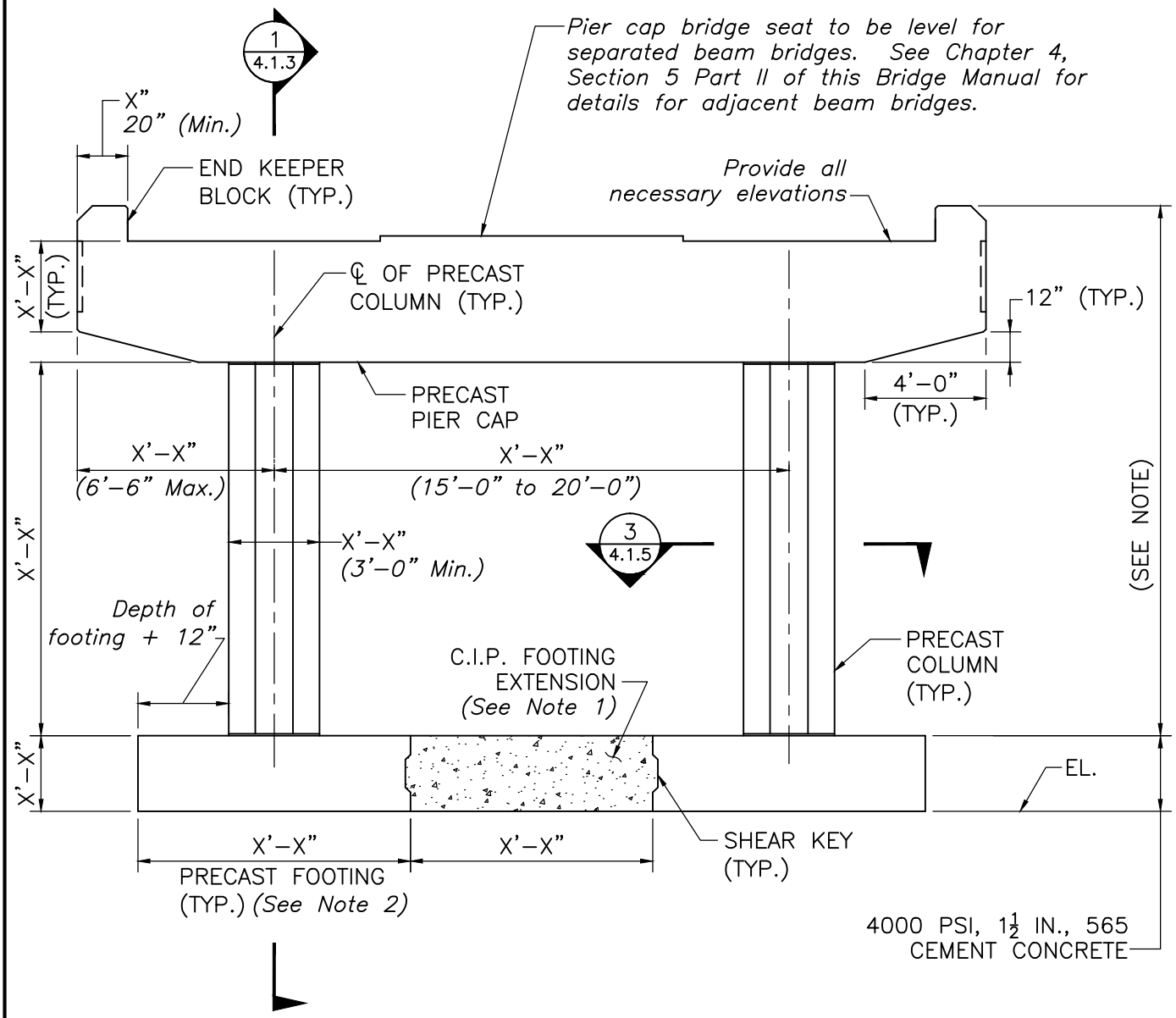


NOTE:

4000 PSI, ¾ IN., 585 HP CEMENT CONCRETE. *(corrosive environments)*
4000 PSI, ¾ IN., 610 CEMENT CONCRETE. *(non–corrosive environments)*

TYPICAL TWO COLUMN PIER FRONT ELEVATION

SCALE: ¼" = 1'–0"

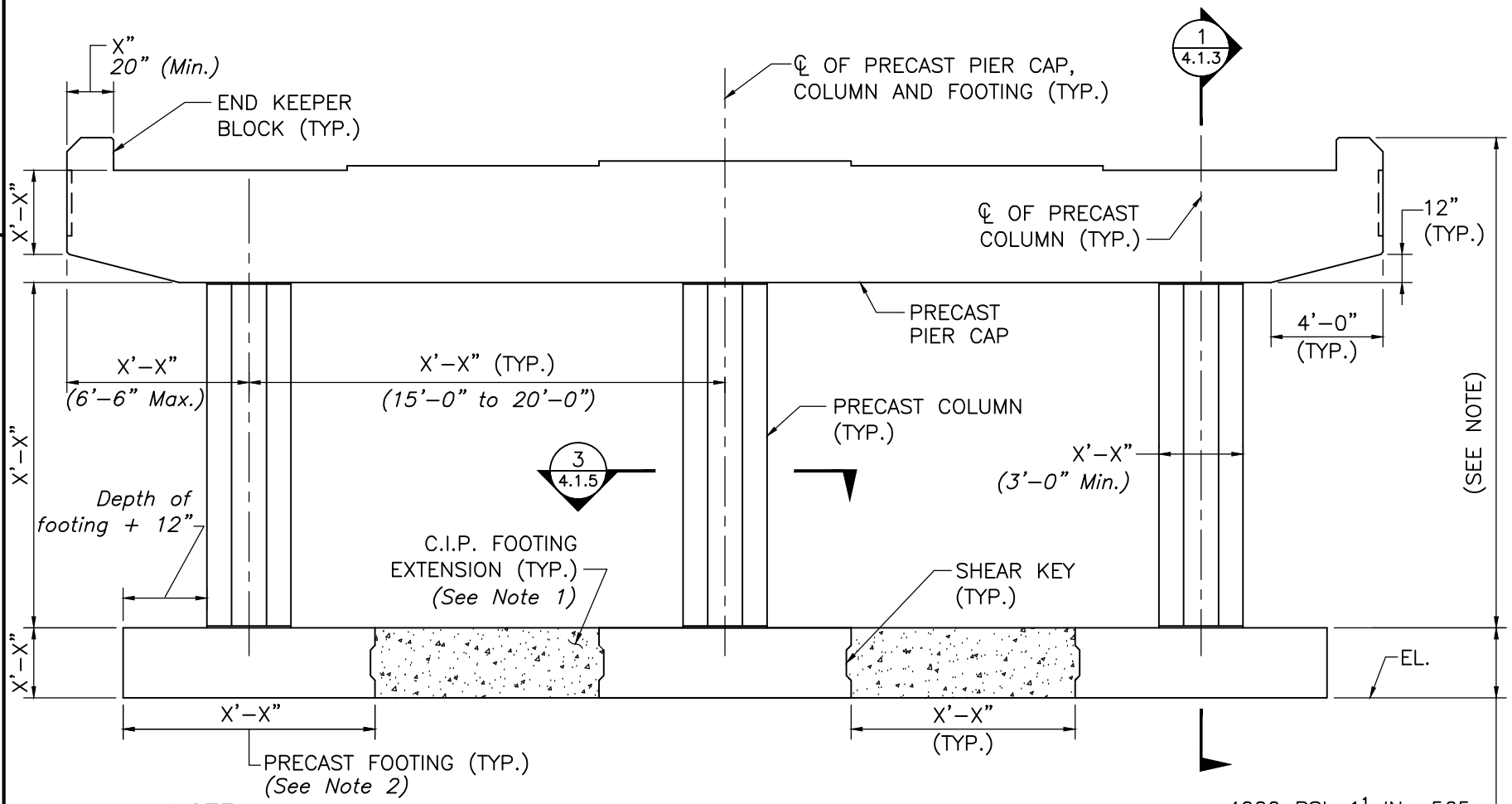
NOTES:

1. *C.I.P. footing extensions are required when precast footing exceeds shipping limits.*
2. *The narrowest width of the element and any projecting reinforcing should be kept below 14 feet due to shipping limitations.*
3. *Include pier cap ends details from Dwg. No. 3.5.6, Part II of this Bridge Manual on Construction Drawings.*
4. *Use continuous footings where footing is on subsoil or piles. Use individual footings where footing is on rock.*
5. *See Designer Notes on Dwg. No. 3.5.2, Part II of this Bridge Manual.*

massDOT Highway Division LRFD BRIDGE MANUAL, PART III	TYPICAL TWO COLUMN PIER FRONT ELEVATION PRECAST PIERS	DATE OF ISSUE JUNE 2013 DRAWING NUMBER **4.1.1**

TYPICAL TRIPLE COLUMN PIER FRONT ELEVATION

PRECAST PIERS



NOTE:

4000 PSI, ¾ IN., 585 HP CEMENT CONCRETE. *(corrosive environments)*
4000 PSI, ¾ IN., 610 CEMENT CONCRETE. *(non–corrosive environments)*

TYPICAL THREE COLUMN PIER FRONT ELEVATION

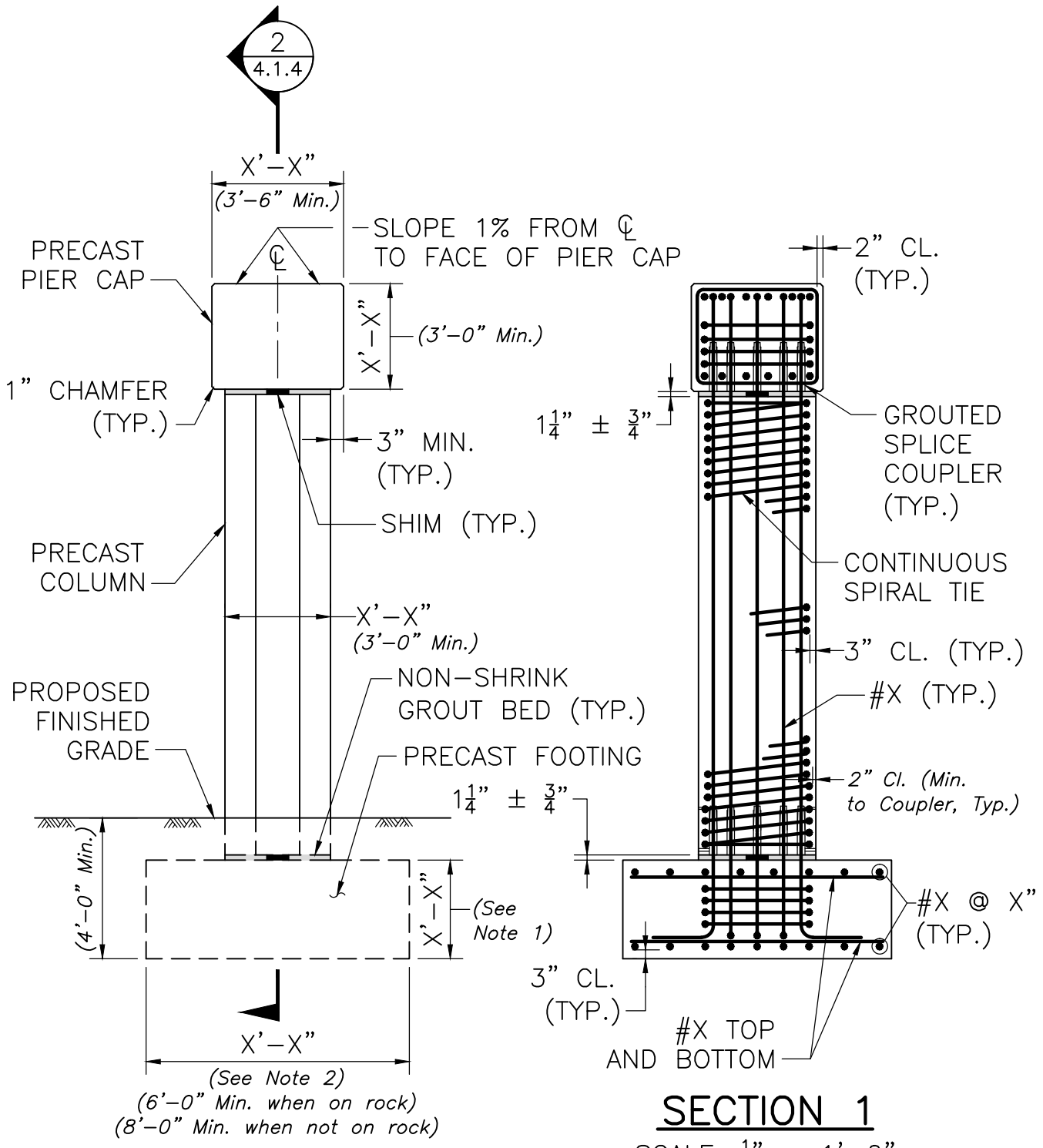
SCALE: ¼" = 1'–0"

NOTES:

1. *Use continuous footings where footing is on subsoil or piles. Use individual footings where footing is on rock.*
2. *The narrowest width of the element and any projecting reinforcing should be kept below 14 feet for shipping reasons.*
3. *For precast pier reinforcement, see Dwg. No. 4.1.4 and include on construction drawings.*
4. *See Designer Notes on Dwg. No. 3.5.2, Part II of this Bridge Manual.*
5. *For piers with 4 or more columns, use combinations of 2 and 3 column piers. The pier caps need not be continuous.*

DATE OF ISSUE
JUNE 2013

DRAWING NUMBER
4.1.2



SECTION 1

SCALE: ¼" = 1'–0"

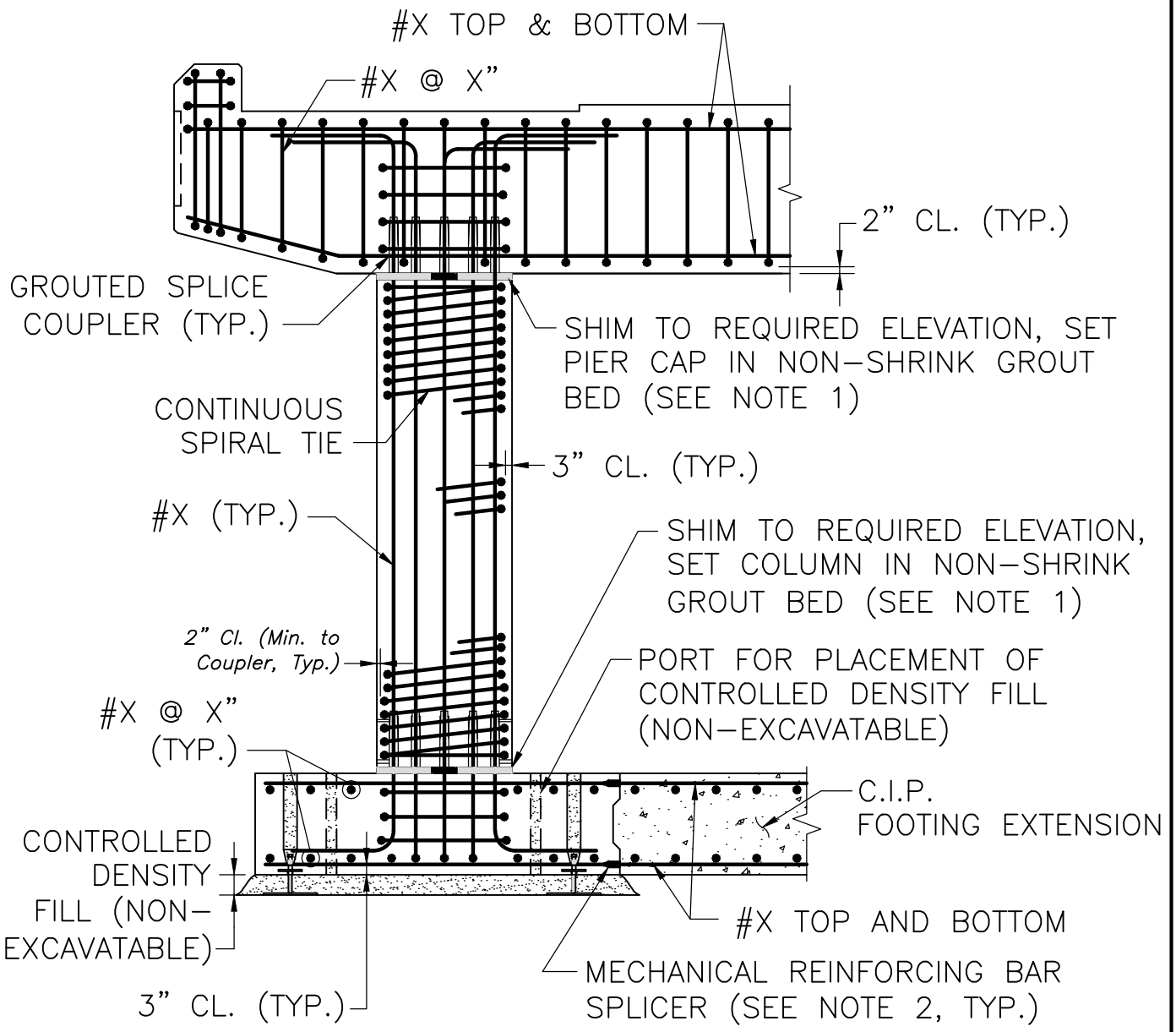
TYPICAL PIER SIDE ELEVATION

SCALE: ¼" = 1'–0"

NOTES:

1. *Maximum depth of footing shall be 3'–0" for footings on subsoil, 3'–6" for footings on piles, and 2'–6" for footings on rock.*
2. *The narrowest width of the element and any projecting reinforcing should be kept below 14 feet for shipping reasons.*

MassDOT Highway Division LRFD BRIDGE MANUAL, PART III	TYPICAL PIER SIDE ELEVATION AND SECTION PRECAST PIERS	DATE OF ISSUE JUNE 2013 DRAWING NUMBER **4.1.3**



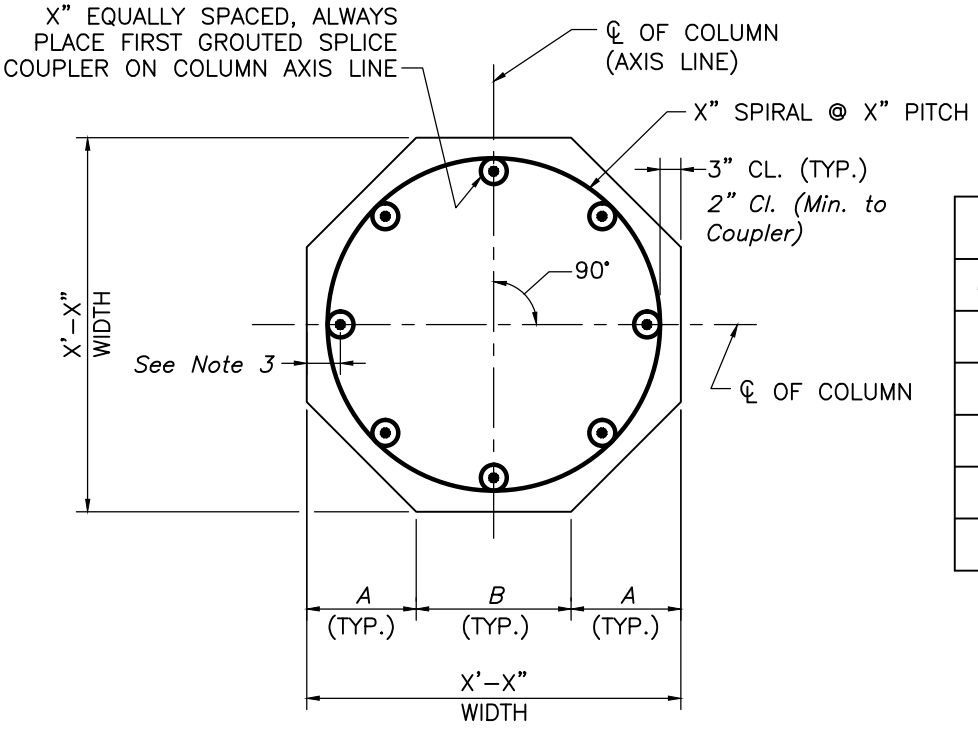
NOTES:

1. PRE-BED SEAT WITH NON-SHRINK GROUT WITH THICKNESS SLIGHTLY MORE THAN SHIM STACK.
2. MECHANICAL REINFORCING BAR SPLICERS MAY BE SUBSTITUTED WITH LAP SPLICES.
3. LEVELING BOLTS SHOWN. CONTRACTOR MAY USE OTHER MEANS OF SETTING GRADE.

SECTION 2

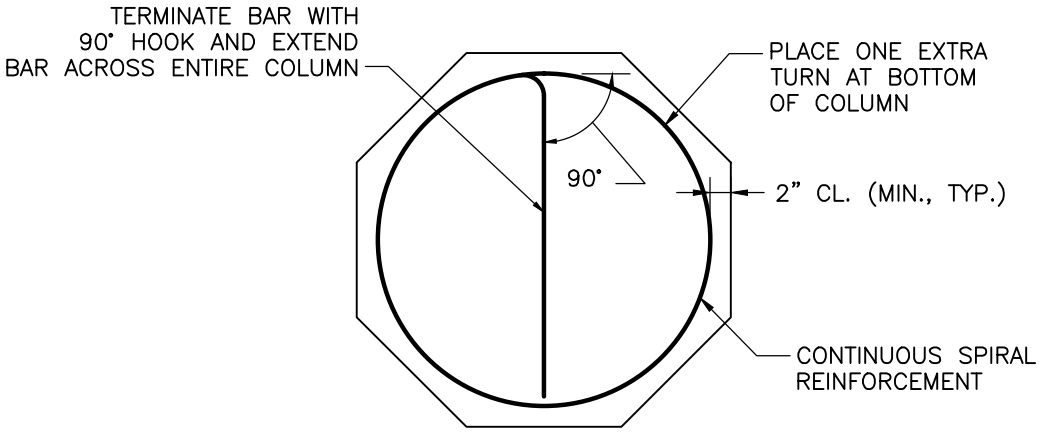
SCALE: $\frac{1}{4}$" = 1'-0"

MassDOT Highway Division LRFD BRIDGE MANUAL, PART III	TYPICAL PIER FRONT SECTION PRECAST PIERS	DATE OF ISSUE JUNE 2013 DRAWING NUMBER **4.1.4**



COLUMN DIMENSIONS		
WIDTH (ft)	A (in)	B (in)
3'-0"	$10\frac{9}{16}$	$14\frac{15}{16}$
3'-6"	$12\frac{5}{16}$	$17\frac{3}{8}$
4'-0"	$14\frac{1}{16}$	$19\frac{7}{8}$
4'-6"	$15\frac{13}{16}$	$22\frac{3}{8}$
5'-0"	$17\frac{9}{16}$	$24\frac{7}{8}$

SECTION 3
SCALE: 1" = 1'-0"



NOTE:

COLUMN VERTICAL REINFORCEMENT NOT SHOWN FOR CLARITY.

SPIRAL REINFORCEMENT TERMINATION DETAIL
SCALE: 1" = 1'-0"

NOTES:

1. *Details shown are based on providing longitudinal reinforcing equal to approximately 1.5% of the gross area of the column. Actual reinforcing will vary by project based on the design.*
2. *Include spiral reinforcement splice detail from Dwg. No. 3.5.4, Part II of this Bridge Manual, on Construction Drawings.*
3. *Design column based on the maximum size coupler. See Dwg. No. 5.1.6 for details.*

GROUTED SPLICE COUPLER CRITICAL MAXIMUM DIMENSIONS		
BAR SIZE	OUTSIDE DIAMETER (IN.)	LENGTH OF COUPLER (IN.)
4	2.625	14.125
5	3.000	14.125
6	3.000	14.125
7	3.000	18.75
8	3.500	18.75
9	3.500	18.75
10	3.500	23.5
11	3.500	23.5
14	4.000	28.375
18	5.000	39.625

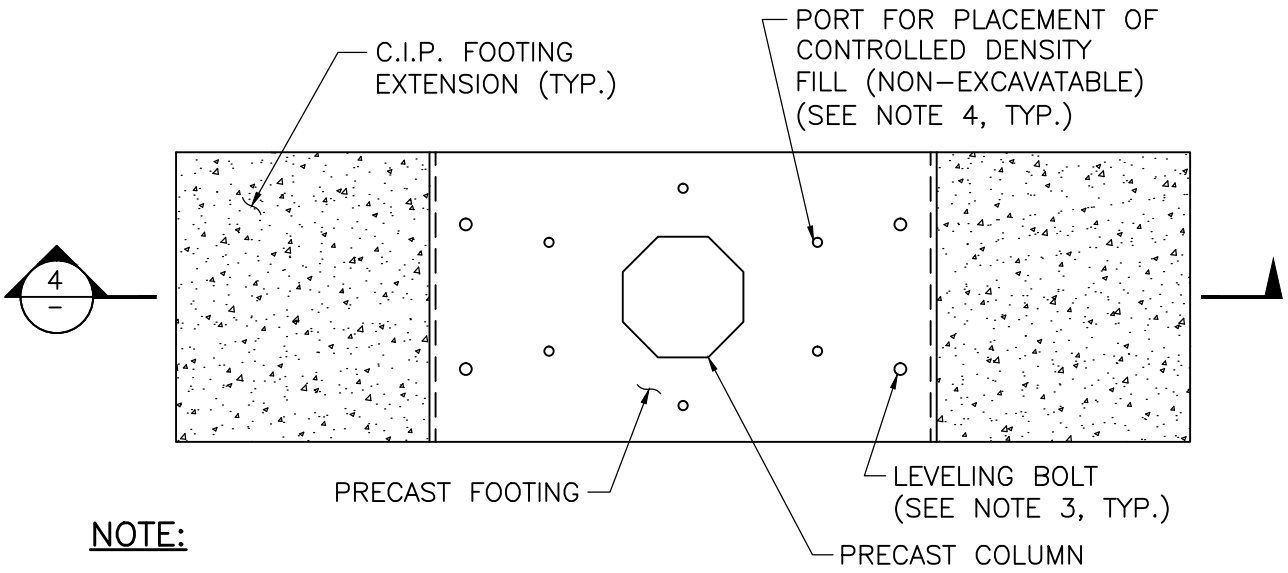
NOTES:

1. Octagonal cross sections are preferred due to the ease of fabrication. Other sections are allowed.
2. Shear reinforcement used for transverse column confinement reinforcement consists of spirals or hoops.
3. It is recommended to place the first grouted splice coupler on the column axis line to facilitate ease of construction.
4. Some grouted splice coupler manufacturers allow the use of oversized couplers in order to increase the setting tolerance for elements. This should only be allowed if supported by test results confirming the ability of the proposed oversized coupler to fully develop the rebar in question.
5. The table provided here should be used for the reinforcing detailing of the precast elements. In most cases, including the potential use of oversized couplers, the critical maximum dimensions provided in the table will be sufficient to satisfy the minimum requirements for spacing, cover, and embedment lengths of the precast element's reinforcement and thus, during the development of the shop drawings, the Fabricator shall make sure that these critical maximum dimensions are not exceeded. During the review of the shop drawings the Designer shall verify that the critical maximum dimensions provided in the table are not exceeded based on the actual coupler used.

Sources: Material specifications from the three most common suppliers (NMB Splice Sleeve, Lenton–Erico, Dayton Superior)

GROUTED SPLICE COUPLER CONNECTION SEQUENCE:

1. The grouting procedure shall be completed by Contractor's personnel that is experienced in the installation of grouted sleeves. Manufacturer training may be required for inexperienced staff.
2. Follow the written installation procedures of the coupler manufacturer. The following are general procedures that apply to most coupler manufacturers.
3. It is recommended that the element with the reinforcement bar extensions be fabricated with extended lengths.
4. Survey location and elevation of lower element.
5. Determine the required reinforcing bar extension lengths and the required shim heights based on the survey.
6. Cut the bar extensions to the required length based on the survey and the coupler manufacturer's recommendations. For coated bars, the ends of the bars need not be re–coated.
7. Place grout bed on top of lower element. The use of extra grout that is allowed to flow out during element placement is recommended. In lieu of pre–placement of grout bed, the grout can be flowed into place after element erection but prior to grouting of couplers.
8. Erect upper element to within the specified erection tolerances. Prevent bedding grout from flowing into coupler.
9. Maintain integrity of grout bed during setting operation. Repair grout that is displaced or gaps that develop in the grout joint using hand tools.
10. Brace the upper element.
11. Install grout in couplers following the manufacturer's written procedures. If the coupler is below the joint, the coupler grout can be installed prior to application of bedding grout.
12. Erection of subsequent elements above a connection should not commence until the connection has achieved adequate strength as determined through strength testing of the grout. The timing of subsequent construction steps should be specified in the bridge assembly plan.

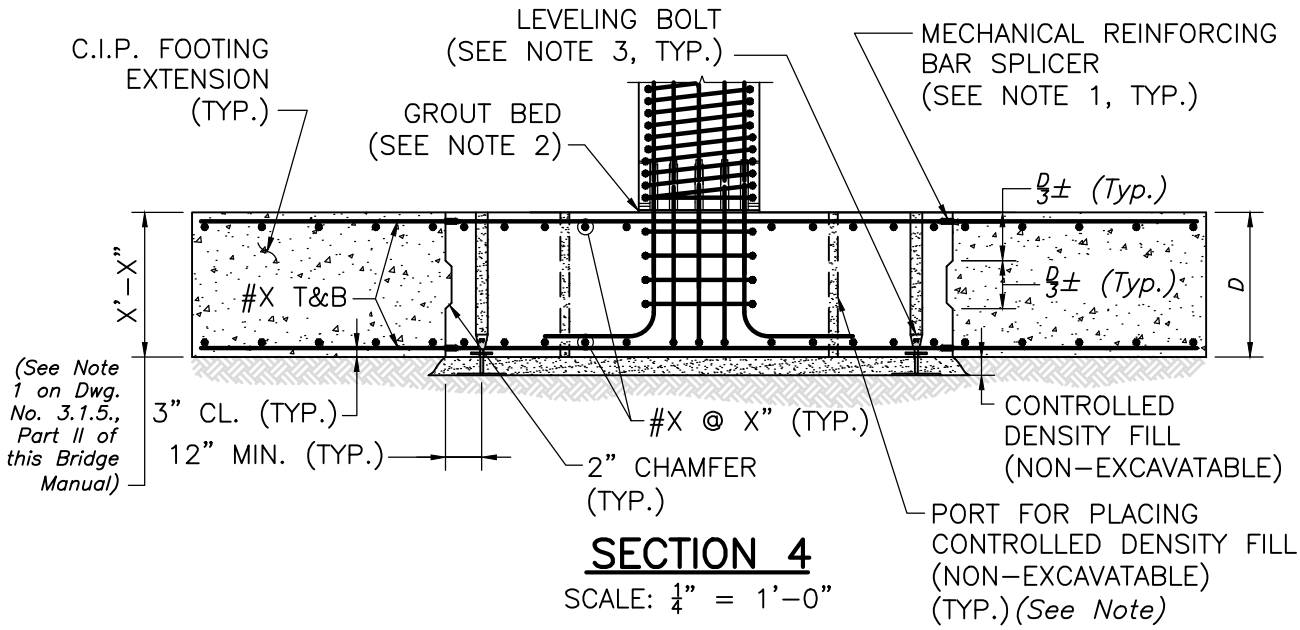


NOTE:

REINFORCEMENT NOT SHOWN FOR CLARITY.

PRECAST SPREAD FOOTING – PLAN

SCALE: $\frac{1}{4}$" = 1'–0"



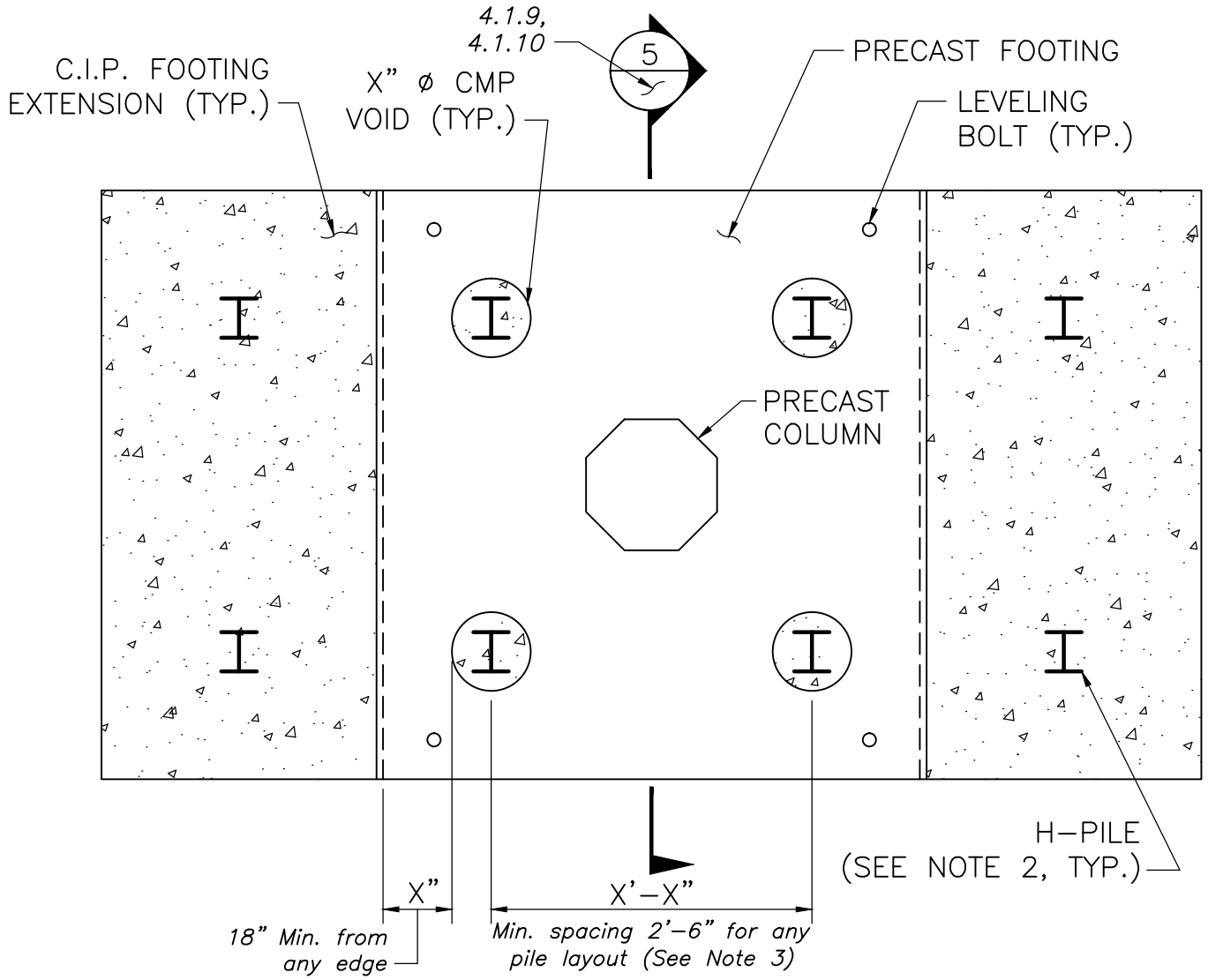
SECTION 4

SCALE: $\frac{1}{4}$" = 1'–0"

PRECAST FOOTING NOTES:

1. MECHANICAL REINFORCING BAR SPLICERS MAY BE SUBSTITUTED WITH LAP SPLICES.
2. PRE–BED SEAT WITH NON–SHRINK GROUT WITH THICKNESS SLIGHTLY MORE THAN SHIM STACK.
3. LEVELING BOLTS SHOWN. CONTRACTOR MAY USE OTHER MEANS OF SETTING GRADE.
4. SPACE PORTS FOR CONTROLLED DENSITY FILL (NON–EXCAVATABLE) AT APPROXIMATELY 4'–0" ON CENTER.

NOTE:
For large footings, consider details on Dwg. No. 4.1.10.



NOTES:

1. REINFORCEMENT NOT SHOWN FOR CLARITY.
2. AFTER EACH PILE IS DRIVEN, THE TOP OF THE PILE SHALL BE WITHIN 3" OF PLAN LOCATION. CONFORMANCE TO THIS TOLERANCE IS OF EXTREME IMPORTANCE.

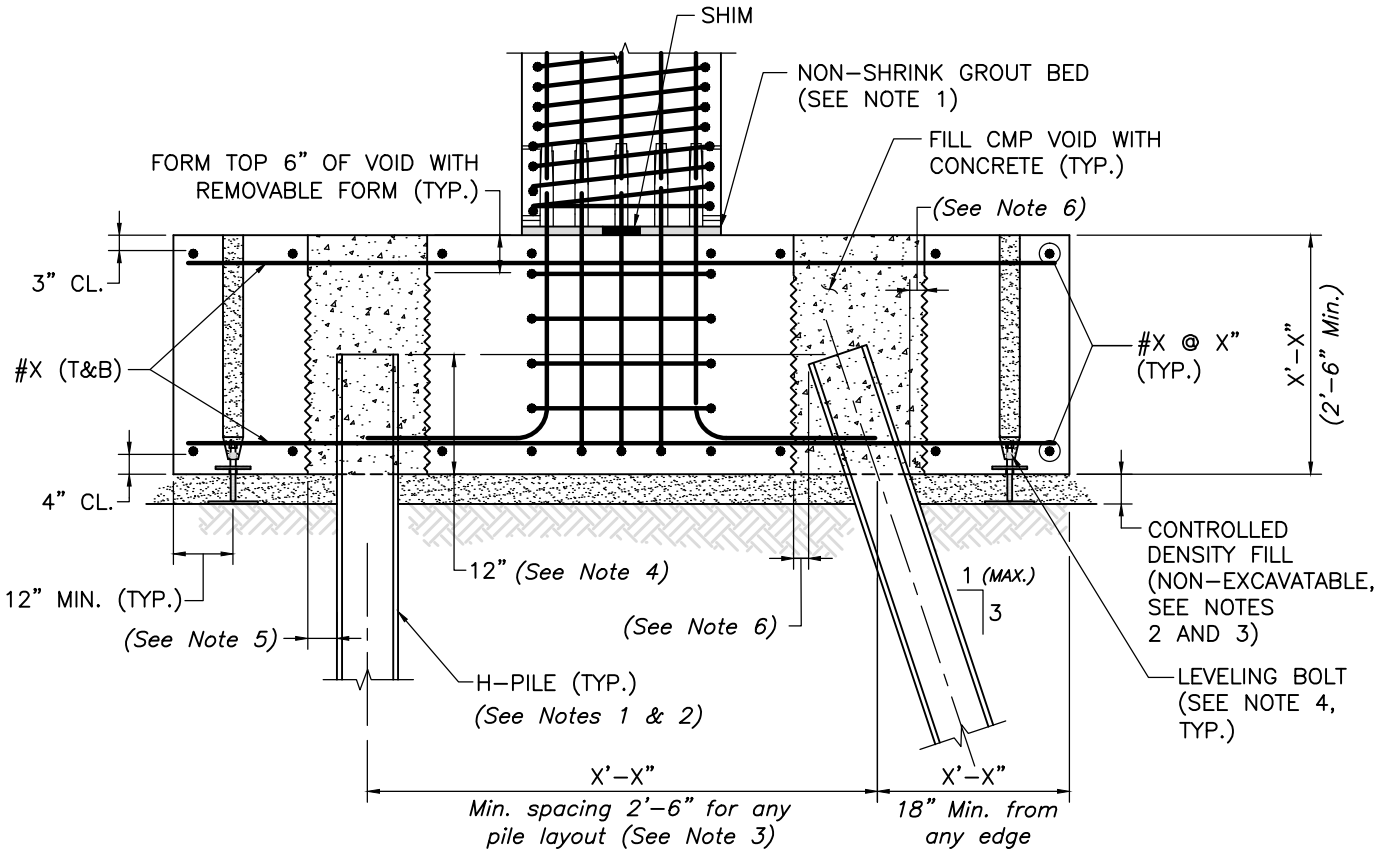
PRECAST FOOTING ON H–PILES – PLAN

SCALE: $\frac{1}{4}$" = 1'–0"

NOTES:

1. *Use this detail for footings with widely spaced piles. For other footings use details on Dwg. No. 4.1.10.*
2. *See Dwg. No. 4.1.9 for Designer Notes.*

massDOT Highway Division LRFD BRIDGE MANUAL, PART III	PRECAST FOOTING ON H–PILES – PLAN PRECAST PIERS	DATE OF ISSUE JUNE 2013 DRAWING NUMBER **4.1.8**



NOTES:

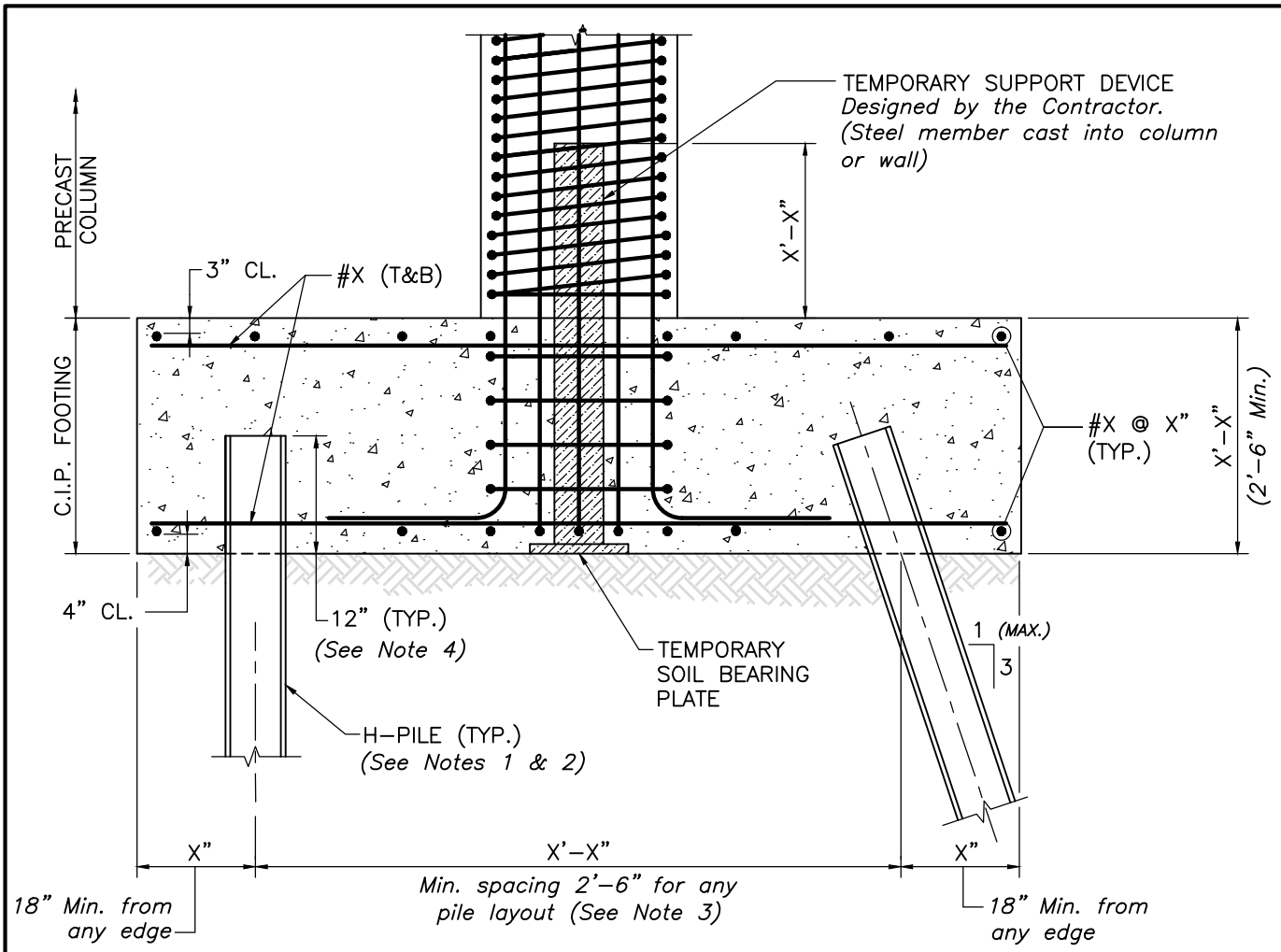
1. PRE–BED SEAT WITH NON–SHRINK GROUT WITH THICKNESS SLIGHTLY MORE THAN SHIM STACK.
2. CARE SHALL BE TAKEN TO PREVENT CONTROLLED DENSITY FILL (NON–EXCAVATABLE) FROM ENTERING AND OCCUPYING, FULLY OR PARTIALLY, CMP VOIDS.
3. THE CONTRACTOR MAY USE CONCRETE IN LIEU OF CONTROLLED DENSITY FILL (NON–EXCAVATABLE) TO FACILITATE CONSTRUCTION. HOWEVER, NO ADDITIONAL COMPENSATION SHALL BE ASSUMED FOR THIS SUBSTITUTION.
4. LEVELING BOLTS SHOWN. CONTRACTOR MAY USE OTHER MEANS OF SETTING GRADE.

SECTION 5

SCALE: $\frac{1}{2}$" = 1'–0"

NOTES:

1. *Show and note total number of piles in plan view of pile layout for each substructure.*
2. *Note the estimated pile tip elevations on the Construction Drawings.*
3. *Maximum spacing of piles is 10'–0".*
4. *Embedment of piles may exceed 12", if required.*
5. *The inside diameter of the CMP shall be equal, as a minimum, to the largest out–to–out pile dimension +8", rounded up to the nearest 3". The smallest CMP which satisfies the required above minimum dimension should be used.*
6. *For battered piles the minimum clear dimension from the edge of the pile to the inside wall of the CMP should be equal to 4".*
7. *Use this detail for footings with widely spaced piles. For other footings, use details on Dwg. No. 4.1.10.*



CONSTRUCTION SEQUENCE:

1. PREPARE SUB–GRADE AND INSTALL PILES (IF PILE SUPPORTED).
2. SET SOIL BEARING PLATE.
3. SET PRECAST COLUMN OR WALL ELEMENT. SHIM AS REQUIRED TO MEET THE REQUIRED GRADE.
4. BRACE COLUMN OR WALL TO PREVENT OVERTURNING.
5. INSTALL FOOTING REINFORCING.
6. CAST AND CURE FOOTING.
7. REMOVE BRACING.

SECTION 5

SCALE: $\frac{1}{2}$" = 1'–0"

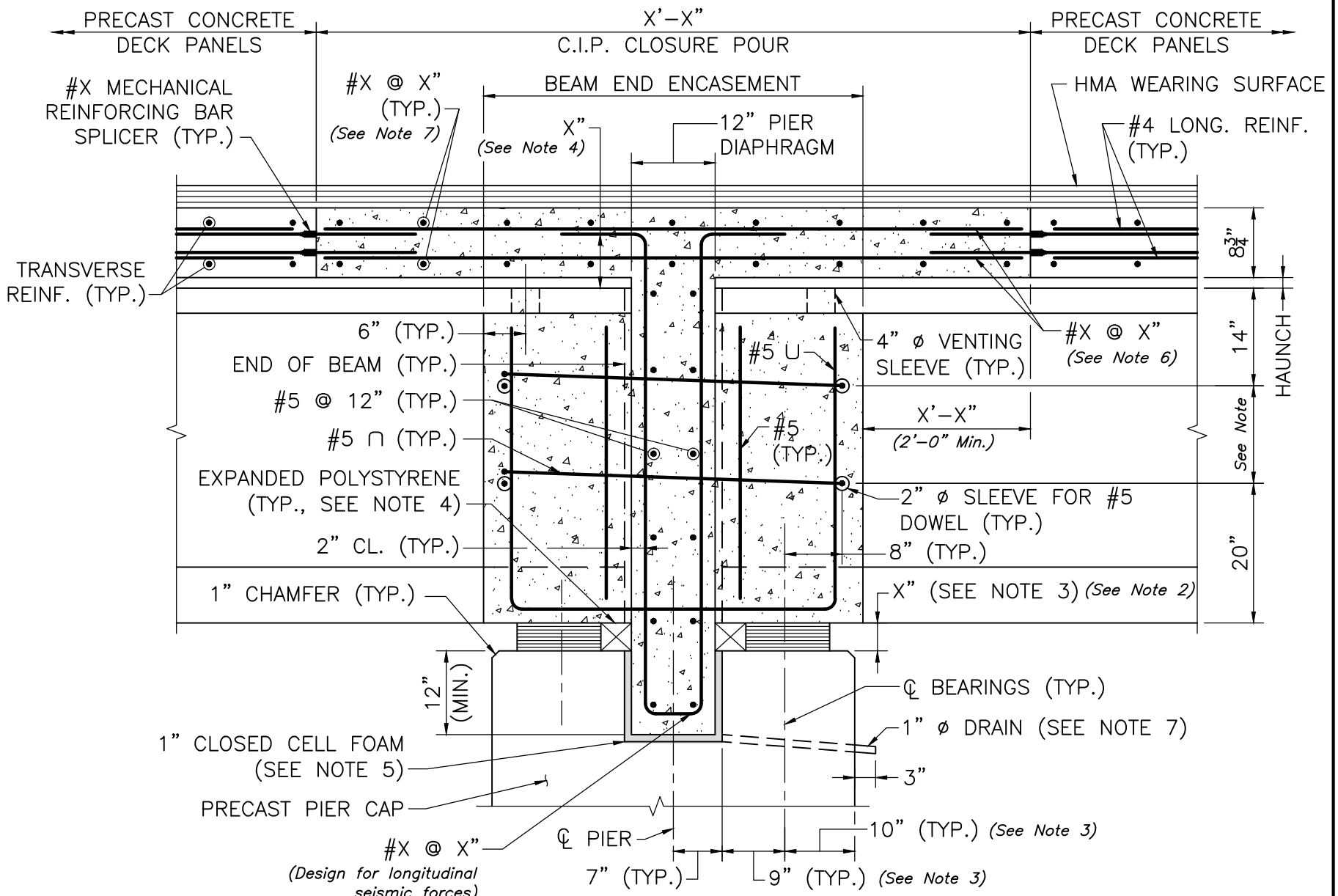
NOTES:

1. *Show and note total number of piles in plan view of pile layout for each substructure.*
2. *Note the estimated pile tip elevations on the Construction Drawings.*
3. *Maximum spacing of piles is 10'–0".*
4. *Embedment of piles may exceed 12", if required.*
5. *Use this detail for footings with closely spaced piles or for large pile supported footings.*
6. *This detail can be used for larger spread footings also.*

MassDOT Highway Division LRFD BRIDGE MANUAL, PART III	CAST–IN–PLACE FOOTING ON H–PILES OPTION VERTICAL SECTION PRECAST PIERS	DATE OF ISSUE JUNE 2013 DRAWING NUMBER **4.1.10**

DETAILS OVER PIER FOR NEBT BEAMS

PRECAST PIERS



DETAILS OVER PIER

SCALE: ¾" = 1'–0"

NEBT BEAMS

NOTE:

See Dwg. No. 4.1.12 for Notes to be included on Construction Drawings and Designer Notes.

DATE OF ISSUE
JUNE 2013

DRAWING NUMBER
4.1.11

DETAILS OVER PIER NOTES:

(Include these Notes with details shown on Dwg. No. 4.1.11)

1. ALL REINFORCEMENT SHOWN IN THESE DETAILS SHALL BE COATED.

2. ALL PIER DIAPHRAGM AND BEAM END ENCASEMENT CONCRETE SHALL BE 4000 PSI, $\frac{3}{4}$ IN., 585 HP CEMENT CONCRETE.

3. CONTRACTOR MAY USE EXPANDED POLYSTYRENE FILLER OR A REMOVABLE FORM TO FORM THE BOTTOM OF THE BEAM END ENCASEMENT.

4. PLACE EXPANDED POLYSTYRENE FILLER UNDER THE BOTTOM FLANGE AT THE EDGE OF THE SHEAR KEY.

5. PRIOR TO PLACING PIER DIAPHRAGM CONCRETE, LINE ALL SURFACES OF THE SHEAR KEY WITH CLOSED CELL FOAM AS SHOWN. PIER DIAPHRAGM CONCRETE MAY NOT COME IN DIRECT CONTACT WITH THE PIER CAP CONCRETE MASONRY.

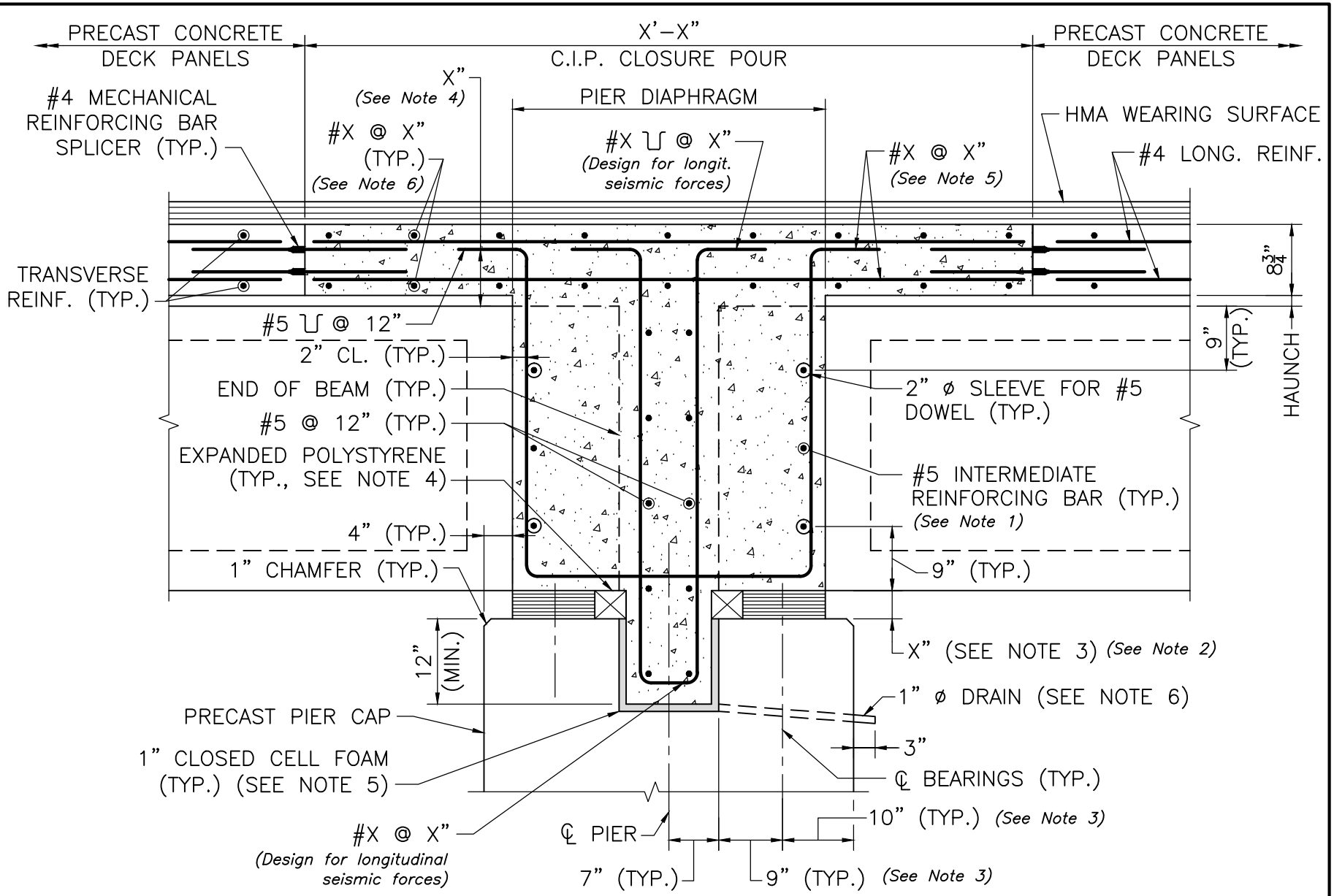
6. PROVIDE VENTING SLEEVES IN THE TOP FLANGE OF THE NEBT BEAMS AS SHOWN.

7. SLOPE SHEAR KEY DRAIN 5% (MIN.) TOWARDS FACE OF PIER CAP.

8. $\frac{3}{4}$" ø THREADED INSERTS FOR #5 REINFORCING BARS SHALL BE CAST–IN–PLACE IN THE PRECAST BEAMS BY THE FABRICATOR AND SHALL PROVIDE A MINIMUM NOMINAL TENSILE RESISTANCE OF 17 KIPS AND A MINIMUM NOMINAL SHEAR RESISTANCE OF 17 KIPS IN 3000 PSI CONCRETE.

NOTES:

1. *For NEBT 1000 use 1 dowel at midbeam,*
   For NEBT 1200 and NEBT 1400, use 2 dowels,
   For NEBT 1600 and NEBT 1800, use 3 dowels equally spaced.
2. *Dimension to be provided is equal to total thickness of bearing.*
3. *If the bearing exceeds 16" in diameter, set the 9" dimension to (Bearing Dia.)/2 + 1", and set the 10" dimension to (Bearing Dia.)/2 + 2".*
4. *The Designer shall ensure that at least 2" clear cover is maintained to the top of the deck at all locations.*
5. *Threaded inserts shall be used only on skewed bridges with a skew angle exceeding 10°. For all other bridges use 2" ø sleeves and #5 ⊏ bars as shown for typical interior bay.*
6. *To minimize the width of the closure pour, the combination of post–tensioning and continuity reinforcement may be used, if required by design.*
7. *Closure pour transverse reinforcement bar size and spacing shall be the same as for precast concrete deck panels transverse (primary) reinforcement.*
8. *See Dwg. No.'s 6.4.3 & 6.4.4, Part II of this Bridge Manual, for pier diaphragm plan and section to be included on Construction Drawings and modify the Drawings as required.*



DETAILS OVER PIER

SCALE: ¾" = 1'–0"

BOX BEAMS

NOTE:

See Dwg. No. 4.1.14 for Notes to be included on Construction Drawings and Designer Notes.

DETAILS OVER PIER FOR BOX BEAMS

PRECAST PIERS

DATE OF ISSUE JUNE 2013

DRAWING NUMBER **4.1.13**

DETAILS OVER PIER NOTES:

(Include these Notes with details shown on Dwg. No. 4.1.13)

1. ALL REINFORCEMENT SHOWN IN THESE DETAILS SHALL BE COATED.

2. ALL PIER DIAPHRAGM CONCRETE SHALL BE 4000 PSI, $\frac{3}{4}$ IN., 585 HP CEMENT CONCRETE.

3. CONTRACTOR MAY USE EXPANDED POLYSTYRENE FILLER OR A REMOVABLE FORM TO FORM THE BOTTOM OF THE PIER DIAPHRAGM.

4. PLACE EXPANDED POLYSTYRENE FILLER UNDER THE BOTTOM FLANGE AT THE EDGE OF THE SHEAR KEY.

5. PRIOR TO PLACING PIER DIAPHRAGM CONCRETE, LINE ALL SURFACES OF THE SHEAR KEY WITH CLOSED CELL FOAM AS SHOWN. PIER DIAPHRAGM CONCRETE MAY NOT COME IN DIRECT CONTACT WITH THE PIER CAP CONCRETE MASONRY.

6. SLOPE SHEAR KEY DRAIN 5% (MIN.) TOWARDS FACE OF PIER CAP.

7. $\frac{3}{4}$" ∅ THREADED MECHANICAL REINFORCING BAR SPLICERS SHALL BE CAST–IN–PLACE IN THE PRECAST BEAMS BY THE FABRICATOR AND SHALL BE EMBEDDED AS REQUIRED TO PROVIDE A MINIMUM NOMINAL TENSILE RESISTANCE OF 17 KIPS AS SPECIFIED BY THE MANUFACTURER.

NOTES:

1. *Provide headed mechanical reinforcing bar splicers by beam designation as follows:*

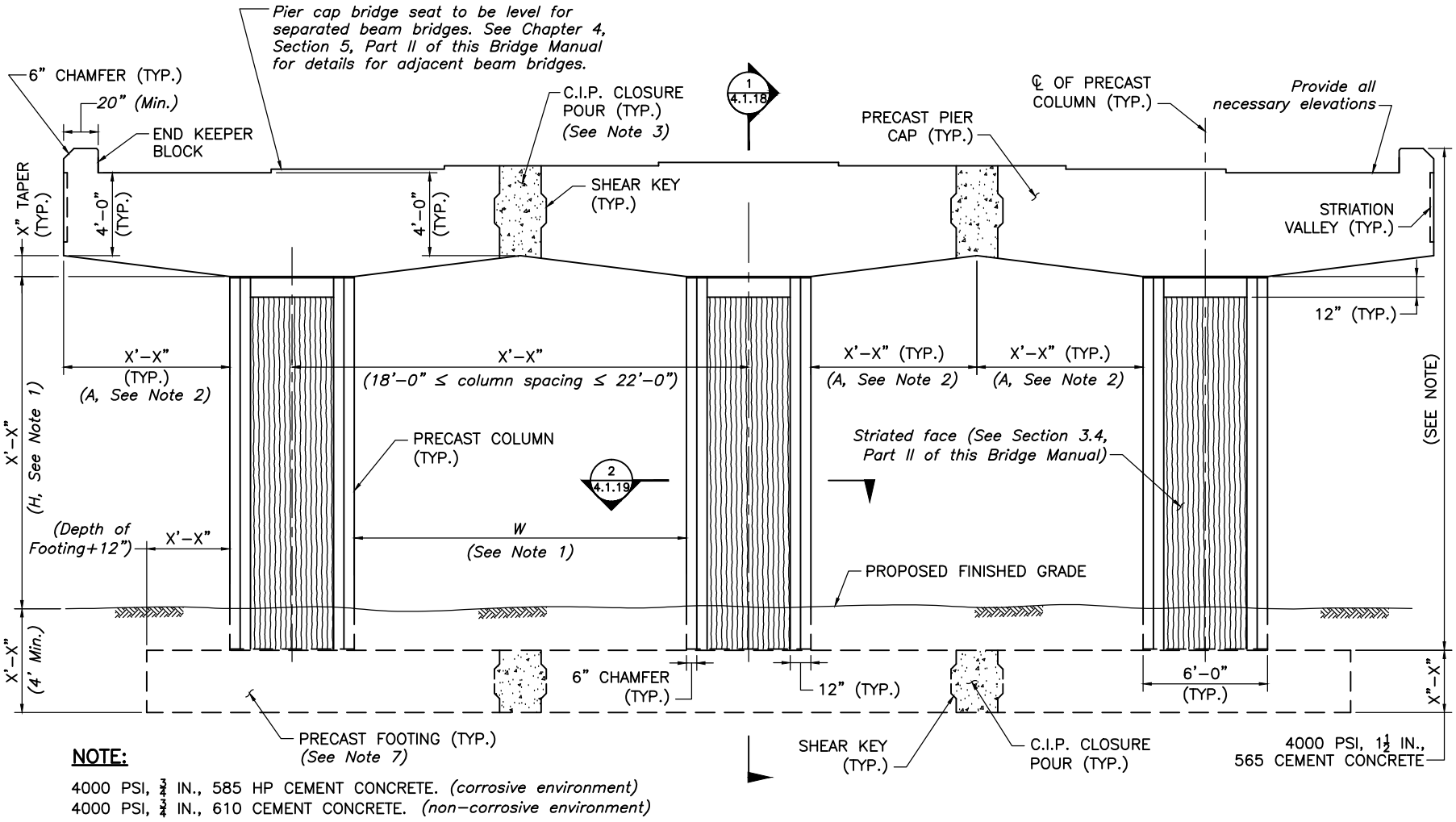
B–24 thru B–30 beams	*1 headed reinforcement bar splicer mid beam;*
B–33 thru B–48 beams	*2 headed reinforcement bar splicers as shown.*

Provide #5 intermediate reinforcing bars by beam designation as follows:

B–24 thru B–30 beams	*No intermediate bars;*
B–33 thru B–48 beams	*1 intermediate bar midway between splicers.*

2. *Dimension to be provided is equal to total thickness of bearing.*
3. *If the bearing exceeds 16" in diameter, set the 9" dimension to (Bearing Dia.)/2 + 1", and set the 10" dimension to (Bearing Dia.)/2 + 2".*
4. *The Designer shall ensure that at least 2" clear cover is maintained to the top of the deck at all locations.*
5. *To minimize the width of the closure pour, the combination of post–tensioning and continuity reinforcement may be used, if required by design.*
6. *Closure pour transverse reinforcement bar size and spacing shall be the same as for precast concrete deck panels transverse (primary) reinforcement.*
7. *See Dwg. No.'s 6.4.7 & 6.4.8, Part II of this Bridge Manual, for pier diaphragm plan and section to be included on Construction Drawings and modify the Drawings as required.*

AESTHETIC PIER – TYPICAL TRIPLE COLUMN ELEVATION
18'–0" ≤ COLUMN SPACING ≤ 22'–0"
PRECAST PIERS



NOTE:

4000 PSI, ¾ IN., 585 HP CEMENT CONCRETE. *(corrosive environment)*
4000 PSI, ¾ IN., 610 CEMENT CONCRETE. *(non–corrosive environment)*

(18'–0" ≤ COLUMN SPACING ≤ 22'–0")

TYPICAL TRIPLE COLUMN PIER ELEVATION

SCALE: ¼" = 1'–0"

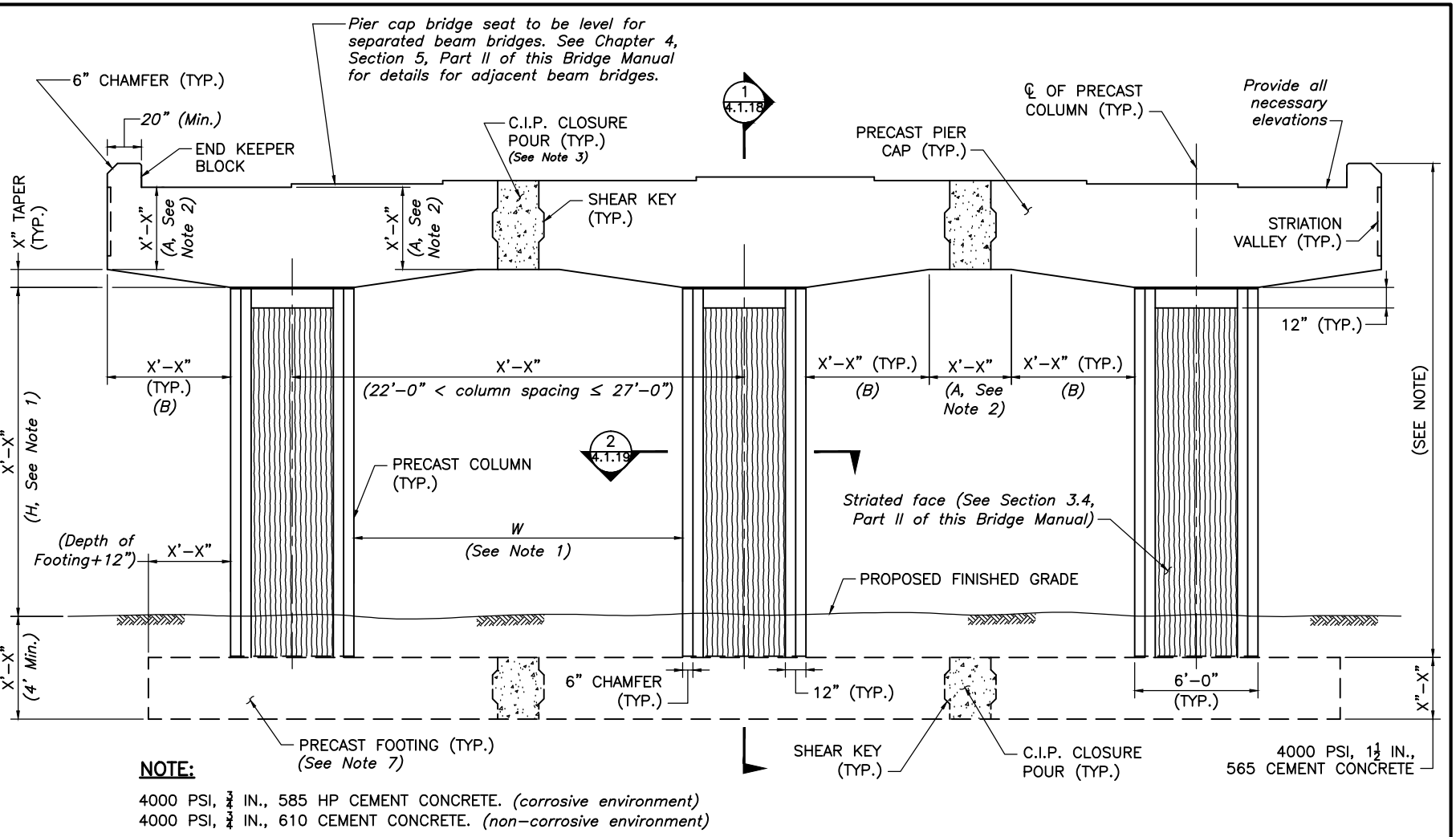
NOTES:

1. *W ≤ H ≤ 1.5W*
2. *A = Varies from 6'–0" to 8'–0".*
3. *C.I.P. closure pour is required when precast element exceeds shipping limits.*
4. *The narrowest width of the element and any projecting reinforcing should be kept below 14 feet due to shipping limitations.*
5. *Provide crash wall or solid pier where required by railroad or hydraulics.*
6. *Use continuous footings where footing is on subsoil or piles. Use individual footings where footing is on ledge.*
7. *In lieu of precast footings, C.I.P. footings may be used. See Section 3.5, Part II of this Bridge Manual.*

DATE OF ISSUE
JUNE 2013

DRAWING NUMBER
4.1.15

AESTHETIC PIER – TYPICAL TRIPLE COLUMN ELEVATION
22'–0" < COLUMN SPACING ≤ 27'–0"
PRECAST PIERS



NOTE:

4000 PSI, ¾ IN., 585 HP CEMENT CONCRETE. *(corrosive environment)*
4000 PSI, ¾ IN., 610 CEMENT CONCRETE. *(non–corrosive environment)*

(22'–0" < COLUMN SPACING ≤ 27'–0")

TYPICAL TRIPLE COLUMN PIER ELEVATION

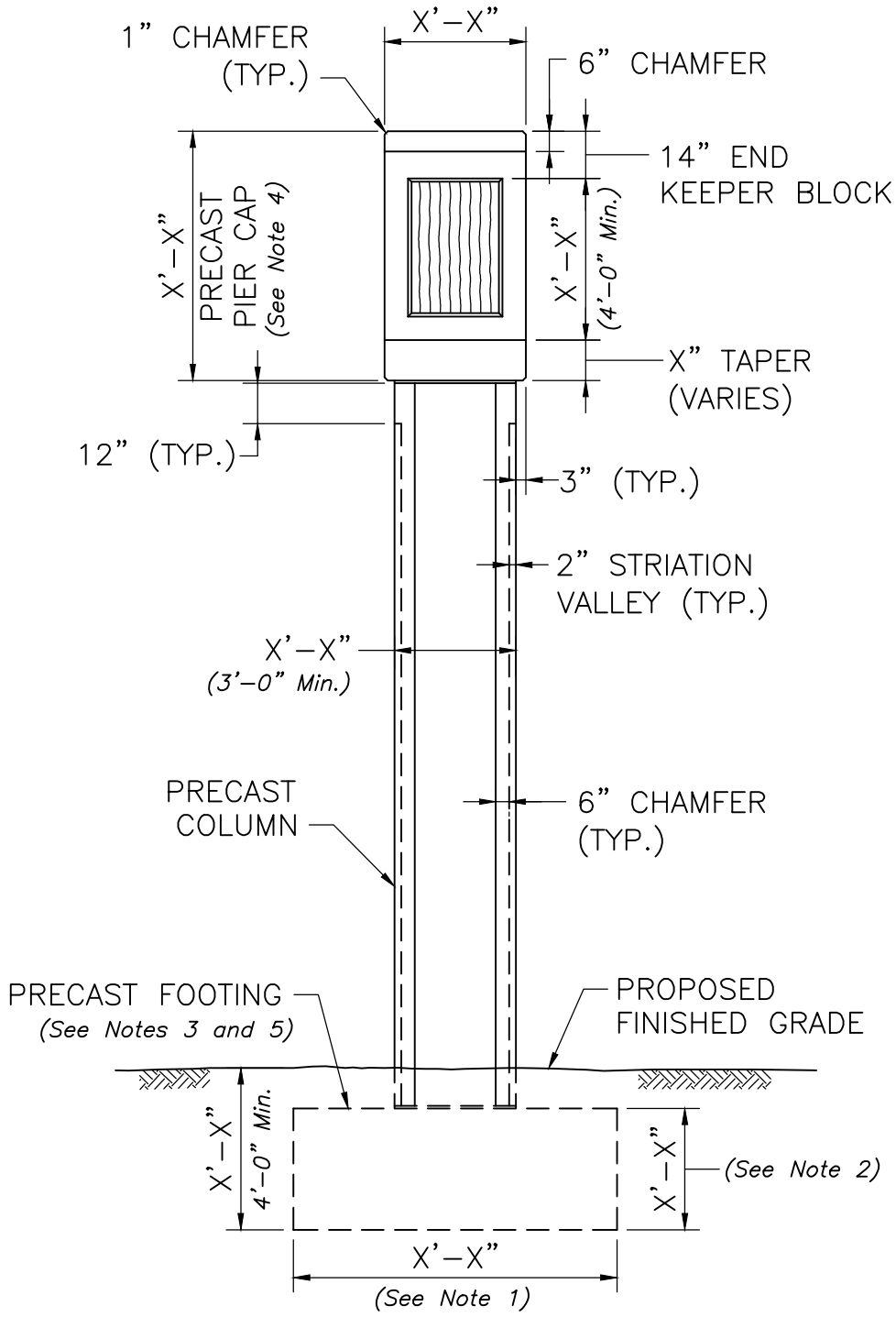
SCALE: ¼" = 1'–0"

NOTES:

1. *H ≤ W ≤ 1.5H*
2. *A = 4'–0" for 22'–0" < column spacing ≤ 25'–0".*
   A = 5'–0" for 25'–0" < column spacing ≤ 27'–0".
3. *C.I.P. closure pour is required when precast element exceeds shipping limits.*
4. *The narrowest width of the element and any projecting reinforcing should be kept below 14 feet due to shipping limitations.*
5. *Provide crash wall or solid pier where required by railroad or hydraulics.*
6. *Use continuous footings where footing is on subsoil or piles. Use individual footings where footing is on ledge.*
7. *In lieu of precast footings, C.I.P. footings may be used. See Section 3.5, Part II of this Bridge Manual.*

DATE OF ISSUE
JUNE 2013

DRAWING NUMBER
4.1.16



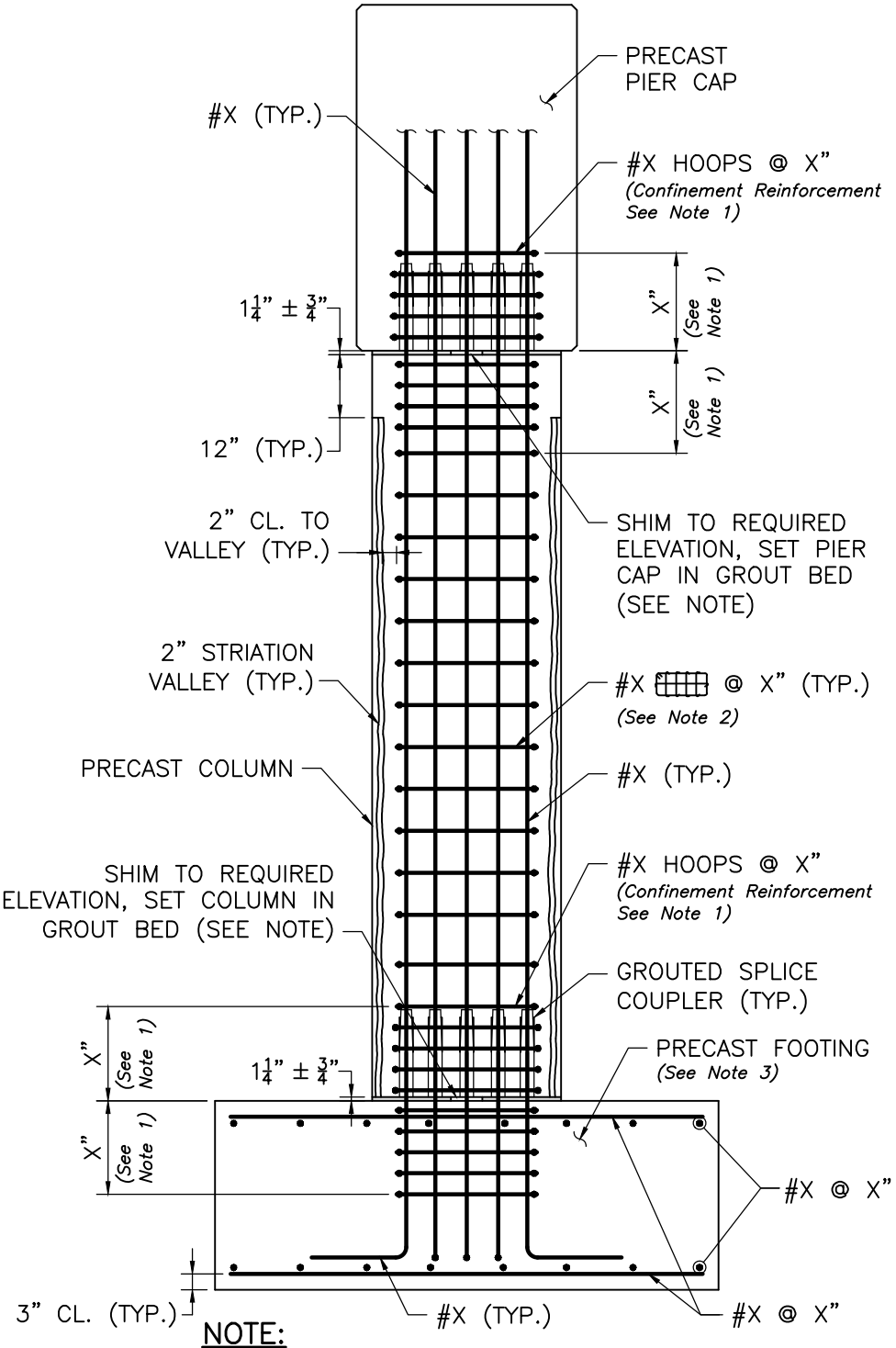
TYPICAL PIER SIDE ELEVATION

SCALE: $\frac{1}{4}$" = 1'–0"

NOTES:

1. *6'–0" minimum when on ledge and 8'–0" minimum when not on ledge.*
2. *Maximum depth of footing shall be 3'–0" for footings on subsoil, 3'–6" for footings on piles, and 2'–6" for footings on ledge.*
3. *Use continuous footings where footing is on subsoil or piles. Use individual footings where footing is on ledge.*
4. *For pier cap end details, see Dwg. No. 4.1.20.*
5. *In lieu of precast footings, C.I.P. footings may be used. See Section 3.5, Part II of this Bridge Manual.*

MassDOT Highway Division LRFD BRIDGE MANUAL, PART III	AESTHETIC PIER TYPICAL SIDE ELEVATION PRECAST PIERS	DATE OF ISSUE JUNE 2013 DRAWING NUMBER **4.1.17**



NOTE:

PRE–BED CAP AND COLUMN WITH NON–SHRINK GROUT WITH THICKNESS MORE THAN SHIM STACK.

SECTION 1

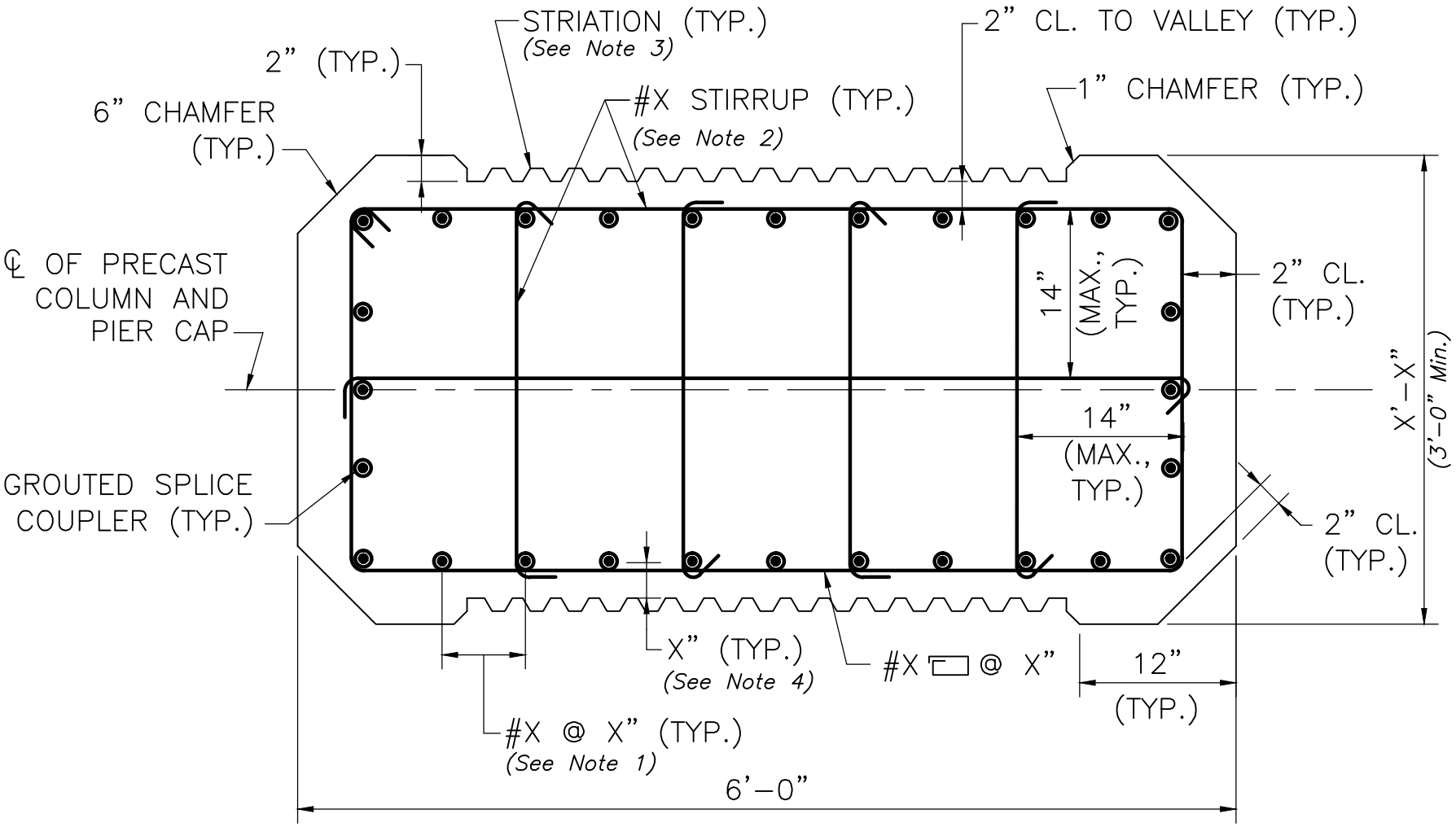
SCALE: ½" = 1'–0"

NOTES:

1. *The spacing of the confinement reinforcement shall conform to AASHTO LRFD Seismic Design Specifications.*
2. *See Section 2, Dwg. No. 4.1.19 for details of transverse reinforcement.*
3. *In lieu of precast footings, C.I.P. footings may be used. See Section 3.5, Part II of this Bridge Manual.*

MassDOT Highway Division LRFD BRIDGE MANUAL, PART III	AESTHETIC PIER – TYPICAL VERTICAL COLUMN SECTION PRECAST PIERS	DATE OF ISSUE JUNE 2013 DRAWING NUMBER **4.1.18**

AESTHETIC PIER
HORIZONTAL COLUMN SECTION
PRECAST PIERS



SECTION 2

SCALE: 1" = 1'-0"

NOTES:

1. *Bars size and spacing shall be designed and detailed to satisfy SDC B and up. See Chapter 3, Part I of this Bridge Manual.*
2. *The reinforcement configuration shown is conceptual. The Designer shall designed and modify the arrangement as required by AASHTO LRFD Seismic Bridge Design Specifications.*
3. *See Section 3.4, Part II of this Bridge Manual, for striation details.*
4. *For design of vertical reinforcing and grouted splice couplers, design for largest diameter coupler and specify distance to the bar. See Dwg. No. 4.1.6 for grouted splice coupler Designer Notes.*

DATE OF ISSUE
JUNE 2013

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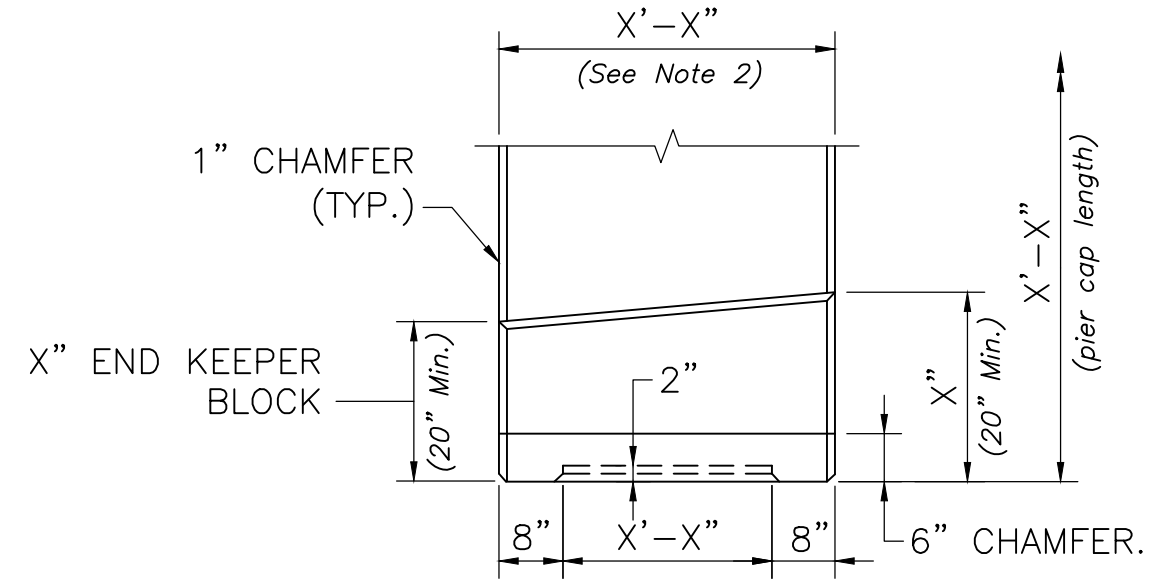
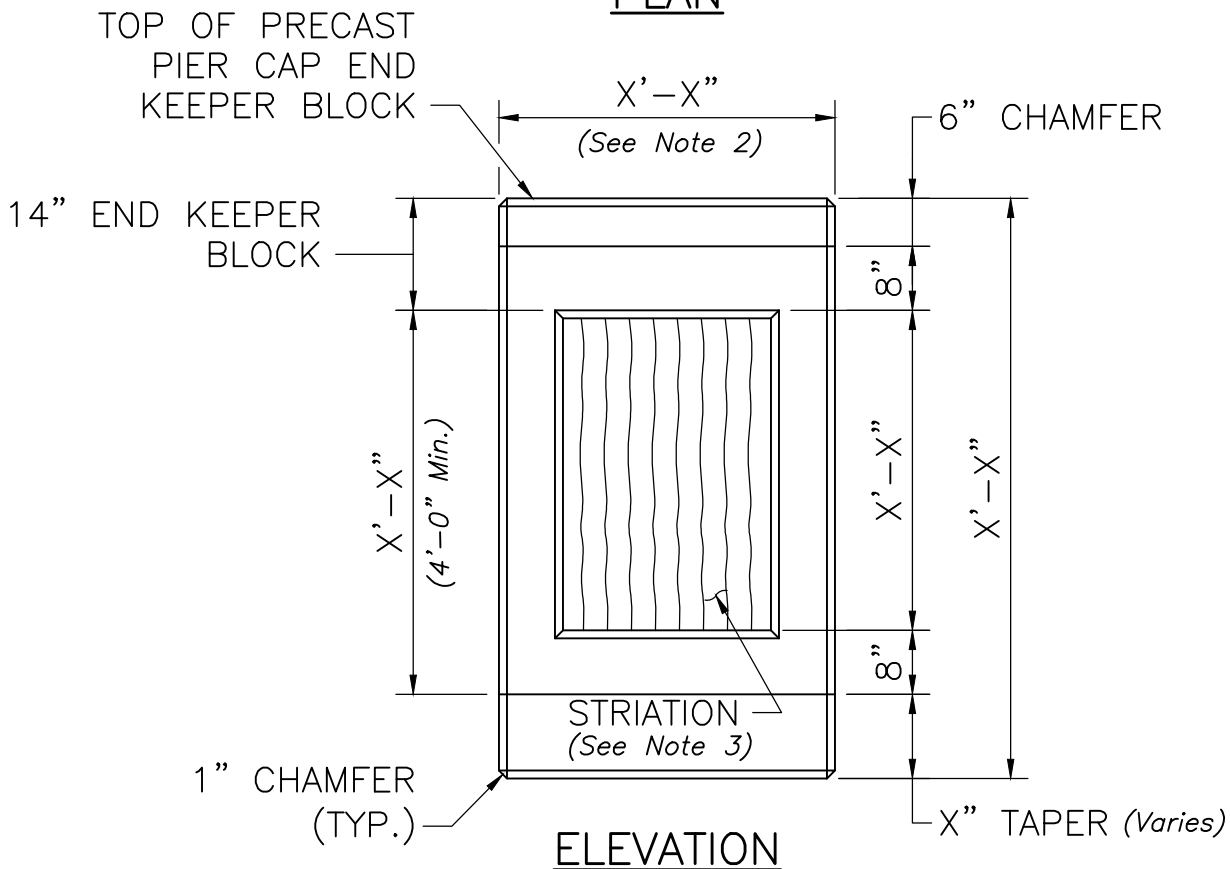
4.1.19



PLAN



ELEVATION

PIER CAP ENDS

SCALE: $\frac{1}{2}$" = 1'–0"

NOTES:

1. *Plan detail shown is for steel bridges. Modify the detail as necessary for precast concrete bridges.*
2. *3'–6" minimum for steel bridges. 4'–4" minimum for precast concrete bridges.*
3. *See Section 3.4, Part II of this Bridge Manual, for striation details.*