDING DIAGRAMS**

1. All bar dimensions in the bending diagrams are out to out.
2. All reinforcing steel at the open joints shall have a 2" minimum cover.
3. Bars SR shall be one continuous or lap spliced bar. No mechanical couplers are permitted.
4. Bars S51 may be continuous or spliced at the construction joints. Lap splices for Bars SR and S51 shall be a minimum of 2'-2".
5. The Contractor may use Welded Wire Reinforcement (WWR) when approved by the Engineer. WWR must consist of deformed wire meeting the requirements of Specification Section 931.
6. See Index Nos. 5214 and 5213 for Bars SR and S51 in L-shaped and Trench footings.

---

**INTERMEDIATE JOINT SEAL NOTES:**

1. All Intermediate Open Joints, seal the lower 6" portion of the open joint with Pre-cured Silicone Sealant in accordance with Specification Section 932.
2. Apply sealant prior to any Class V finish coating and remove all curing compound and loose material from the surface prior to application of bonding agent.
3. The cost of the Pre-cured Silicone Sealant shall be included in the Contract Unit Price for the Traffic Railing.

**DETAIL "B" - SECTION AT INTERMEDIATE OPEN JOINT**

---

**TRAFFIC RAILING/NOISE WALL QUANTITIES**

<table>
<thead>
<tr>
<th>ITEM</th>
<th>UNIT</th>
<th>QUANTITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Concrete (Railing)</td>
<td>CY/LF</td>
<td>0.104</td>
</tr>
<tr>
<td>Concrete (Noise Wall)</td>
<td>CY/LF</td>
<td>0.145</td>
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<tr>
<td>Reinforcing Steel (Typical)</td>
<td>LB/LF</td>
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<tr>
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<td>3.20</td>
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</tbody>
</table>

(The above quantities are based on the bridge mounted typical section, 2% deck cross slope and railing on low side of deck.)

---

**Traffic Railing/Noise Wall (8'-0")**

- **FY 2017-18**
- **Design Standards**
ELEVATION OF RAILING/NOISE WALL REINFORCING STEEL
(INTERMEDIATE OPEN JOINT SHOWN, DECK JOINT SIMILAR)
(Bars S51 in Railing not shown for clarity)

ELEVATION OF RAILING/NOISE WALL END TAPER (ADJACENT TO TRAFFIC RAILING SHOWN, GUARDRAIL ATTACHMENT SIMILAR SEE DETAIL "A", SHEET 5)
(Bars S51 in Railing not shown for clarity)

NOTES:
* Field Cut Bars SR & S51 to maintain clearance.
** Terminate 3/8" V-groove at construction joint & cast top of railing with End Taper.
*** Bar spacing shown for Bars SV applies only to bridge mounted Railing/Noise Wall. See Index 5212 for spacing of Bars SV in junction slabs and Index 5213 (T-Shaped), 5214 (L-Shaped) or 5215 (Trench) for Bars SV spacing in footings.
**DETAIL "A" NOTES:**

1. Rotate Bars 5P & 5V in Railing End Transition to maintain cover. Begin placing Railing Bars 5P and 5V at the railing end and proceed toward the guardrail (three beam) terminal connector to ensure placement of guardrail bolt holes. Pair Bars SR with Bars 5P as shown. Clearance of Bars 5P, 5R & 5V to guardrail bolt holes shall be checked to prevent cutting of bars if holes are to be drilled. Shift bars locally where conflicts occur.

2. For Guardrail connection details, see Design Standards Index 400.

3. Omit Railing End Transition if a 32" F-Shape Traffic Railing is used beyond the End Taper. See the Plan Sheets. If Railing End Transition is omitted, space Bars 5P, 5R & 5V at 6" as shown above (Typ.)

4. For L-Shaped (Index 5214) and Trench (Index 5215) footings, Bars 5V and 5T replace Bars 5V as shown at left. Details and bar spacing shown apply except that it is not necessary to rotate Bars 5V and 5T to maintain cover and there is no field cut End Bar 5V.

5. Bottom Bars 5S1 are not present in L-Shaped or Trench Footings.

---

**PLAN - RAILING END TRANSITION**

(Showing Bars 5P, 5R, and Bars 5S1) (Bars 5V, Noise Wall & Reinforcement not shown for Clarity)

**SECTION C-C**

THRU NOISE WALL END TAPER

**CROSS REFERENCE:**

For location of Detail "A" see Sheet 1.
For location of Section C-C, see Sheet 1.
For View B-B see Sheet 4.
1. This railing has been structurally evaluated to be equivalent or greater in strength to a safety shape/Noise Wall combination railing which has been crash tested to NCHRP Report 350 TL-4 Criteria.

2. CONSTRUCTION REQUIREMENTS: Construct the Traffic Railing/Noise Wall and joints plumb; do not construct the Traffic Railing/Noise Wall perpendicular to the roadway surface.

3. CONCRETE: Use Class II concrete for slightly aggressive environments. Use Class IV concrete for moderately or extremely aggressive environments. Concrete will be in accordance with Specification Section 346.

4. Construct ⅛ Open Joints plumb and perpendicular or radial to Gutter Line. Provide at 90'-0" maximum intervals as shown. ⅛ Open Joint locations are to coincide with ⅛ Expansion Joints in footings.

5. Construct ⅝ V-Grooves plumb and provide at 30'-0" maximum intervals as shown. Space V-Grooves equally between ⅛ Open Joints and/or Begin or End Traffic Railing/Noise Wall. V-Groove locations are to coincide with V-groove locations in footings.

6. 14'-0" Noise Wall End Taper is required when adjacent to an 8'-0" Traffic Railing/Noise Wall and may be used when an 8'-0" Traffic Railing/Noise Wall End Taper is provided (see Index 5210 for details). See Roadway Plans for Traffic Railing/Noise Wall End Treatment.

7. Work this Standard Drawing with Index 5210 - Traffic Railing/Noise Wall (8'-0") and one or more of the following:
   a. Index 5213 - Traffic Railing/Noise Wall T-Shaped Spread Footing,
   b. Index 5214 - Traffic Railing/Noise Wall L-Shaped Spread Footing or
   c. Index 5215 - Traffic Railing/Noise Wall Trench Footing.

TRAFFIC RAILING/NOISE WALL (14'-0")

For Section A-A, Detail "A" and Estimated Quantities, see Sheet 3. For Expansion Joint Detail in Footing, see Index 5213, 5214 or 5215.
ELEVATION OF TRAFFIC RAILING/NOISE WALL REINFORCING STEEL
(Bars 5S1 in Railing not shown for clarity)

NOTES:
1. Field Cut Bars 5R & 5S1 in Noise Wall End Taper as required to maintain minimum cover.
2. See Index 5213, 5214 and 5215 for footing reinforcement.
3. 3/8" Open Joint may be omitted when 8'-0" Traffic Railing/Noise Wall End Taper is adjacent to a
   14'-0" Traffic Railing/Noise Wall End Taper as shown on Sheet 1. See Index 5210 for
   reinforcement details and spacing. Bars 5S2 are not required when 3/8" Open Joint is omitted.
4. Bar spacing shown is along the Gutter Line.
REINFORCING STEEL BENDING DIAGRAMS

BILL OF REINFORCING STEEL

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<td>5</td>
<td>AS REQD</td>
</tr>
<tr>
<td>S2</td>
<td>5</td>
<td>7'-3&quot;</td>
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BARS S51 & S52

 concrete (Traffic Railing)

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<td>Additional Reinforcement @ Open Joint (Railing/Noise Wall)</td>
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SECTION A-A

TYPICAL SECTION THRU TRAFFIC RAILING/NOISE WALL

NOTES:
1. See Index 5213, 5214 and 5215 for footing reinforcement.
2. At 3" Open Joints, plug the lower 3" portion of the open joint by filling it with mortar in accordance with Specification Section 400.
CONSTRUCTION REQUIREMENTS: Construct the expansion joints and face of coping plumb.

CONCRETE: Use Class II concrete for slightly aggressive environments. Use Class IV concrete for moderately or extremely aggressive environments.

DOWELS: Dowel Load Transfer Devices will be hot-dip galvanized ASTM A36 smooth round bars or GFRP smooth round bars with a minimum shear strength of 22ksi in accordance with ASTM D637. Install Dowel Load Transfer Devices in accordance with Specification Section 350.

EXPANSION JOINTS: Construct 1/2" Expansion Joints plumb, and either perpendicular or radial to Gutter Line. Provide at 90'-0" maximum intervals as shown.

DOWEL SHEAR KEYS: Dowel Load Transfer Devices are permitted with steel dowel bars. Tongue Splice on Shear Key must be constant and between 5" to 45" from horizontal.

Dowels: Dowel Load Transfer Devices will be hot-dip galvanized ASTM A36 smooth round bars or GFRP smooth round bars with a minimum shear strength of 22ksi in accordance with ASTM D637. Install Dowel Load Transfer Devices in accordance with Specification Section 350.

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EXPANSION JOINTS: Construct 1/2" Expansion Joints plumb, and either perpendicular or radial to Gutter Line. Provide at 90'-0" maximum intervals as shown.

DOWEL SHEAR KEYS: Dowel Load Transfer Devices are permitted with steel dowel bars. Tongue Splice on Shear Key must be constant and between 5" to 45" from horizontal.

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EXPANSION JOINTS: Construct 1/2" Expansion Joints plumb, and either perpendicular or radial to Gutter Line. Provide at 90'-0" maximum intervals as shown.

DOWEL SHEAR KEYS: Dowel Load Transfer Devices are permitted with steel dowel bars. Tongue Splice on Shear Key must be constant and between 5" to 45" from horizontal.

Dowels: Dowel Load Transfer Devices will be hot-dip galvanized ASTM A36 smooth round bars or GFRP smooth round bars with a minimum shear strength of 22ksi in accordance with ASTM D637. Install Dowel Load Transfer Devices in accordance with Specification Section 350.

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Dowels: Dowel Load Transfer Devices will be hot-dip galvanized ASTM A36 smooth round bars or GFRP smooth round bars with a minimum shear strength of 22ksi in accordance with ASTM D637. Install Dowel Load Transfer Devices in accordance with Specification Section 350.

EXPANSION JOINTS: Construct 1/2" Expansion Joints plumb, and either perpendicular or radial to Gutter Line. Provide at 90'-0" maximum intervals as shown.

DOWEL SHEAR KEYS: Dowel Load Transfer Devices are permitted with steel dowel bars. Tongue Splice on Shear Key must be constant and between 5" to 45" from horizontal.

Dowels: Dowel Load Transfer Devices will be hot-dip galvanized ASTM A36 smooth round bars or GFRP smooth round bars with a minimum shear strength of 22ksi in accordance with ASTM D637. Install Dowel Load Transfer Devices in accordance with Specification Section 350.

EXPANSION JOINTS: Construct 1/2" Expansion Joints plumb, and either perpendicular or radial to Gutter Line. Provide at 90'-0" maximum intervals as shown.
BILL OF REINFORCING STEEL

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<td>E</td>
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</tbody>
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| H    | 5    | 12'-0" | 12'-10"

REINFORCING STEEL BENDING DIAGRAMS

- All bar dimensions in the bending diagrams are out to out.
- All reinforcing steel at the open joints will have a 2" minimum cover.
- Lap splices for Bars 5B will be a minimum of 2'-2".
- The Contractor may use Deformed WWR when approved by the Engineer. Deformed WWR must meet the requirements of Specification Section 931.

REINFORCING STEEL NOTES:

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<th>ITEM</th>
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<td>Additional Rein. @ Expansion Joint</td>
<td>LB</td>
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<td>21.36</td>
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NOTES:

1. Match Cross Slope of Travel Lane or Shoulder.
2. Vary Junction Slab slope based on roadway cross slope to maintain a minimum 6" asphalt depth at the edge of the slab as shown.
3. Actual width varies depending on type of Retaining Wall used.
4. See Index No. 5210 for Bars 5V and Bars 5S1.
5. For Rigid Pavement (Concrete), Junction Slab may be thickened to match finished grade.
6. If slip forming is used, submit shop drawings for approval showing Expansion Joint support details and 2" side cover with adjusted Typical Section dimensions.

CROSS REFERENCE:
For location of Section B-B, see Sheet 1.

SECTION B-B
TYPICAL SECTION THRU JUNCTION SLAB AND RETAINING WALL

TRAFFIC RAILING/NOISE WALL (8'-0")
JUNCTION SLAB

FOR REV. February 01, 2016

DESIGN STANDARDS

FY 2017-18

TRAFFIC RAILING/NOISE WALL INDEX NO. 5212 SHEET NO. 2 OF 2

NOTE: See Index No. 5210, Detail "A" for details.

NOTE: See Index No. 5210, Detail "A" for details.

1" Ø Dowel Load Transfer Devices at expansion joints (Typ.)
Shoulder or Roadway Pavement (Full depth asphalt or See Note 5)
Cross Reference:
For Section B-B and Detail "W", see Sheet No. 2.
REINFORCING STEEL BENDING DIAGRAMS

BILL OF REINFORCING STEEL

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<tr>
<td>U</td>
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<td>1'-0&quot;</td>
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</table>

DOWEL 1" Ø Smooth Bar 2'-0"

BARS 5A & 5B

REINFORCING STEEL NOTES:
1. All bar dimensions in the bending diagrams are out to out.
2. All reinforcing steel at the open joints will have a 2" minimum cover.
3. Lap splices for Bars 5B will be a minimum of 2'-2".
4. The Contractor may use Welded Wire Reinforcement (WWR) when approved by the Engineer.
   WWR must consist of Deformed wire meeting the requirements of Specification Section 931.

REINFORCING STEEL BENDING DIAGRAMS

PARTIAL END VIEW OF RAILING END
TRANSITION FOR GUARDRAIL ATTACHMENT
(Showing Bars 5V, Bars 5S1 and Bars 5B inside of Stirrup Bars 5V)

NOTE: See Index No. 5210, Detail "A" for details.

SECTION B-B
TYPICAL SECTION THRU SPREAD FOOTING
(Bars 5P, 5R and 5S1 in Traffic Railing/Noise Wall not shown for clarity)

NOTES:
1. Match Cross Slope of Travel Lane or Shoulder.
2. Place 6 ~ Bars 5B inside Stirrup Bars 5V as shown.
3. See Index No. 5210 for Bars 5V and Bars 5S1.

ESTIMATED T-SHAPED SPREAD FOOTING QUANTITIES

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<td>ADDITIONAL Rein. @ Expansion Joint</td>
<td>LB</td>
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Note: The reinforcing steel quantity accounts for the difference between the shorter Stirrup Bars 5V for junction slabs or bridges and the longer Stirrup Bars 5V for spread footings.

CROSS REFERENCE:
For location of Section B-B, see Sheet 1.
Notes:
1. Construction Requirements: Construct the Spread Footing level transversely and expansion joints plumb; do not construct the spread footing perpendicular to the roadway surface.
2. Concrete: Use Class II concrete for slightly aggressive environments. Use Class IV concrete for moderately or extremely aggressive environments. Concrete will be in accordance with Specification Section 346.
3. Dowels: Dowel Load Transfer Devices will be ASTM A 36 smooth round bar and hot-dip galvanized in accordance with Specification Section 962. Install Dowel Load Transfer Devices in accordance with Specification Section 350.
4. Construct 3/4" Expansion Joints plumb and perpendicular or radial to Gutter Line. Provide at 90'-0" maximum intervals as shown.
5. Provide and install Preformed Expansion Joint Filler in accordance with Specification Section 932.
6. Construct 1/2" V-Grooves plumb and provide at 30'-0" maximum intervals as shown. Space V-Grooves equally between 3/4" Expansion Joints and/or Begin or End Spread Footing. V-Groove locations are to coincide with V-Groove locations in the Railing/Noise Wall.
7. Fill Requirements: Shoulder or Roadway Pavement and Fill is required on the traffic side of the spread footing for a distance of 4'-0" and the full length of the spread footing (3'-0" minimum depth) on the backside of the spread footing for Option A. Fill is required for a distance of 4'-0" on the backside of the spread footing and the full length of the spread footing (3'-0" minimum depth) on the traffic side of the spread footing for Option B. See Typical Sections on Sheet Nos. 2 and 3 for details.
8. Spacing shown is along the Gutter Line.
9. Work this Standard Drawing with one or both of the following:
   a. Index 5210 - Traffic Railing/Noise Wall (8'-0").
   b. Index 5211 - Traffic Railing/Noise Wall (14'-0").
14'-0" or 8'-0" Traffic Railing/Noise Wall

TYPICAL SECTION THRU SPREAD FOOTING AND BARRIER WALL INLET - OPTION A
(Reinforcing Steel not shown for clarity (See Note 3))

NOTES:
1. Match Cross Slope of Travel Lane or Shoulder.
2. Place 10 - Bars 5B inside Bars SU1 as shown.
3. For Reinforcing Steel spacing, see Typical Section Thru Spread Footing - Option A.
4. Provide 3" lip when optional construction joint is used.

TYPICAL SECTION THRU SPREAD FOOTING - OPTION A
(Bars 5P, 5R and S51 in Traffic Railing/Noise Wall not shown for clarity)
TYPICAL SECTION THRU SPREAD FOOTING - OPTION B
(Bars 5P, 5R and 5S1 in Traffic Railing/Noise Wall not shown for clarity)

NOTES:
1. Match Cross Slope of Travel Lane or Shoulder.
2. Place 10 ~ Bars 5B inside Bars 5U1 as shown.
3. Provide 3" lip when optional construction joint is used.

EXPANSION JOINT DETAIL
(Spread Footing expansion joints are required at 1/8" open joints in Traffic Railing/Noise Wall)

DETAIL "A"
(Option A Shown, Option B Similar)
(Showing Locations of 1/8" V-Grooves and 1/8" Preformed Expansion Joint Filler)
**DESCRIPTION:**

**FY 2017-18 DESIGN STANDARDS**

**Traffic Railing/Noise Wall**

**L-Shaped Spread Footing**

**BILL OF REINFORCING STEEL**

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<td>C</td>
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<td>S3</td>
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<td>S</td>
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**REINFORCING STEEL BENDING DIAGRAMS**

**SECTION A-A**

TYPICAL SECTION THRU SPREAD FOOTING AND BARRIER WALL INLET - OPTION B
(Bars 5P, 5R and 5S1 in Traffic Railing/Noise Wall not shown for clarity)

**NOTES:**

1. Place 10 ~ Bars 5B inside Bars 5U1 as shown.
2. For Reinforcing Steel spacing, see Typical Section Thru Spread Footing - Option B on Sheet 3.
3. Provide 3" lip when optional construction joint is used.

**ESTIMATED L-SHAPED SPREAD FOOTING QUANTITIES**

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<td>Concrete (Foot)</td>
<td>CY/FT</td>
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<td>Reinforcing Steel (Typical)</td>
<td>LB/FT</td>
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<td>Additional Rein. @ Expansion Joint</td>
<td>LB</td>
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(Subtract 12.69 lb/ft from typical reinforcing steel quantity shown on Index No. 5210 to account for the absence of Stirrup Bars 5V and 5S1 in L-Shaped Spread Footings.)

**CROSS REFERENCE:**

For location of Section A-A, see Sheet 1.
1. Construct Perimeter Walls in accordance with Specification Section 534.

2. Choice of either Precast Option or Masonry Option is at the discretion of the Contractor. Contractor must also select the desired foundation type. Modifications to this Index is restricted to those required for geometric needs only.

3. Post spacing is measured from centerline to centerline of foundation element. For this index, posts and foundation elements have been designed for 20 ft. spacings. Use post spacing less than 20 feet only at changes in horizontal alignment, wall terminations or to accommodate steep grades.

4. See "Perimeter Wall Data Tables" in the plans for project requirements.

5. Field verify the locations of all overhead and underground utilities shown in the Wall Control Drawings.

### PRECAST OPTION NOTES:

6. WALL NOTES:
   - Walls may consist of either a single height panel or two stacked panels. Minimum panel height is 4'-8".
   - Only when reduced overhead clearance between posts prohibits installation of panels from the top, side-installed panels are allowed. After panel is centered between posts, grout between panel ends and posts.

7. CONCRETE AND GROUT:
   - Cast-in-Place and Precast Concrete: Class IV
   - Grout for Auger Cast Piling: Minimum 28 Day Strength = 5500 psi
   - Minimum Compressive Strength for Form Removal and Handling of Posts, Panels and Precast Spread Footings:
     - 2,500 psi for horizontally cast post, panels and precast spread footings.
     - 2,000 psi for vertically cast panels or when lift-up form tables are used for horizontally cast panels.

8. REINFORCING STEEL:
   - Concrete Cover: 1 3/8" unless otherwise noted.
   - In addition to the requirements of Specification Section 415, tie post and pile stirrups at the following locations as a minimum:
     - Post Stirrups - Tie at all four corner bars and at every third interior bar intersection.
     - Pile Stirrups - Tie to the main vertical reinforcing at alternate intersections.

9. BEARING PADS:
   - Pads for Collar or Pedestal Bearing Points and between stacked panels may be either Plain or Fiber Reinforced Pads, in accordance with Specification Section 932 for ancillary structures.

10. CASTING TOLERANCES:
    - Overall Height & Width: +/- 3/8".
    - Thickness: +/- 3/16".
    - Plane of side mold: +/- 3/32".
    - Openings: +/- 3/32".
    - Out of Square: 1/2" per 6 ft, but not more than 3/4" total along any side.
    - Warping: 1/8" per foot distance to nearest corner.
    - Bowing: 1/240 panel dimension.

11. PILING:
    - Construct Auger Cast Piling in accordance with the Plans and Specification Section 455.

### MASONRY OPTION NOTES (CONT.):

D. Fully Grout all cells with horizontal or vertical reinforcing bars.
E. Use reinforcing bar positioners to maintain vertical and horizontal bar placement.
F. Fully grout first three courses of the wall.
G. Joint Reinforcement. Use W 1.2 (9mm) galvanized ladder reinforcing spaced at 10" vertically. Provide special accessories for corners, intersections, etc. Joint reinforcing shall be continuous except it shall not pass through vertical masonry control joints. Lap joint reinforcing a minimum of 6".
H. Construct expansion joints in the foundation at 90 foot maximum intervals, and directly below a wall control joint.
I. Dowel Load Transfer Devices will be ASTM A 36 smooth round bars hot-dip galvanized in accordance with Specification Section 963. Install Dowel Load Transfer Devices in accordance with Specification Section 230.
J. For spread footings, use a walk-behind compactor of at least 600 lbs. in weight. Obtain a minimum density of 95% of the maximum dry density as determined by FM 1 T-180. Perform soil density tests at 100 foot intervals.
K. Protect walls during construction from soil, grout or mortar stains. Clean wall as work progresses by dry brushing to remove mortar fins and smears before tooling joints.
L. Use soap and water to keep clean walls. If stain removal is necessary, use a cleaning method indicated in NCMA TEK 8-2A applicable to the type of stain on the exposed surface.
M. During construction, cover top of walls, with waterproof sheeting at the end of each day's work, or when construction is not in progress. Extend sheeting a minimum of 2 feet down each side and secure in place.
N. Comply with Hot Weather Requirements in ACI 530.1.

### MASONRY OPTION NOTES (CONT.):

1. Concrete Masonry Units (CMU): Provide normal weight blocks.
2. Aggregate for Grout: Meet the requirements of ASTM C404 or Specification Section 901 size 8 or 89.
3. Store masonry accessories and reinforcing to prevent corrosion and accumulation of dirt and oil.
4. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp or exceeded the manufacturers shelf life.
5. For spread footings, use a walk-behind compactor of at least 600 lbs. in weight. Obtain a minimum density of 95% of the maximum dry density as determined by FM 1 T-180. Perform soil density tests at 100 foot intervals.
6. Protect walls during construction from soil, grout or mortar stains. Clean wall as work progresses by dry brushing to remove mortar fins and smears before tooling joints.
7. Use soap and water to keep clean walls. If stain removal is necessary, use a cleaning method indicated in NCMA TEK 8-2A applicable to the type of stain on the exposed surface.
8. During construction, cover top of walls, with waterproof sheeting at the end of each day's work, or when construction is not in progress. Extend sheeting a minimum of 2 feet down each side and secure in place.
DRAINAGE HOLES TYPES A, B, C & D

* Hole Types A, B, C, & D refer to distance from bottom of panel/wall to center of the pipe.

NOTES:
1. Drainage holes may be formed with 4" NPS PVC pipe that may remain in place.
2. See Wall Control drawings for number, Type and location/spacing of drainage holes.
**REVISION NO.**

**INDEX NO.**

**DESCRIPTION:**

 FY 2017-18
DESIGN STANDARDS

**PERIMETER WALLS**

**PRECAST OPTION - TYPICAL DETAILS**

**NOTE:** Shop Drawings shall include specific pivoting point details of panel ends at locations where the deflection angle (20°) between panels exceeds 20°.

**PIVOTING JOINT DETAILS**

**TYPICAL ELEVATION**

(Front Face Shown, Textured Finish not Shown for Clarity)

**SECTION D-D**

**SECTION E-E**

**ELEVATION STEP AT TOP OF WALL**
(Precast Panel Cap not Shown)

**ELEVATION STEP AT BOTTOM OF WALL**
(Auger Cast Pile not Shown)

**TYPICAL PLAN**

* Nominal embedment (not including tolerances)
**TYPICAL PANEL ELEVATION**

*In lieu of utilizing the standard pick up points below, panels may be cast vertically or cast horizontally then tilted upright, using lift-cables prior to lifting from form. In this case, pick points must be placed in the top of panels only and transported maintaining the vertical orientation. If these criteria are met, the vertical steel may be reduced to #4 Bars @ 1'-3" (As=0.16 in.²/ft.).

**STANDARD PICK UP POINTS FOR PANELS**
(Panels shall be rotated about long axis only)

**NOTE:**
At the Contractor’s option, Smooth or Deformed Welded Wire Reinforcement may be used (equal area).

**Horizontal Steel:** #4 Bars @ 7/8" (As=0.32 in.²/ft.) (Typ.)

**Vertical Steel:** #4 Bars @ 10" (As=0.24 in.²/ft.) (Typ.)

**Legend:**
- Texture
- Front Face
- Pick up points
- Chamfer (Typ.)
- Reinforcing Mat

**Section F-F**

**Detail "B" - Side-Installed**
(Typ. Both Ends)

**Detail "B" - Top-Installed**
(Typ. Both Ends)

**Section G-G**

**Panel Height (H):** 0.207 H

**Panel Length (L):**
- 0.207 L
- 0.586 L
- 0.207 L

**PRECAST OPTION - TYPICAL PANEL DETAILS**

**Perimeter Walls**

**Design Standards**

**FY 2017-18**

**Index No.**

5250

**Sheet No.**

5 of 10
LOW CLEARANCE OPTION

NOTES:
1. See Shop Drawing for Post Lengths.
**typical post**

**low clearance option**

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**standard post placement in auger cast pile**

(standard post shown, 45° and 90° corner posts similar)

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**perimeter walls**

**fy 2017-18**

**design standards**

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**precast option - post placement & pile reinforcing steel details**

**index no.**

5250

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**sheet no.**

7 of 10

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**notes:**

1. for reinforcing steel sizes and pile lengths, see table 1, sheet 6.
2. for corner posts, see sheet 8.
3. for typical post section dimensions, see sheet 6.
TYPICAL ELEVATION
(T-Footing Showed, Trench Footing Similar)

SECTION K-K
(Shown at Cell Without Vertical Reinforcing)

SECTION M-M
PILASTER REINFORCING AND WALL CONTROL JOINT DETAIL

Table 2

<table>
<thead>
<tr>
<th>Wind Speed Category</th>
<th>Masonry Walls (8x8x16)</th>
<th>Foundations</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Bars V1</td>
<td>F1 &amp; F2</td>
</tr>
<tr>
<td>150</td>
<td>#5</td>
<td>#5</td>
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<tr>
<td>200</td>
<td>#5</td>
<td>#5</td>
</tr>
</tbody>
</table>

Notes:
1. End vertical reinforcing bars 1½" from top of bond beam blocks and horizontal bars 1½" from edge of control joints.
2. Do not continue horizontal #4 bond beam reinforcing through control joint.
3. Use stainless steel joint stabilizing anchors spaced at 16" vertically at all control joints. Install per manufacturer's instructions.
4. Seal Control Joints with backer rod and Type "A" silicone sealant (top and both sides).
5. See Sheet 10 for Bar placement details.
6. For Pilaster Cap Details, see Sheet 2.

BAR F1
Length = 5'-2"

All bar dimensions in bending diagram are out to out. All bars not shown in the bending diagrams are straight.

BAR BENDING DETAIL

MASONRY OPTION

Table 2

Notes:
1. End vertical reinforcing bars 1½" from top of bond beam blocks and horizontal bars 1½" from edge of control joints.
2. Do not continue horizontal #4 bond beam reinforcing through control joint.
3. Use stainless steel joint stabilizing anchors spaced at 16" vertically at all control joints. Install per manufacturer's instructions.
4. Seal Control Joints with backer rod and Type "A" silicone sealant (top and both sides).
5. See Sheet 10 for Bar placement details.
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SECTION M-M
PILASTER REINFORCING AND WALL CONTROL JOINT DETAIL

MASONRY OPTION

Table 2

Notes:
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SECTION M-M
PILASTER REINFORCING AND WALL CONTROL JOINT DETAIL

MASONRY OPTION

Table 2

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SECTION M-M
PILASTER REINFORCING AND WALL CONTROL JOINT DETAIL

MASONRY OPTION

Table 2

Notes:
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SECTION M-M
PILASTER REINFORCING AND WALL CONTROL JOINT DETAIL

MASONRY OPTION

Table 2

Notes:
1. End vertical reinforcing bars 1½" from top of bond beam blocks and horizontal bars 1½" from edge of control joints.
2. Do not continue horizontal #4 bond beam reinforcing through control joint.
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4. Seal Control Joints with backer rod and Type "A" silicone sealant (top and both sides).
5. See Sheet 10 for Bar placement details.
6. For Pilaster Cap Details, see Sheet 2.
REINFORCING AT PILASTER WITH EXPANSION JOINT
(Step Shown, without Step Similar)
(T-Footing Shown, Trench Footing Similar)

1. For location of Sections K-K and L-L see Sheet 9.
2. Provide and install ½ Preformed Expansion Joints with 3 - 1" Ø Dowel Load Transfer Devices at 90' Max. as shown. See Sections L-L for placement details.
3. For reinforcing sizes and spacings, see Table 2, Sheet 9.
4. Pairs F1, V1 are required in the wall cells on both sides of pilasters, plus a pair in each pilaster cell. Space wall reinforcing per Table 2, Sheet 9.

Notes:

PERIMETER WALLS

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MASONRY OPTION

FY 2017-18

DESIGN STANDARDS

PERIMETER WALLS