GENERAL NOTES

1. ALL REINFORCEMENT STEEL SHALL MEET THE REQUIREMENTS OF ASTM A 615, A 706, OR A 996.

2. MATERIALS AND WORKMANSHIP ARE TO BE IN ACCORDANCE WITH PUBLICATION 408.

3. PIER DIMENSIONS ARE DETERMINED BY DESIGN.

4. PROVIDE THE FOLLOWING MINIMUM CONCRETE COVER FOR REINFORCEMENT:
   - 3" for Class "A" concrete to the top of footing or pier.
   - 2" for Class "B" concrete to the top of footing or pier.
   - 1.5" for Class "C" concrete to the top of footing or pier.

5. USE CLASS "A" CONCRETE IN FLOORS, FOOTINGS AND CAST-IN-PLACE SHEETS.

6. USE CLASS "C" CONCRETE BELOW BOTTOM OF FOOTINGS, IF SPECIFIED.

7. ENSURE THAT REINFORCEMENT BARS BE PLACED BETWEEN FLOOR OR PIER PLATES AND CAP SHEET WITHOUT JOINTS.

8. FOR ADDITIONAL EPOXY COATED REINFORCEMENT BAR REQUIREMENTS, SEE DESIGN MANUAL, PART 4, CONCRETE STRUCTURES, SECTION D.5.4.3.4V.

9. KEY FOR CONSTRUCTION JOINT MAY BE FORMED INTO THE COLUMN OR INTO THE FOOTING.

10. SEE RECOMMENDATIONS FOR STANDARD SPLICE AND DEVELOPMENT LENGTHS.

11. PROVIDE 10" SPACING IN CENTERS OF PIER CAP PLATES FOR PIER SECTIONS.

12. FOR POSTING HEIGHTS, USE A Minimum OF 30" FOR SIGNS 25 PREVIOUSLY, BUT NOT REQUIRED. SOIL COVER MAY BE ANY DEPTH TO AVOID UNNECESSARY EXCAVATION.

13. FOR CHECKING CRACK CONTROL, THE CLEANSING"

14. APPLY AN EPOXY RESIN COATING TO ENTIRE PIER COLUMN/WALL THAT ARE WITHIN SPLASH ZONE (10 FT. OF ROADWAY EDGE), TO PROTECT AGAINST SALT SPRAY.

DESIGN DATA

1. UNIT WEIGHT OF BACKFILL MATERIAL: 300 lbs/ft³

2. UNIT WEIGHT OF CONCRETE: 150 lbs/ft³

3. EQUIVALENT FRICTION EARTH PRESSURE = 35 psf/ft³ OF DEPTH

4. FOR FOOTINGS USE A MINIMUM DEPTH OF 6" FOR ROUND AND SQUARE COLUMNS AND 8" FOR RECTANGULAR COLUMNS. FOR ROUND, SQUARE, AND RECTANGULAR COLUMNS USE A 4" MINIMUM PIER CAP DEPTH.

5. SIMPLIFIED joints MAY NOT BE USED AT PIER CAPS TO ELIMINATE PARTIAL OR TOTAL LAMINATION STRUCTURES.

6. FOR PIER ENDS OR PIER CAPS LOCATED IN THE SLANTED PORTION OF AN EMBANKMENT, USE AN EARTH PRESSURE ADJUSTMENT TO THE EARTH PRESSURE ALONG THE EARTH PRESSURE ALONG THE COLUMN FORMS.

7. EPOXY COAT MAIN REINFORCEMENT BARS (J-BARS) PROTRUDING FROM PIER FOOTINGS INTO PIER CAPS TO PROVIDE CONSTRUCTION TOLERANCE AND LONG TERM SERVICEABILITY.

8. PROVIDE A TEMPERATURE/DISPLACEMENT TABLE FOR PLACEMENT AT OTHER THAN 70°F.

9. KEY FOR CONSTRUCTION JOINT MAY BE FORMED INTO THE COLUMN OR INTO THE FOOTING.

10. SEE BC-736M FOR STANDARD SPLICE AND DEVELOPMENT LENGTHS.

11. PROVIDE 1.5" THICKNESS AT PIER ENDS TO ALLOW PLACEMENT OF THE PIER CAP REINFORCEMENT CAGE.

12. USE SELECT SPLICE AND DEVELOPMENT LENGTHS.

13. FOR ADDITIONAL EPOXY COATED REINFORCEMENT BAR REQUIREMENTS, SEE DESIGN MANUAL, PART 4, CONCRETE STRUCTURES, SECTION D.5.4.3.6V.

14. PROVIDE THE FOLLOWING MINIMUM CONCRETE COVER FOR REINFORCEMENT:

   - 6" - CONCRETE EXPOSED TO WEATHER
   - 3" - CONCRETE EXPOSED TO EARTH
   - 2" - CONCRETE EXPOSED TO EARTH
   - 3" - CONCRETE CAST AGAINST AND PERMANENTLY EXPOSED TO EARTH
   - 4" - CONCRETE CAST AGAINST AND PERMANENTLY EXPOSED TO EARTH
   - 4" - CONCRETE CAST AGAINST AND PERMANENTLY EXPOSED TO EARTH
   - 6" - CONCRETE CAST AGAINST AND PERMANENTLY EXPOSED TO EARTH
   - 8" - CONCRETE CAST AGAINST AND PERMANENTLY EXPOSED TO EARTH

CONSTRUCTABILITY CONSIDERATIONS

1. TO ALLOW PLACEMENT OF THE PIER CAP REINFORCEMENT CAGE:
   - PROVIDE SPLICED TIES.
   - PROVIDE SPLICES IN COLUMN TIES WHICH EXTEND INTO THE PIER CAP.

2. MATERIALS AND WORKMANSHIP ARE TO BE IN ACCORDANCE WITH PUBLICATION 408.

3. PIER DIMENSIONS ARE DETERMINED BY DESIGN.

4. PROVIDE A TEMPERATURE/DISPLACEMENT TABLE FOR PLACEMENT AT OTHER THAN 70°F.

5. EPOXY COAT MAIN REINFORCEMENT BARS (J-BARS) PROTRUDING FROM PIER FOOTINGS INTO PIER CAPS TO PROVIDE CONSTRUCTION TOLERANCE AND LONG TERM SERVICEABILITY.

6. EQUIVALENT FLUID EARTH PRESSURE = 35 psf/ft³ OF DEPTH

7. EARTH PRESSURE AGAINST THE BACK OF THE FOOTING AND COLUMN = 100% TO INCLUDE THE EFFECT OF THE ADJACENT EMBANKMENT.

8. FOR FOOTINGS USE A MINIMUM DEPTH INCREMENT OF 3".

9. FOR COLUMNS OR PIER BENTS LOCATED IN THE SLOPED PORTION OF AN EMBANKMENT, INCREASE THE EARTH PRESSURE ALONG THE EMBANKMENT.

10. FOR FOOTINGS FOUNDED ON BEDROCK A MINIMUM OF 1 FT. SOIL COVER IS PREFERRED.

11. PROVIDE 1.5" V-NOTCH IN COLUMNS OF PIERS AT FINISH GROUND LINE FOR SUPERSTRUCTURE LOADS.

12. FOR FOOTINGS FOUNDED ON BEDROCK A MINIMUM OF 1 FT. SOIL COVER IS PREFERRED.

13. FOR CHECKING CRACK CONTROL, THE CLEANSING"

14. PROVIDE THE FOLLOWING MINIMUM CONCRETE COVER FOR REINFORCEMENT:

   - 6" - CONCRETE EXPOSED TO WEATHER
   - 3" - CONCRETE EXPOSED TO EARTH
   - 2" - CONCRETE EXPOSED TO EARTH
   - 3" - CONCRETE CAST AGAINST AND PERMANENTLY EXPOSED TO EARTH
   - 4" - CONCRETE CAST AGAINST AND PERMANENTLY EXPOSED TO EARTH
   - 4" - CONCRETE CAST AGAINST AND PERMANENTLY EXPOSED TO EARTH
   - 6" - CONCRETE CAST AGAINST AND PERMANENTLY EXPOSED TO EARTH
   - 8" - CONCRETE CAST AGAINST AND PERMANENTLY EXPOSED TO EARTH

15. PROVIDE 1.5" THICKNESS AT PIER ENDS TO ALLOW PLACEMENT OF THE PIER CAP REINFORCEMENT CAGE.

16. FOR ADDITIONAL EPOXY COATED REINFORCEMENT BAR REQUIREMENTS, SEE DESIGN MANUAL, PART 4, CONCRETE STRUCTURES, SECTION D.5.4.3.6V.

17. PROVIDE A TEMPERATURE/DISPLACEMENT TABLE FOR PLACEMENT AT OTHER THAN 70°F.

18. FOR COLUMNS OR PIER BENTS LOCATED IN THE SLOPED PORTION OF AN EMBANKMENT, INCREASE THE EARTH PRESSURE ALONG THE EMBANKMENT.

19. FOR ADDITIONAL EPOXY COATED REINFORCEMENT BAR REQUIREMENTS, SEE DESIGN MANUAL, PART 4, CONCRETE STRUCTURES, SECTION D.5.4.3.6V.

20. PROVIDE A TEMPERATURE/DISPLACEMENT TABLE FOR PLACEMENT AT OTHER THAN 70°F.

21. FOR COLUMNS OR PIER BENTS LOCATED IN THE SLOPED PORTION OF AN EMBANKMENT, INCREASE THE EARTH PRESSURE ALONG THE EMBANKMENT.

22. FOR ADDITIONAL EPOXY COATED REINFORCEMENT BAR REQUIREMENTS, SEE DESIGN MANUAL, PART 4, CONCRETE STRUCTURES, SECTION D.5.4.3.6V.

23. PROVIDE A TEMPERATURE/DISPLACEMENT TABLE FOR PLACEMENT AT OTHER THAN 70°F.

24. FOR COLUMNS OR PIER BENTS LOCATED IN THE SLOPED PORTION OF AN EMBANKMENT, INCREASE THE EARTH PRESSURE ALONG THE EMBANKMENT.

25. FOR ADDITIONAL EPOXY COATED REINFORCEMENT BAR REQUIREMENTS, SEE DESIGN MANUAL, PART 4, CONCRETE STRUCTURES, SECTION D.5.4.3.6V.

26. PROVIDE A TEMPERATURE/DISPLACEMENT TABLE FOR PLACEMENT AT OTHER THAN 70°F.
NOTE:
)

4- Column Connection
- Design: 6.0% max. col. dimension or 15".

3- Plastic Hinge Zone
- Splice is at max. column dimension, 1.5' or min. length of column or 18"

2- Splice Criteria (See Permitted Splice Location Details)
- The splice length must not be less than 1.25 times the diameter of the reinforcing bars or the location.
- Use a 6" maximum tie spacing along the length of the splice.
- If the above splice criteria cannot be met, full mechanical connection splices can be used provided not more than 50% of the reinforcing bars are spliced at the location.
- The splice must not be staggered with the splice of vertical column reinforcement.

1- Coordinate vertical column reinforcement with bottom flexural cap reinforcement to avoid interference.

For bundled #10 bars or larger, vertical tie spacing or pitch of spiral must not exceed 3".

Notes:
- Flexural cap reinforcement must be coordinated with vertical column reinforcement to avoid interference.
- If the above splice criteria cannot be met, full mechanical connection splices can be used provided not more than 50% of the reinforcing bars are spliced at the location.
- The splice must not be staggered with the splice of vertical column reinforcement.

6 - Tie Spacing

4 - Spiral Reinforcement

3 - Vertical Column Reinforcement

2 - Flexural Cap Reinforcement

1 - Bottom Flexural Cap Reinforcement

Permitted Splice Location
- In Non-Splash Zone
- In Splash Zone

Commonwealth of Pennsylvania
Department of Transportation
Bureau of Project Delivery

Standard
Reinforced Concrete Piers
Multi-Column Bent
Column Details

Recommended 3-7-16
Recommended 3-7-16

Sheet 2 of 15

APR. 29, 2016

Director, Bur. of Project Delivery
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
STANDARD REINFORCED CONCRETE PIERS
MULTI-COLUMN BENT
COLUMN SECTIONS

SHEET NO. 3

SECTION A-A
ROUND COLUMN
SQUARE COLUMN

SECTION B-B
ROUND COLUMN
SQUARE COLUMN
SQUARE COLUMN (DESIGNED AS ROUND)

SECTION C-C
ROUND COLUMN
SQUARE COLUMN (DESIGNED AS ROUND)

SECTION D-D
ROUND COLUMN
SQUARE COLUMN

NOTES:
1. COORDINATE VERTICAL COLUMN REINFORCEMENT WITH BOTTOM PLATE (IF REINFORCEMENT IS NOT DESIGNED TO BEND INTERSECTED);
2. FOR LOCATION OF SECTIONS A-A, B-B, C-C & D-D, SEE COLUMN DETAILS SHEET NO. 1;
3. CONTRACTOR MAY SUBSTITUTE SPILOED TIES AT NO ADDITIONAL COST TO THE DEPARTMENT;
4. ALL HOOKS ON TIES MUST ENGAGE VERTICAL COLUMN REINFORCING STEEL.
5. ALTERNATE 90° & 135° HOOKS ON CROSS TIES BOTH VERTICALLY AND HORIZONTALLY.
6. MAKE NON-CONTINUOUS TIES OF USE (TYP.), THEY SHALL BE LAPPED TO THE INTRUSION OF COLUO COLUMN REINFORCEMENT TO AVOID INTERFERENCE.
7. ALTERNATE BARS SPACING WHEN 6" MAX. CLEAR CENTER TO CENTER (PLASTIC HINGE ZONE).
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
STANDARD
REINFORCED CONCRETE PIERS
HAMMERHEAD
BD-629M

DETAILS
SHEET OF
6
15

CHIEF BRIDGE ENGINEER
RECOMMENDED

BUREAU OF PROJECT DELIVERY

SECTION A-A

NOTES:
1. STIRRUPS TO BE SPACED AT A MIN. OF 9" CLEAR TO FACILITATE CONCRETE PLACEMENT.
2. PLACE REINFORCING BARS DIRECTLY BELOW REINFORCING BARS IN UPPER LAYER(S).
3. PROVIDE #5 @ 12" MIN. OR IF EFFECTIVE DEPTH "DE" EXCEEDS 3'-0", PROVIDE LONGITUDINAL SKIN REINFORCEMENT PER AASHTO 5.7.3.4.
4. PROVIDE AT LEAST ONE SPACE AT A MIN. OF 9" CLEAR TO FACILITATE CONCRETE PLACEMENT.
5. TOP FLEXURAL REINFORCEMENT TO BE PLACED IN ONE SPACE OR TOTAL SPACING NOT TO EXCEED 12".
6. PROVIDE 1'-0" MIN. COVER OVER COLUMN REINFORCEMENT 2'-0" MINIMUM EXTEND DESIGN CANTILEVER SHEAR REINFORCEMENT PER AASHTO 5.7.3.4.
7.内部 coordination of the vertical column of the cap.
8. EXTEND ALL TOP FLEXURAL REINFORCEMENT THE ENTIRE LENGTH OF CAP.
9. PROVIDE ONE SPACE AT A MIN. OF 9" CLEAR TO FACILITATE CONCRETE PLACEMENT. MAX. SPACING IS 12".
10. PROVIDE TWO 9" CLEAR SPACES FOR CAPS GREATER THAN 5'-0" WIDE.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF PROJECT DELIVERY

STANDARD
REINFORCED CONCRETE PIERS
HAMMERHEAD
DETAILS

RECOMMENDED HAMMERHEAD PIER CONFIGURATIONS

<table>
<thead>
<tr>
<th>PIER TYPE</th>
<th>GRADE SEPARATION</th>
<th>RIVER</th>
<th>RAILROAD WITHIN 25 FT. OF CLR TRACK</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td></td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>B</td>
<td></td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>C</td>
<td></td>
<td>x</td>
<td></td>
</tr>
</tbody>
</table>

APR.29, 2016
DIRECTOR, BUR. OF PROJECT DELIVERY

APR.29, 2016
APR.29, 2016
ELEVATION
(RESPONSE ACCELERATION COEFFICIENT, $S_{D1}$)
LESS THAN 0.10

ELEVATION
(SITE CLASS E, F OR RESPONSE
ACCELERATION COEFFICIENT, $S_{D1}$)
GREATER THAN OR EQUAL TO 0.10

NOTES:
1. COORDINATE VERTICAL COLUMN REINFORCEMENT WITH BOTTOM CAP REINFORCEMENT TO AVOID INTERFERENCE.
2. FOR SPLICE CRITERIA, SEE SHEET 3, NOTE 2.
3. FOR BUNDLED #10 BARS OR LARGER, VERTICAL TIE SPACING MUST NOT EXCEED 6".
4. COLUMN CONNECTION:
   - SPLINTS ON: 1/3 MAX. $Y$ DIMENSION OR 15".
   - PLASTIC HINGE ZONE:
     - GREATER SP: 1/3 MAX.
     - GREATER DIM: 1/3 CLR. WEIGHT OF COLUMN ON 10LB.
5. ALTERNATE 90° & 135° HOOKS ON CROSS TIES.
6. BOTH VERTICALLY AND HORIZONTALLY.
7. WHERE NON-CONTINUOUS TIES ARE USED, THEY SHALL BE LAP SPICED WITH A CLASS A SPLICE AND HAVE A 180 DEGREE HOOK WITH AN EXTENSION OF SIX BAR DIAMETERS.

OPTIONAL END TREATMENTS
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DEPARTMENT OF TRANSPORTATION
STANDARD REINFORCED CONCRETE PIERS

SECTION C-C

SECTION A-A

DETAILS

"Y"

"Y"

ROADWAY, STREAMS OR RIVERS

STREAMS OR RIVERS

OPTIONAL END TREATMENTS

RECOMMENDED SOLID SHAFT CONFIGURATION

GRADE SEPARATION RIVER RAILROAD WITHIN 25 FT.

ELEVATION (RESPONSE ACCELERATION COEFFICIENT, S01, LESS THAN 0.10)

ELEVATION (SITE CLASS E, F OR RESPONSE ACCELERATION COEFFICIENT, S01, GREATER THAN OR EQUAL TO 0.10)

NOTES:

1. FOR SPACE CRITERIA, SEE SHEET 3, NOTE 2.
2. FOR SINGLE #4 BARS OR LARGER, VERTICAL TIE SPACING MUST NOT EXCEED 12".
3. COLUMN CONNECTION
   GREATER OR MAX. "Y" DIMENSION OR 15".
4. PLASTIC HINGE ZONE
   GREATER OR MAX. "Y" DIMENSION, 1/6 CLR. HEIGHT OF COLUMN OR 18".
5. ALL BARS ON TIES MUST ENGAGE VERTICAL COLUMN REINFORCING STEEL
   ALTERNATE 90° & 135° HOOKS ON CROSS TIES WHERE NON-CONTINUOUS TIES ARE USED, THEY SHALL BE LAP SPLICED WITH A
   180° DEGREE HOOK WITH AN EXTENSION OF 6" WHERE NON-CONTINUOUS TIES ARE USED, THEY SHALL BE LAP SPLICED WITH A
   180° DEGREE HOOK WITH AN EXTENSION OF 6"
6. MIN. (TYP.)

1. FOR SPLICE CRITERIA, SEE SHEET 3, NOTE 2.
2. FOR SPLICE CRITERIA, SEE SHEET 3, NOTE 2.
3. FOR SPLICE CRITERIA, SEE SHEET 3, NOTE 2.
4. MIN. (TYP.)

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STANDARD REINFORCED CONCRETE PIERS
SOLID SHAFT (WALL) DETAILS

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APR. 29, 2016
APR. 29, 2016
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
STANDARD
REINFORCED CONCRETE PIERS
SINGLE COLUMN
BD-629M

RECOMMENDED SINGLE COLUMN CONFIGURATION
GRADE SEPARATION RIVER
RAILROAD WITHIN 20 FT. OF EL. TRACK

ELEVATION
@ CONSIDER USING 1'-0" INCREMENTS.

SECTION A-A

CAP ELEVATION

NOTES:
1. STIRRUP TO BE PLACED AT A MIN. OF 3" CLEAR TO EXALTATION CONCRETE PLACEMENT. ANY LOCALIZED REGION WITH HIGH STRESS SALTS MIN. ELEVATE A SMALLER CONCRETE PLACEMENT CLEARANCE. SPACING IN VERTICAL CONCRETE CLEARANCE 2'-0" LATERAL.
2. PROVIDE AT LEAST ONE SPACE AT A MIN. OF 3" CLEAR TO EXALTATION CONCRETE PLACEMENT. SPACING IN VERTICAL CONCRETE CLEARANCE 2'-0" LATERAL.
3. PROVIDE #5 @ 12" MIN. OR IF EFFECTIVE DEPTH INCLUDING SLEEVES. WILL NEED TO BE ADJUSTED TO CLEAR DOWELS OR ANCHOR BOLTS PROVIDE 6" MIN. AT ALL OTHER SPACES. REINF. SPACING WITHIN 6" MIN. AT ALL SPACES.
4. PROVIDE AT LEAST ONE SPACE AT A MIN. OF 9" CLEAR TO FACILITATE CONCRETE PLACEMENT.
5. MULTI-LAYERS: PROVIDE REINFORCING BARS SPECIFIC TO REINFORCING BARS IN EACH LAYER. CLEAR SPACING MUST BE 1'-0" MINIMAL.
6. COORDINATE RIGID FLEXURAL CAP REINFORCEMENT WITH VERTICAL COLUMN REINFORCEMENT TO AVOID INTERFERENCE.
7. BOTTOM OF FOOTING ELEVATION DETERMINED BY SOIL CONDITIONS, PROBABLY, SCOUR, AGAINST THERMAL SHRINKAGE, OR ANY OTHER REQUIREMENTS AS DETERMINED BY THE ENGINEER.
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DEPARTMENT OF TRANSPORTATION
STANDARD
REINFORCED CONCRETE PIERS
SINGLE COLUMN
BD-629M

COLUMN DETAILS AND SECTIONS

SHEET OF 10

CHIEF BRIDGE ENGINEER
RECOMMENDED
BUREAU OF PROJECT DELIVERY
APR. 29, 2016
APR. 29, 2016

NOTES:
1. COORDINATE VERTICAL COLUMN REINFORCEMENT WITH BOTTOM CAP REINFORCEMENT TO AVOID INTERFERENCE.
2. FOR SPLICE CRITERIA, SEE SHEET 3, NOTE 2.
3. FOR SMALL #10 REINFORCING BARS OR LARGER, VERTICAL TIE SPACING MUST NOT EXCEED 6".
4. COLUMN CONNECTION MUST BE LEFT GREATER THAN OR EQUAL TO 15".
5. PLASTIC HINGE ZONE SPACING OF MAX. COL. DIMENSION + 1/8 COL. HEIGHT OF COLUMN.

1. COORDINATE VERTICAL COLUMN REINFORCEMENT WITH BOTTOM CAP REINFORCEMENT TO AVOID INTERFERENCE.
2. FOR SPLICE CRITERIA, SEE SHEET 3, NOTE 2.
3. FOR SMALL #10 REINFORCING BARS OR LARGER, VERTICAL TIE SPACING MUST NOT EXCEED 6".
4. COLUMN CONNECTION MUST BE LEFT GREATER THAN OR EQUAL TO 15".
5. PLASTIC HINGE ZONE SPACING OF MAX. COL. DIMENSION + 1/8 COL. HEIGHT OF COLUMN.

COLUMN (RESPONSE ACCELERATION COEFFICIENT, S_D1):
LESS THAN 0.10

COLUMN (SITE CLASS E, F OR RESPONSE ACCELERATION COEFFICIENT, S_D1):
GREATER THAN OR EQUAL TO 0.10

CAP REINFORCEMENT TO AVOID INTERFERENCE.

OPTIMAL CONSTRUCTION JOINT

FOOTING

OPTIMAL CONSTRUCTION JOINT

FOOTING

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF PROJECT DELIVERY
STANDARD
REINFORCED CONCRETE PIERS
SINGLE COLUMN
COLUMN DETAILS AND SECTIONS

RECOMMENDED BD-629M

SHEET 10 OF 15

DIRECTOR, BUR. OF PROJECT DELIVERY
APR. 29, 2016
APR. 29, 2016
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
STANDARD REINFORCED CONCRETE PIERS
BD-629M
SINGLE DRILLED SHAFT

MULTI-DRILLED SHAFT CONFIGURATIONS
(DETAILS NOT SHOWN)

NOTES:
1. DRILLED SHAFTS NOT DESIGNED OR SOCKETED INTO ROCK ARE GENERALLY NOT PERMITTED IN THE DEPT., AND IF USED, MUST BE APPROVED BY THE CHIEF BRIDGE ENGINEER.
2. USE OF BELLED TIP REQUIRES THE PRIOR APPROVAL OF THE CHIEF BRIDGE ENGINEER.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF PROJECT DELIVERY
STANDARD REINFORCED CONCRETE PIERS
SINGLE DRILLED SHAFT
DETAILS

DRILLED SHAFT

BELLED TIP
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
STANDARD
REINFORCED CONCRETE PIERS
DETAILS
BD-629M
REHABILITATION AND JACKING

SHEET OF 15

1 81/2" MIN. CONCRETE (TYP.)
6" MIN. CONCRETE (TYP.)
3" MIN. CONCRETE (TYP.)
2" MIN. CONCRETE (TYP.)
1" MIN. CONCRETE (TYP.)
1 3/8" MIN. CONCRETE (TYP.)
5/8" MIN. CONCRETE (TYP.)
3/8" MIN. CONCRETE (TYP.)
1/4" MIN. CONCRETE (TYP.)
1/8" MIN. CONCRETE (TYP.)
1/16" MIN. CONCRETE (TYP.)

3" CLR.
2" DIA. BOLTS
@ 8" MIN.

1'-0" MIN.

THROUGH REINFORCING
BAR MIN.

TURNBUCKLE DETAIL

COLUMN REHABILITATION DETAILS

REHABILITATION NOTES:
1. WHERE NEW CONCRETE CONTACTS EXISTING CONCRETE, SANDBLAST AND THOROUGHLY CLEAN EXISTING CONCRETE SURFACE TO PARTIALLY REMOVE AGGREGATE. APPLY ADHESIVE (TYP.) TO NEW CONCRETE PRIOR TO ADDING DOWEL HOLES. ADJUST SPACING AS REQUIRED.
2. CONTRACTOR IS RESPONSIBLE FOR FINAL REINFORCEMENT BARS LENGTHS.
3. DOWEL BAR TO ENGAGE NEW VERTICAL COLUMN REINFORCEMENT.
4. SPACE 2" PVC PIPE TO CLEAR ANCHOR BOLTS AND PIER CAP STIRRUPS (NUMBER AND LOCATION AS REQUIRED).

JACKING NOTES:
1. JACKING LOAD TO CONSIST OF SUPERSTRUCTURE DEAD LOAD ONLY.
2. SPACE 2" PVC PIPE TO CLEAR ANCHOR BOLTS AND PIER CAP REINFORCEMENT.

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APR. 29, 2016

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
BUREAU OF PROJECT DELIVERY
STANDARD
REINFORCED CONCRETE PIERS
REHABILITATION AND JACKING
DETAILS
BD-629M
RECOMMENDED APR. 29, 2016
RECOMMENDED APR. 29, 2016
TYP. 15 OF 15
SHEET 15 OF 15
BD-629M