

**Environmental
Protection**

SEWER DESIGN STANDARDS

PREPARED BY

CITY OF NEW YORK
DEPARTMENT OF DESIGN AND CONSTRUCTION
DIVISION OF INFRASTRUCTURE
BUREAU OF DESIGN

(SEPTEMBER 2007) REVISED AUGUST 2018

SEWER DESIGN STANDARDS

TABLE OF CONTENTS

| | |
|---|------|
| SEWER DESIGN CRITERIA - MANHOLE SPACING AND LOCATION ON PIPE SEWERS | A |
| VITRIFIED CLAY PIPE ON CONCRETE CRADLE ON EARTH OR ON ROCK | SE1 |
| VITRIFIED CLAY PIPE ON CONCRETE CRADLE ON PILES | SE2 |
| CIRCULAR REINFORCED CONCRETE PIPE ON CONCRETE CRADLE ON EARTH OR ON ROCK | SE3 |
| 24" DIAMETER TO 48" DIAMETER CIRCULAR REINFORCED CONCRETE PIPE ON CONCRETE CRADLE ON PILES - 2 PILE BENTS (20' AND 25' COVER) | SE4 |
| 54" DIAMETER TO 96" DIAMETER CIRCULAR REINFORCED CONCRETE PIPE ON CONCRETE CRADLE ON PILES - 3 PILE BENTS (20' AND 25' COVER) | SE5 |
| 24" DIAMETER TO 60" DIAMETER CIRCULAR REINFORCED CONCRETE PIPE ON CONCRETE CRADLE ON PILES - 2 PILE BENTS (5', 10' AND 15' COVER) | SE6 |
| 66" DIAMETER TO 96" DIAMETER CIRCULAR REINFORCED CONCRETE PIPE ON CONCRETE CRADLE ON PILES - 3 PILE BENTS (5', 10' AND 15' COVER) | SE7 |
| HORIZONTAL ELLIPTICAL REINFORCED CONCRETE PIPE ON CONCRETE CRADLE ON EARTH OR ON ROCK | SE8 |
| 23"W x 14"H TO 76"W x 48"H HORIZONTAL ELLIPTICAL REINFORCED CONCRETE PIPE ON CONCRETE CRADLE ON PILES - 2 PILE BENTS (5', 10' AND 15' COVER) | SE9 |
| 83"W x 53"H TO 121"W x 77"H HORIZONTAL ELLIPTICAL REINFORCED CONCRETE PIPE ON CONCRETE CRADLE ON PILES - 3 PILE BENTS (5', 10, AND 15' COVER) | SE10 |
| TYPE A-1 AND TYPE A-2 MANHOLES ON 8" DIAMETER TO 30" DIAMETER PIPE SEWERS IN DRY LOCATION | SE11 |
| TYPE A-1 AND TYPE A-2 MANHOLES ON 8" DIAMETER TO 30" DIAMETER PIPE SEWERS ON PILES IN DRY LOCATION | SE12 |
| TYPE A-3 SHALLOW MANHOLE ON 8" DIAMETER TO 30" DIAMETER PIPE SEWERS | SE13 |
| TYPE B-1 AND TYPE B-2 MANHOLES ON 8" DIAMETER TO 30" DIAMETER PIPE SEWERS IN WET LOCATION | SE14 |
| TYPE B-1 AND TYPE B-2 MANHOLES ON 8" DIAMETER TO 30" DIAMETER PIPE SEWERS ON PILES IN WET LOCATION | SE15 |
| TYPE C-1 AND TYPE C-2 MANHOLES ON 36" DIAMETER TO 60" DIAMETER REINFORCED CONCRETE PIPE SEWERS | SE16 |
| TYPE C-1 AND TYPE C-2 MANHOLES ON 36" DIAMETER TO 60" DIAMETER REINFORCED CONCRETE PIPE SEWERS ON PILES | SE17 |
| TYPE D-1 AND TYPE D-2 MANHOLES ON 66" DIAMETER TO 96" DIAMETER REINFORCED CONCRETE PIPE SEWERS | SE18 |
| TYPE D-1 AND TYPE D-2 MANHOLES ON 66" DIAMETER TO 96" DIAMETER REINFORCED CONCRETE PIPE SEWERS ON PILES | SE19 |
| TYPE E-1 MANHOLE ON 23"W x 14"H TO 60"W x 38"H HORIZONTAL ELLIPTICAL REINFORCED CONCRETE PIPE SEWERS | SE20 |
| TYPE E-1 MANHOLE ON 23"W x 14"H TO 60"W x 38"H HORIZONTAL ELLIPTICAL REINFORCED CONCRETE PIPE SEWERS ON PILES | SE21 |
| TYPE E-2 MANHOLE ON 68"W x 43"H TO 121"W x 77"H HORIZONTAL ELLIPTICAL REINFORCED CONCRETE PIPE SEWERS | SE22 |
| TYPE E-2 MANHOLE ON 68"W x 43"H TO 121"W x 77"H HORIZONTAL ELLIPTICAL REINFORCED CONCRETE PIPE SEWERS ON PILES | SE23 |
| DROP PIPE MANHOLE (TYPE I) ON 10" DIAMETER TO 24" DIAMETER PIPE SEWERS | SE24 |
| DROP PIPE MANHOLE (TYPE I) ON 10" DIAMETER TO 24" DIAMETER PIPE SEWERS ON PILES | SE25 |
| DROP PIPE MANHOLE (TYPE II) (FOR 10" DIAMETER TO 24" DIAMETER INCOMING DROP PIPE SEWERS) | SE26 |

CONTENTS

| | |
|---|-----------------------------|
| DROP PIPE MANHOLE (TYPE II) ON PILES (FOR 10" DIAMETER TO 24" DIAMETER INCOMING DROP PIPE SEWERS) | SE27 |
| 4'-0" DIAMETER PRECAST MANHOLE (4 DRAWINGS) | SE28A, SE28B, SE28C & SE28D |
| 5'-0" DIAMETER PRECAST MANHOLE (4 DRAWINGS) | SE29A, SE29B SE29C & SE29D |
| 6'-0", 7'-0", 8'-0" AND 10'-0" DIAMETER PRECAST MANHOLE (4 DRAWINGS) | SE30A, SE30B, SE30C & SE30D |
| PRECAST MANHOLE DETAILS (3 DRAWINGS) | SE31A, SE31B & SE31C |
| ALTERNATE MONOLITHIC BASE SECTION FOR PRECAST MANHOLES (POURED IN PLACE) | SE32 |
| PRECAST DROP PIPE MANHOLE (TYPE I) | SE33 |
| PRECAST DROP PIPE MANHOLE (TYPE II) | SE34 |
| REMOVABLE PRECAST REINFORCED CONCRETE SLAB | SE35 |
| REMOVABLE PRECAST REINFORCED CONCRETE SLAB FOR DROP PIPE MANHOLE (TYPE I) | SE36 |
| REMOVABLE PRECAST REINFORCED CONCRETE SLAB FOR DROP PIPE MANHOLE (TYPE II) | SE37 |
| MANHOLE CHIMNEY DETAIL (WHEN LEGAL GRADE IS BELOW FINAL GRADE) | SE38 |
| 27" DIAMETER CAST IRON MANHOLE FRAME AND COVER (FOR ACCESS OR CLEANOUT) | SE39 |
| 27" DIAMETER CAST IRON EXTENSION RING FOR 27" DIAMETER MANHOLE FRAME AND COVER | SE40 |
| 36" DIAMETER CAST IRON MANHOLE FRAME AND COVER FOR CLEANOUT | SE41 |
| 24" DIAMETER CAST IRON MANHOLE COVER | SE42 |
| CAST IRON MANHOLE STEP | SE43 |
| CAST IRON MANHOLE STEP (BOLT-ON TYPE) | SE44 |
| CIRCULAR CAST IRON MANHOLE STEP (BOLT-ON TYPE) | SE45 |
| PLASTIC MANHOLE STEP | SE46 |
| TYPE 1 CATCH BASIN (WITH CURB PIECE) | SE47 |
| TYPE 2 CATCH BASIN (WITHOUT CURB PIECE) | SE48 |
| TYPE 3 CATCH BASIN (WITHOUT CURB PIECE) | SE49A |
| TYPE 3 CATCH BASIN (WITH CURB PIECE) | SE49B |
| DOUBLE CATCH BASIN (WITHOUT CURB PIECE) | SE50A |
| DOUBLE CATCH BASIN (WITH CURB PIECE) | SE50B |
| MODIFICATION OF EXISTING TYPE 2 CATCH BASIN | (NOT INCLUDED) SE51 |

CONTENTS

| | |
|---|-----------------------------|
| PRECAST TYPE 1 CATCH BASIN | SE52A |
| SPLIT PRECAST TYPE 1 CATCH BASIN | SE52B |
| PRECAST TYPE 2 CATCH BASIN | SE53A |
| SPLIT PRECAST TYPE 2 CATCH BASIN | SE53B |
| PRECAST TYPE 3 CATCH BASIN (WITHOUT CURB PIECE) | SE54A |
| PRECAST TYPE 3 CATCH BASIN (WITH CURB PIECE) | SE54B |
| PRECAST DOUBLE CATCH BASIN (WITHOUT CURB PIECE) (2 DRAWINGS) | SE55A & SE55B |
| PRECAST DOUBLE CATCH BASIN (WITH CURB PIECE) | SE55C |
| PRECAST SEEPAGE BASIN (4 DRAWINGS) | SE56A, SE56B, SE56C & SE56D |
| CAST IRON FRAME FOR CATCH BASINS (WITH CURB PIECE) | SE57 |
| CAST IRON FRAME FOR CATCH BASINS (WITHOUT CURB PIECE) | SE58A |
| CAST IRON FRAME FOR TYPE 3 CATCH BASINS (WITH CURB PIECE) | SE58B |
| CAST IRON GRATING, BACK PLATE, AND CURB PIECE FOR CATCH BASINS (WITH H=6") | SE59A |
| CAST IRON GRATING, BACK PLATE, AND CURB PIECE FOR CATCH BASINS (WITH H=8") | SE59B |
| CAST IRON HOOD AND HOOKS FOR CATCH BASINS | SE60 |
| DUCTILE IRON PIPE ALTERNATE | SE61 |
| HOUSE CONNECTIONS (FOR 6" AND 8" DIAMETER CAST IRON SOIL PIPE OR VITRIFIED CLAY PIPE ON CONCRETE CRADLE OR ENCASED IN CONCRETE ON EARTH OR ON ROCK) | SE62 |
| RISER ON 10" DIAMETER TO 18" DIAMETER VITRIFIED CLAY PIPE SEWERS ON CONCRETE CRADLE | SE63 |
| RISER ON PRECAST REINFORCED CONCRETE PIPE SEWERS ON CONCRETE CRADLE | SE64 |
| 27" DIAMETER ALUMINUM FLOOR GRATING | SE65 |
| 36" DIAMETER ALUMINUM FLOOR GRATING | SE66 |
| CONSTRUCTION OF CATCH BASIN (NO EXISTING CURB) | SE67 |
| RECONSTRUCTION OF EXISTING MANHOLE AND REPLACEMENT OF EXISTING MANHOLE FRAME AND COVER | SE68 |
| ROADWAY RESURFACING (PAVEMENT KEY - TYPE B) | SE69 |
| MINIMUM LOAD DIAGRAM FOR NON-WATERTIGHT SHEETING DESIGN | SE70 |
| MINIMUM LOAD DIAGRAM FOR WATERTIGHT SHEETING DESIGN | SE71 |

CITY OF NEW YORK
DEPARTMENT OF ENVIRONMENTAL PROTECTION

STANDARD FOR SEWER DESIGN CRITERIA - MANHOLE SPACING AND LOCATION ON PIPE SEWERS

A. MAXIMUM SPACING OF MANHOLE ON PIPE SEWERS

| <u>PIPE SIZE:</u> | <u>RECOMMENDED MAXIMUM SPACING</u> | <u>ABSOLUTE MAXIMUM SPACING</u> |
|--|--|-------------------------------------|
| 10" DIA. TO 36" DIA. CIRCULAR PIPE 14"H x 23"W TO 29"H x 45"W HORIZONTAL ELLIPTICAL PIPE 23"H x 14"W TO 45"H x 29"W VERTICAL ELLIPTICAL PIPE | 250' | 300' |
| 42" DIA. TO 72" DIA. CIRCULAR PIPE 34"H x 53"W TO 58"H x 91"W HORIZONTAL ELLIPTICAL PIPE 53"H x 34"W TO 91"H x 58"W VERTICAL ELLIPTICAL PIPE | 400' | 500' |
| 78" DIA. AND LARGER CIRCULAR PIPE 63"H x 98"W AND LARGER HORIZONTAL ELLIPTICAL PIPE 98"H x 63"W AND LARGER VERTICAL ELLIPTICAL PIPE | 600' | 800' |


B. MANHOLE LOCATION ON PIPE SEWERS

1. AT ALL CHANGES IN GRADE OR ELEVATION FOR ALL SIZES OF SEWERS.
2. AT ALL CHANGES IN ALIGNMENT FOR ALL SIZES OF SEWERS.
3. AT ALL STREET INTERSECTIONS FOR SEWERS UP TO AND INCLUDING 24" DIAMETER.
4. AT ALL JUNCTIONS OF 2 OR MORE SEWERS.
5. AT ALL CATCH BASIN CONNECTIONS WHERE IT IS NOT PRACTICAL TO CONNECT DIRECTLY TO THE SEWER. A DIRECT CONNECTION SHALL NOT BE MADE TO A SEWER LESS THAN 60" IN DIAMETER.
6. THE TERM "DRY LOCATION" SHALL MEAN ANY LOCATION WHERE THE ENTIRE MANHOLE IS LOCATED ABOVE THE WATER TABLE AND IS IN NORMALLY DRY SOIL.
7. THE TERM "WET LOCATION" SHALL MEAN ANY LOCATION WHERE THE MANHOLE IS LOCATED IN WHOLE OR IN PART BELOW THE WATER TABLE OR IN NORMALLY WET SOIL.
8. SPECIAL CONSIDERATION WILL BE REQUIRED FOR SITUATIONS NOT COVERED HEREIN.


ASSOCIATE COMMISSIONER, DESIGN
DEPARTMENT OF DESIGN AND CONSTRUCTION

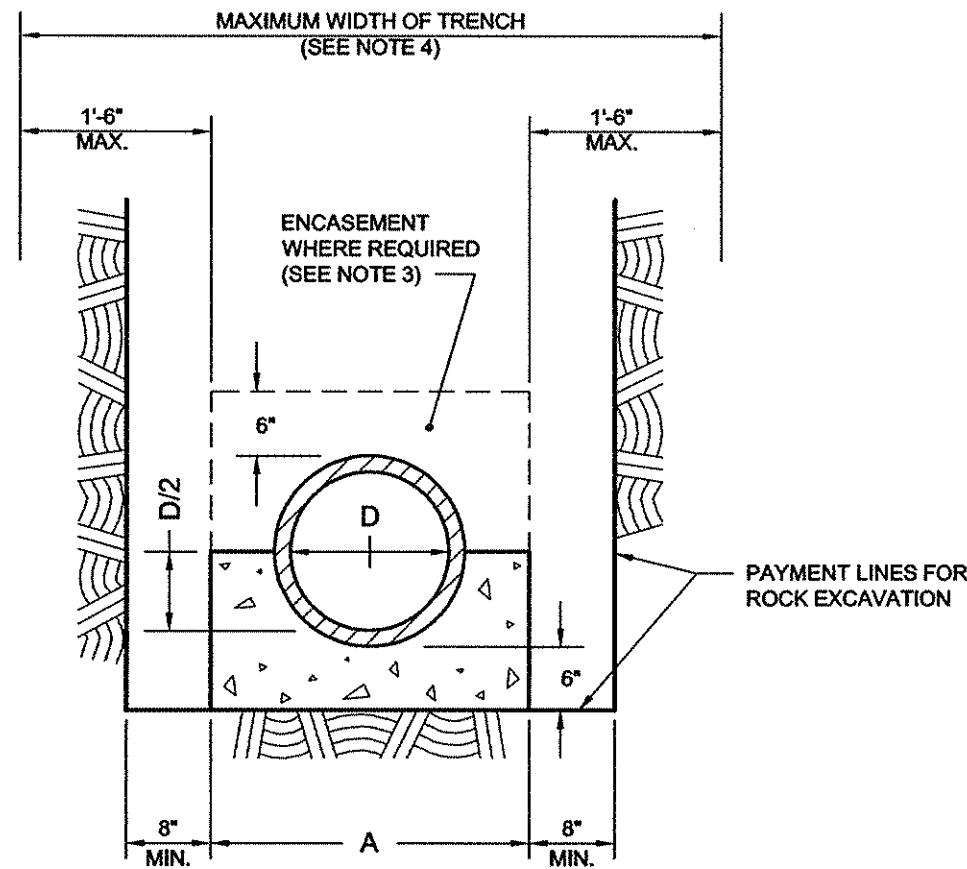
P.E.

8/14/18
DATE

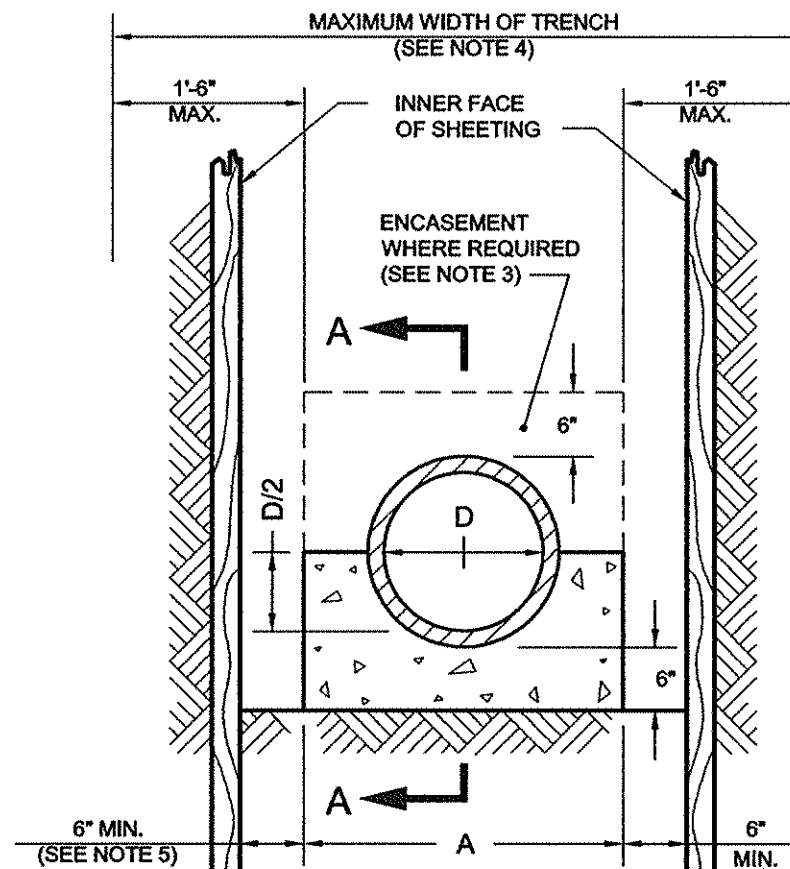

EXECUTIVE DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION

P.E.

8/14/18
DATE

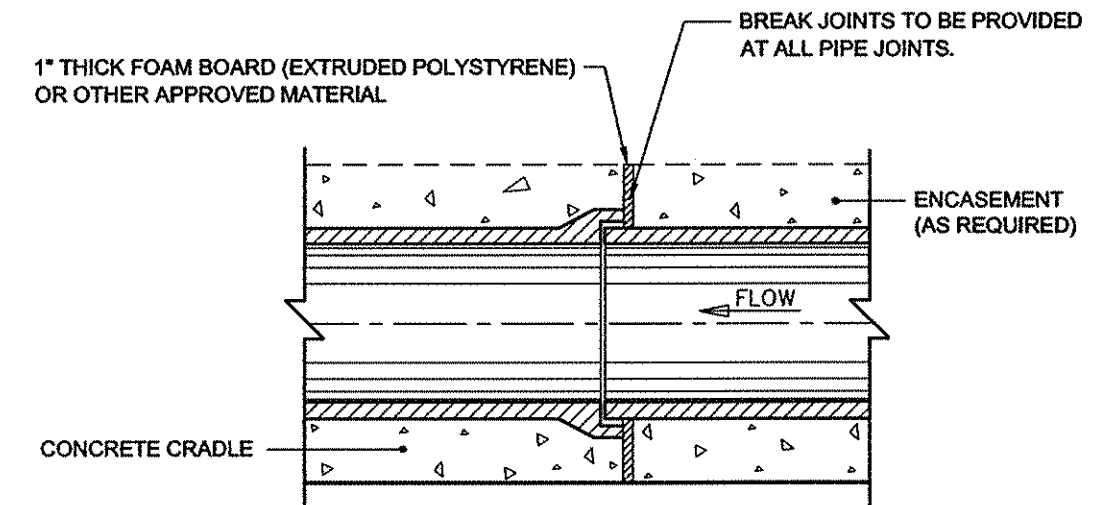
CITY OF NEW YORK
DEPARTMENT OF ENVIRONMENTAL PROTECTIONSTANDARD FOR VITRIFIED CLAY PIPE
ON CONCRETE CRADLE ON EARTH OR ON ROCK

SECTION ON ROCK



SECTION ON EARTH

| D | A | MAX. COVER WITHOUT ENCSMT. | CONC. CRADLE CU. YD./L.F. | CONC. ENCSMT. CU. YD./L.F. |
|-----|--------|-------------------------------|------------------------------|-------------------------------|
| 8" | 1'-6" | 22' | 0.0408 | 0.0815 |
| 10" | 2'-0" | 20' | 0.0596 | 0.1191 |
| 12" | 2'-3" | 18' | 0.0708 | 0.1415 |
| 15" | 2'-6" | 16' | 0.0831 | 0.1661 |
| 18" | 2'-10" | 15' | 0.0998 | 0.1996 |

SECTION A-A
BREAK JOINTS TO CONCRETE BEDDING

NOTES:

- (1) CRADLE AND ENCASEMENT ARE CLASS 40 CONCRETE.
- (2) ENTIRE CRADLE OR ENCASEMENT IS TO BE PLACED MONOLITHICALLY.
- (3) ENCASEMENT REQUIRED ON PIPE WHICH HAS A COVER, FROM FINAL GRADE TO THE OUTER TOP OF THE PIPE, OF LESS THAN FOUR (4) FEET OR WHEN THE UPPER LIMIT OF COVER IS EXCEEDED.
- (4) UNLESS OTHERWISE APPROVED BY THE ENGINEER, THE MAX. WIDTH OF TRENCH SHALL BE SUCH THAT THE MAX. WIDTH BETWEEN INNER FACES OF THE LOWEST STAGE OF SHEETING OR ROCK CUT LINES, FROM SUBGRADE OF TRENCH TO A MIN. HEIGHT OF TWO (2) FEET ABOVE THE OUTER TOP OF THE PIPE, SHALL NOT BE GREATER THAN THE STANDARD CRADLE WIDTH PLUS EIGHTEEN (18) INCHES MAXIMUM EACH SIDE.
- (5) SIX (6) INCH MINIMUM SHALL BE MAINTAINED AT ALL TIMES, EXCEPT WHERE SHEETING IS TO BE USED AS FORMWORK.

Gardip S. Saini

P.E.

ASSOCIATE COMMISSIONER, DESIGN
DEPARTMENT OF DESIGN AND CONSTRUCTION

8/14/18

DATE

Thomas W. Byrne

P.E.

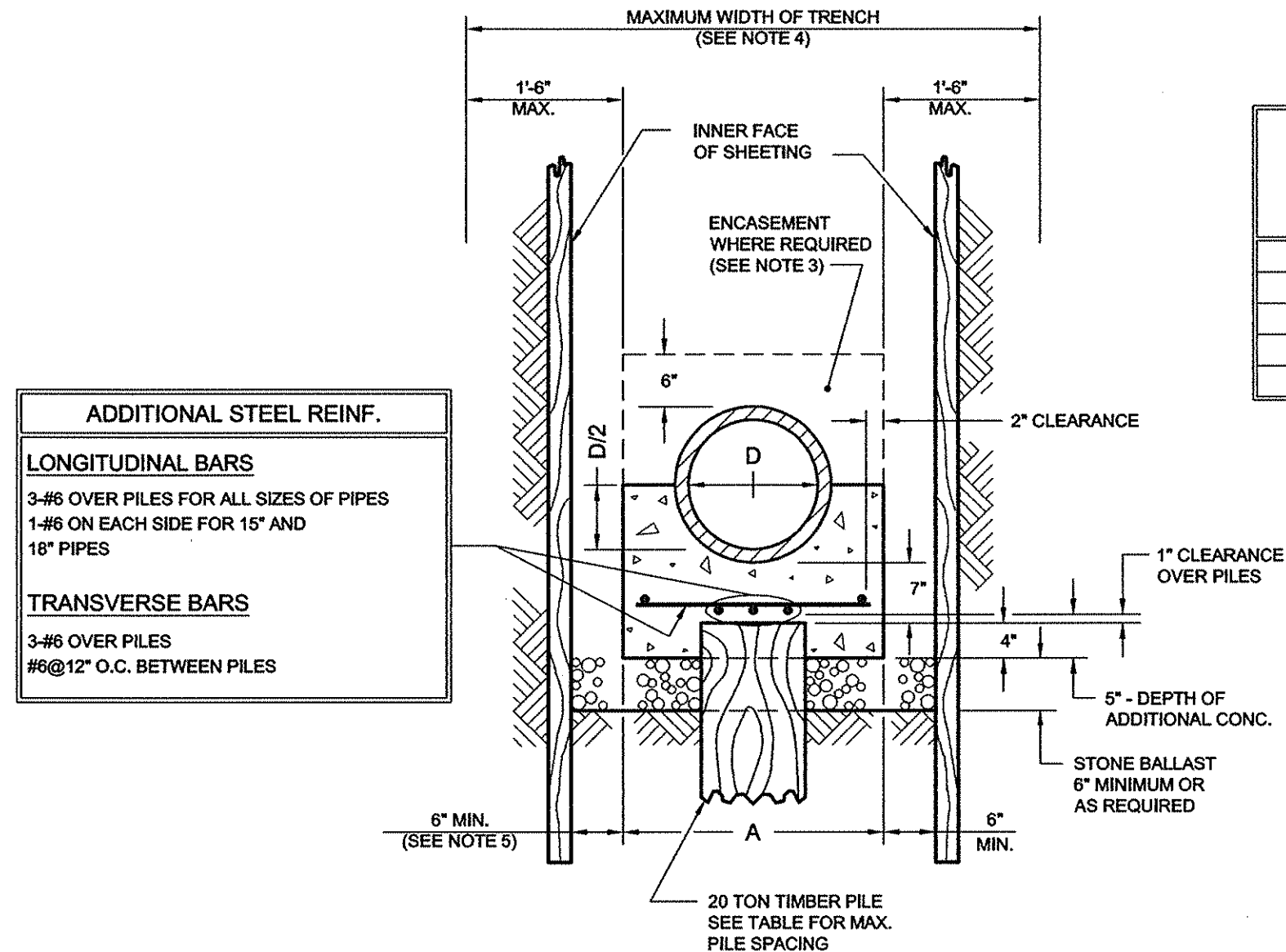
EXECUTIVE DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION

8/14/18

DATE

CITY OF NEW YORK
DEPARTMENT OF ENVIRONMENTAL PROTECTION

STANDARD FOR VITRIFIED CLAY PIPE ON CONCRETE CRADLE ON PILES



| D | A | MAXIMUM PILE SPACING | | | | ADD. CONC. CU. YD. | ADDITIONAL ITEMS/L.F. | | | | STONE BALLAST CU. YD. PER L.F. |
|-----|--------|----------------------|-----------|-----------|-----------|--------------------|-----------------------|-----------|-----------|-----------|--------------------------------|
| | | 10' COVER | 15' COVER | 20' COVER | 25' COVER | | 10' COVER | 15' COVER | 20' COVER | 25' COVER | |
| 8" | 1'-6" | 6'-0" | 6'-0" | 6'-0" | 6'-0" | 0.0232 | 6.85 | 6.85 | 6.85 | 6.85 | 0.0834 |
| 10" | 2'-0" | 6'-0" | 6'-0" | 6'-0" | 6'-0" | 0.0309 | 7.85 | 7.85 | 7.85 | 7.85 | 0.0926 |
| 12" | 2'-3" | 6'-0" | 6'-0" | 6'-0" | 5'-0" | 0.0348 | 8.35 | 8.35 | 8.35 | 8.54 | 0.0973 |
| 15" | 2'-6" | 6'-0" | 6'-0" | 5'-0" | 4'-0" | 0.0386 | 11.85 | 11.85 | 12.07 | 12.40 | 0.1019 |
| 18" | 2'-10" | 6'-0" | 5'-0" | 4'-0" | 3'-6" | 0.0438 | 12.52 | 12.77 | 13.15 | 13.95 | 0.1081 |

NOTES:

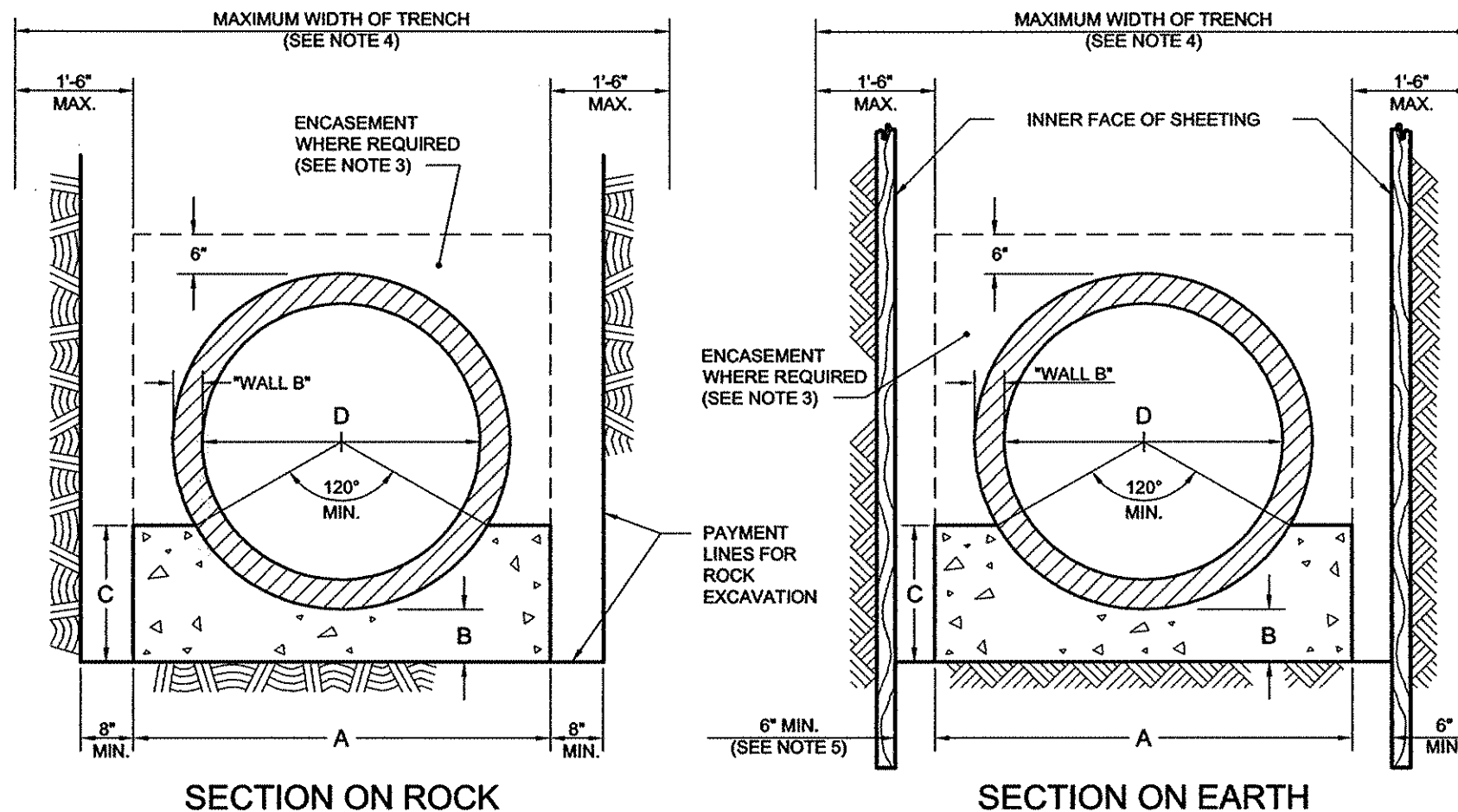
- (1) CRADLE AND ENCASEMENT ARE CLASS 40 CONCRETE. REBARS-GRADE 60.
- (2) ENTIRE CRADLE OR ENCASEMENT IS TO BE PLACED MONOLITHICALLY.
- (3) ENCASEMENT REQUIRED ON PIPE WHICH HAS A COVER, FROM FINAL GRADE TO THE OUTER TOP OF THE PIPE, OF LESS THAN FOUR (4) FEET OR WHEN THE UPPER LIMIT OF COVER IS EXCEEDED.
- (4) UNLESS OTHERWISE APPROVED BY THE ENGINEER, THE MAX. WIDTH OF TRENCH SHALL BE SUCH THAT THE MAX. WIDTH BETWEEN INNER FACES OF THE LOWEST STAGE OF SHEETING OR ROCK CUT LINES, FROM SUBGRADE OF TRENCH TO A MIN. HEIGHT OF TWO (2) FEET ABOVE THE OUTER TOP OF THE PIPE, SHALL NOT BE GREATER THAN THE STANDARD CRADLE WIDTH PLUS EIGHTEEN (18) INCHES MAXIMUM EACH SIDE.
- (5) SIX (6) INCH MINIMUM SHALL BE MAINTAINED AT ALL TIMES, EXCEPT WHERE SHEETING IS TO BE USED AS FORMWORK.

Gurdeep S. Saini
P.E.
ASSOCIATE COMMISSIONER, DESIGN
DEPARTMENT OF DESIGN AND CONSTRUCTION

8/14/18
DATE

Thomas W. Lyons
P.E.
EXECUTIVE DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION

8/14/18
DATE

CITY OF NEW YORK
DEPARTMENT OF ENVIRONMENTAL PROTECTIONSTANDARD FOR CIRCULAR REINFORCED CONCRETE PIPE
ON CONCRETE CRADLE ON EARTH OR ON ROCK

| D | A | B | C | CONC. CRADLE CU. YD./L.F. | CONC. ENCSMT. CU. YD./L.F. | MAX. COVER FOR PIPE CLASS | | |
|-----|--------|-----|--------|------------------------------|-------------------------------|---------------------------|--------|--------|
| | | | | | | III | IV | V |
| 24" | 3'-6" | 6" | 1'-2" | 0.1124 | 0.2719 | 12'-0" | 18'-0" | 27'-0" |
| 30" | 4'-1" | 6" | 1'-4" | 0.1414 | 0.3410 | 12'-6" | 18'-6" | 27'-6" |
| 36" | 4'-8" | 7" | 1'-6" | 0.1829 | 0.4300 | 12'-6" | 18'-6" | 28'-0" |
| 42" | 5'-3" | 8" | 1'-9" | 0.2348 | 0.5279 | 12'-6" | 18'-6" | 28'-0" |
| 48" | 5'-10" | 9" | 2'-0" | 0.2928 | 0.6348 | 12'-6" | 18'-6" | 28'-6" |
| 54" | 6'-5" | 10" | 2'-3" | 0.3570 | 0.7507 | 13'-0" | 19'-0" | 28'-6" |
| 60" | 7'-0" | 11" | 2'-5" | 0.4219 | 0.8757 | 13'-0" | 19'-0" | 29'-0" |
| 66" | 7'-7" | 12" | 2'-8" | 0.4981 | 1.0097 | 13'-0" | 19'-0" | 29'-0" |
| 72" | 8'-2" | 13" | 2'-11" | 0.5806 | 1.1526 | 13'-0" | 19'-6" | 29'-6" |
| 78" | 8'-9" | 14" | 3'-2" | 0.6691 | 1.3046 | 13'-6" | 19'-6" | 29'-6" |
| 84" | 9'-4" | 15" | 3'-4" | 0.7574 | 1.4656 | 13'-6" | 20'-0" | 29'-6" |
| 90" | 9'-11" | 17" | 3'-8" | 0.8886 | 1.6662 | 14'-0" | 20'-0" | 30'-0" |
| 96" | 10'-6" | 18" | 3'-11" | 0.9972 | 1.8470 | 14'-0" | 20'-0" | 30'-0" |

NOTES:

- (1) CRADLE AND ENCASEMENT ARE CLASS 40 CONCRETE.
- (2) ENTIRE CRADLE OR ENCASEMENT IS TO BE PLACED MONOLITHICALLY.
- (3) ENCASEMENT REQUIRED ON PIPE WHICH HAS A COVER, FROM FINAL GRADE TO THE OUTER TOP OF THE PIPE, OF LESS THAN FOUR (4) FEET OR WHEN THE UPPER LIMIT OF COVER FOR CLASS V PIPE IS EXCEEDED.
- (4) UNLESS OTHERWISE APPROVED BY THE ENGINEER, THE MAX. WIDTH OF TRENCH SHALL BE SUCH THAT THE MAX. WIDTH BETWEEN INNER FACES OF THE LOWEST STAGE OF SHEETING OR ROCK CUT LINES, FROM SUBGRADE OF TRENCH TO A MIN. HEIGHT OF TWO (2) FEET ABOVE THE OUTER TOP OF THE PIPE, SHALL NOT BE GREATER THAN THE STANDARD CRADLE WIDTH PLUS EIGHTEEN (18) INCHES MAXIMUM EACH SIDE.
- (5) SIX (6) INCH MINIMUM SHALL BE MAINTAINED AT ALL TIMES, EXCEPT WHERE SHEETING IS TO BE USED AS FORMWORK.
- (6) CRADLE WIDTH "A" IS BASED ON MINIMUM WALL THICKNESS PER ASTM C76 FOR "WALL B" FOR CLASS III, IV & V - R.C.P.

Gurdeep S. Saini

P.E.

ASSOCIATE COMMISSIONER, DESIGN
DEPARTMENT OF DESIGN AND CONSTRUCTION

8/14/18

DATE

Thomas Wynne

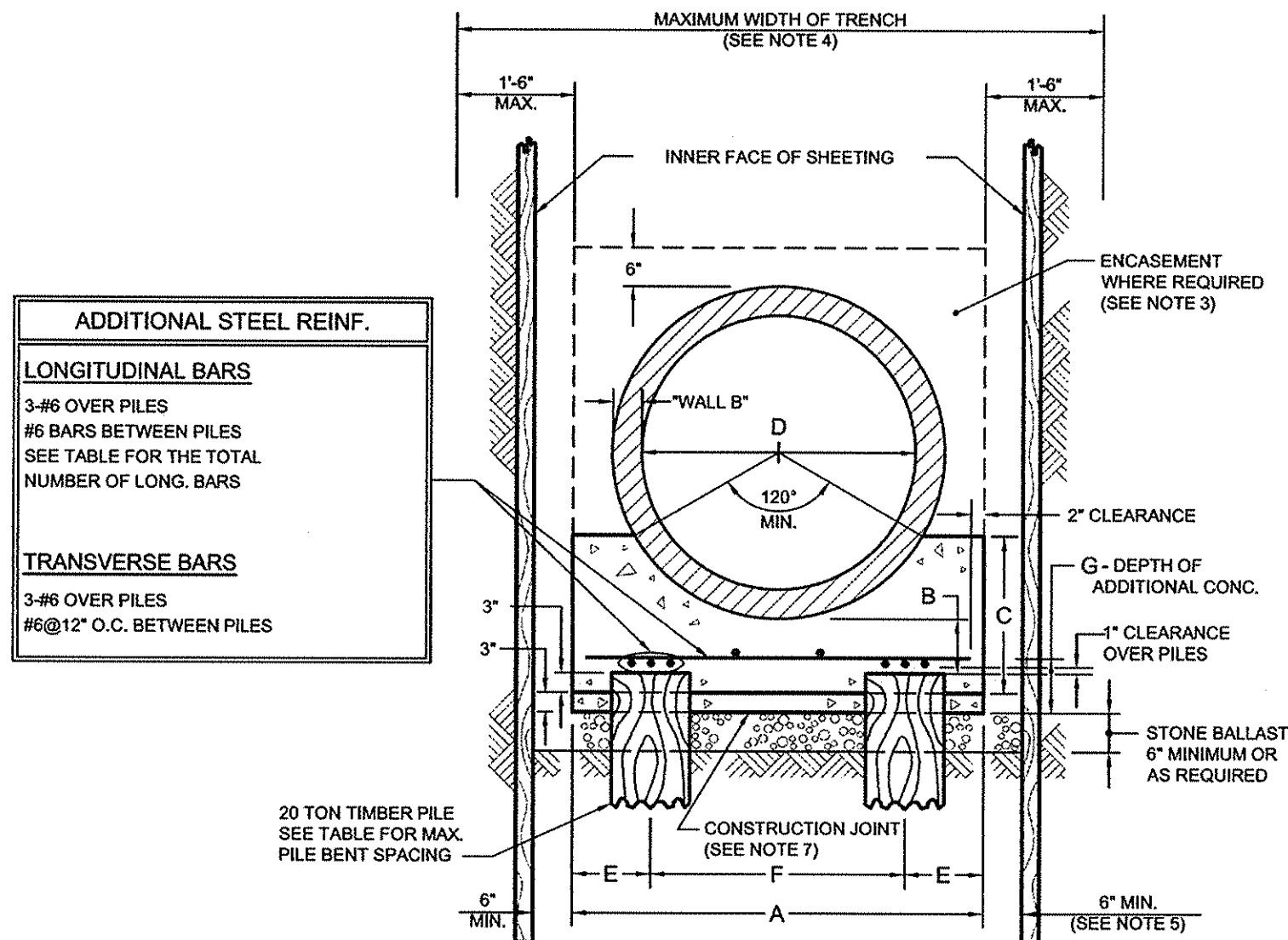
P.E.

EXECUTIVE DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION

8/14/18

DATE

STANDARD FOR 24" DIA. TO 48" DIA. CIRCULAR REINFORCED CONCRETE PIPE ON CONCRETE CRADLE ON PILES - 2 PILE BENTS (20' AND 25' COVER)



| D | A | B | C | E | F | G | MAXIMUM PILE BENT SPACING | | #6 LONG. BARS | ADDITIONAL ITEMS/L.F. | | | STONE BALLAST CU. YD. PER L.F. |
|-----|--------|-----|-------|-----|--------|-----|---------------------------------|--------------|---------------------|----------------------------|--------------|--------------------------|---|
| | | | | | | | 20' COVER | 25' COVER | | ADD. STL. REINF. (LBS.) | | ADD. CONC. CU. YD. | |
| | | | | | | | | | | 20' COVER | 25' COVER | | |
| 24" | 3'-6" | 10" | 1'-9" | 9" | 2'-0" | 10" | 6'-0" | 6'-0" | 7 | 16.86 | 16.86 | 0.1081 | 0.1204 |
| 30" | 4'-1" | 8" | 1'-9" | 9" | 2'-7" | 8" | 5'-6" | 5'-0" | 7 | 17.69 | 18.40 | 0.1009 | 0.1312 |
| 36" | 4'-8" | 7" | 1'-9" | 12" | 2'-8" | 6" | 5'-0" | 4'-6" | 7 | 19.63 | 19.20 | 0.0865 | 0.1420 |
| 42" | 5'-3" | 8" | 2'-0" | 12" | 3'-3" | 6" | 4'-3" | 4'-0" | 8 | 22.45 | 23.10 | 0.0973 | 0.1528 |
| 48" | 5'-10" | 9" | 2'-3" | 12" | 3'-10" | 6" | 3'-9" | 3'-6" | 9 | 26.74 | 25.32 | 0.1081 | 0.1636 |

NOTES:

- (1) CRADLE AND ENCASEMENT ARE CLASS 40 CONCRETE. REBARS-GRADE 60.
- (2) ENTIRE CRADLE OR ENCASEMENT IS TO BE PLACED MONOLITHICALLY ABOVE THE CONSTRUCTION JOINT.
- (3) ENCASEMENT REQUIRED ON PIPE WHICH HAS A COVER, FROM FINAL GRADE TO OUTER TOP OF THE PIPE, OF LESS THAN FOUR (4) FEET OR WHEN THE UPPER LIMIT OF COVER FOR CLASS V PIPE IS EXCEEDED.
- (4) UNLESS OTHERWISE APPROVED BY THE ENGINEER, THE MAX. WIDTH OF TRENCH SHALL BE SUCH THAT THE MAX. WIDTH BETWEEN INNER FACES OF THE LOWEST STAGE OF SHEETING OR ROCK CUT LINES, FROM SUBGRADE OF TRENCH TO A MIN. HEIGHT OF TWO (2) FEET ABOVE THE OUTER TOP OF THE PIPE, SHALL NOT BE GREATER THAN THE STANDARD CRADLE WIDTH PLUS EIGHTEEN (18) INCHES MAXIMUM EACH SIDE.
- (5) SIX (6) INCH MINIMUM SHALL BE MAINTAINED AT ALL TIMES, EXCEPT WHERE SHEETING IS TO BE USED AS FORMWORK.
- (6) CRADLE WIDTH "A" IS BASED ON MINIMUM WALL THICKNESS PER ASTM C76 FOR "WALL B" FOR CLASS III, IV & V - R.C.P.
- (7) CONSTRUCTION JOINT TO BE UTILIZED WHENEVER GROUND CONDITIONS PREVENT PROPER SUPPORT OF PIPE.

Gurdeep S. Saini

P.E.

ASSOCIATE COMMISSIONER, DESIGN
DEPARTMENT OF DESIGN AND CONSTRUCTION

8/14/18

DATE

Thomas Wynne

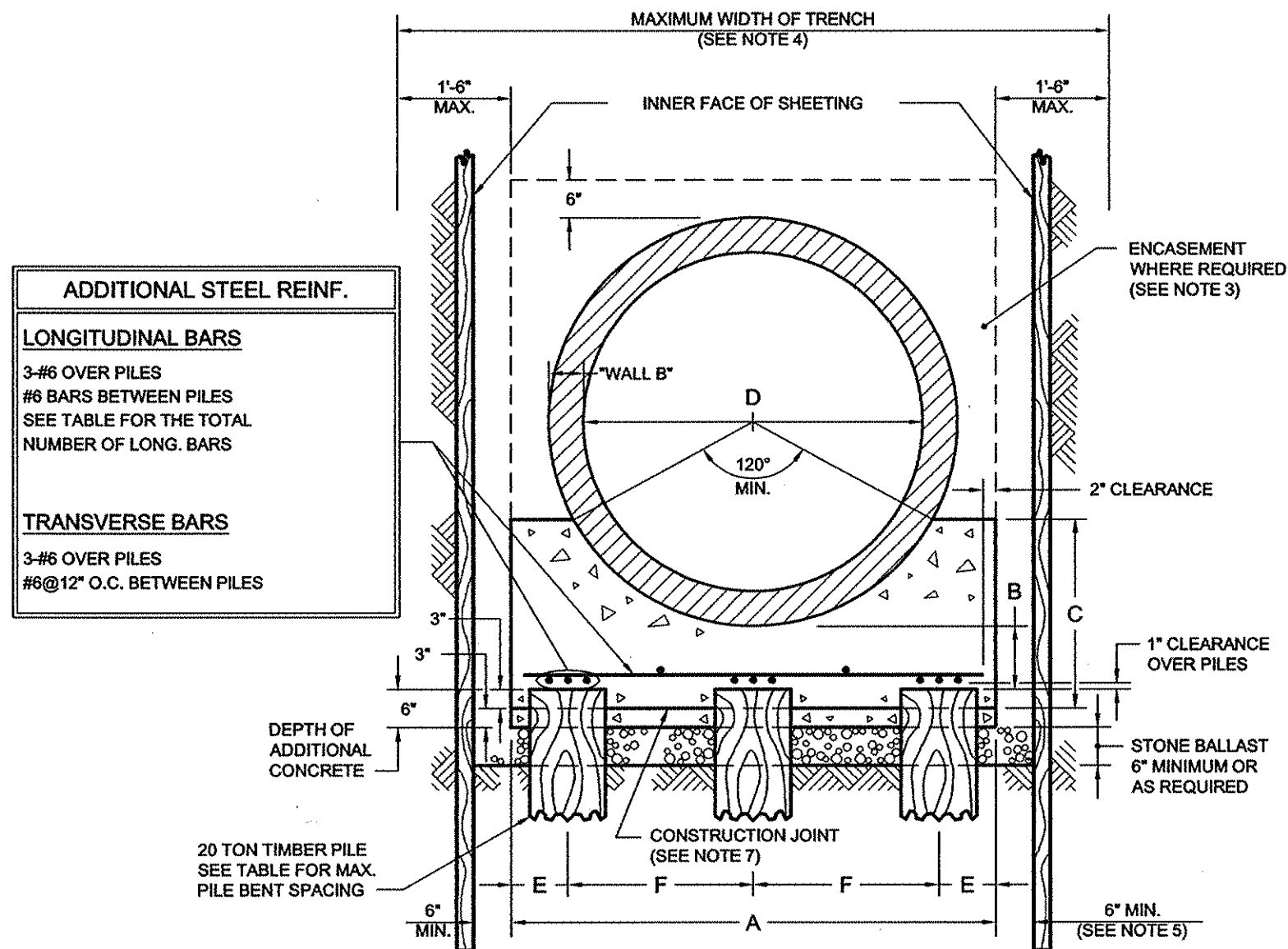
P.E.

EXECUTIVE DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION

8/14/18

DATE

STANDARD FOR 54" DIA. TO 96" DIA. CIRCULAR REINFORCED CONCRETE PIPE ON CONCRETE CRADLE ON PILES - 3 PILE BENTS (20' AND 25' COVER)



| D | A | B | C | E | F | MAXIMUM PILE BENT SPACING | | #6 LONG. BARS | ADDITIONAL ITEMS/L.F. | | | STONE BALLAST CU. YD. PER L.F. |
|-----|--------|-----|--------|-----|------------|---------------------------------|--------------|---------------------|----------------------------|--------------|--------------------------|---|
| | | | | | | 20' COVER | 25' COVER | | ADD. STL. REINF. (LBS.) | | ADD. CONC. CU. YD. | |
| | | | | | | | | | 20' COVER | 25' COVER | | |
| 54" | 6'-5" | 10" | 2'-6" | 9" | 2'-5 1/2" | 5'-3" | 4'-9" | 11 | 28.71 | 29.99 | 0.1189 | 0.1744 |
| 60" | 7'-0" | 11" | 2'-8" | 12" | 2'-6" | 4'-9" | 4'-3" | 11 | 31.28 | 30.66 | 0.1297 | 0.1852 |
| 66" | 7'-7" | 12" | 2'-11" | 12" | 2'-9 1/2" | 4'-3" | 4'-0" | 11 | 31.90 | 32.86 | 0.1405 | 0.1960 |
| 72" | 8'-2" | 13" | 3'-2" | 12" | 3'-1" | 4'-0" | 3'-6" | 13 | 37.18 | 36.34 | 0.1513 | 0.2068 |
| 78" | 8'-9" | 14" | 3'-5" | 12" | 3'-4 1/2" | 3'-6" | 3'-3" | 13 | 37.59 | 38.98 | 0.1621 | 0.2176 |
| 84" | 9'-4" | 15" | 3'-7" | 12" | 3'-8" | 3'-3" | 3'-0" | 13 | 40.33 | 42.06 | 0.1729 | 0.2284 |
| 90" | 9'-11" | 17" | 3'-11" | 12" | 3'-11 1/2" | 3'-0" | 2'-9" | 15 | 46.53 | 48.71 | 0.1837 | 0.2392 |
| 96" | 10'-6" | 18" | 4'-2" | 12" | 4'-3" | 3'-0" | 2'-6" | 15 | 47.99 | 53.01 | 0.1945 | 0.2500 |

NOTES:

- (1) CRADLE AND ENCASEMENT ARE CLASS 40 CONCRETE. REBARS-GRADE 60.
- (2) ENTIRE CRADLE OR ENCASEMENT IS TO BE PLACED MONOLITHICALLY ABOVE THE CONSTRUCTION JOINT.
- (3) ENCASEMENT REQUIRED ON PIPE WHICH HAS A COVER, FROM FINAL GRADE TO OUTER TOP OF THE PIPE, OF LESS THAN FOUR (4) FEET OR WHEN THE UPPER LIMIT OF COVER FOR CLASS V PIPE IS EXCEEDED.
- (4) UNLESS OTHERWISE APPROVED BY THE ENGINEER, THE MAX. WIDTH OF TRENCH SHALL BE SUCH THAT THE MAX. WIDTH BETWEEN INNER FACES OF THE LOWEST STAGE OF SHEETING OR ROCK CUT LINES, FROM SUBGRADE OF TRENCH TO A MIN. HEIGHT OF TWO (2) FEET ABOVE THE OUTER TOP OF THE PIPE, SHALL NOT BE GREATER THAN THE STANDARD CRADLE WIDTH PLUS EIGHTEEN (18) INCHES MAXIMUM EACH SIDE.
- (5) SIX (6) INCH MINIMUM SHALL BE MAINTAINED AT ALL TIMES, EXCEPT WHERE SHEETING IS TO BE USED AS FORMWORK.
- (6) CRADLE WIDTH "A" IS BASED ON MINIMUM WALL THICKNESS PER ASTM C76 FOR "WALL B" FOR CLASS III, IV & V - R.C.P.
- (7) CONSTRUCTION JOINT TO BE UTILIZED WHENEVER GROUND CONDITIONS PREVENT PROPER SUPPORT OF PIPE.

REVISED FEBRUARY 2018: P. LEUNG
W. PATALANO/P. MOY

Sandeep S. Saini
ASSOCIATE COMMISSIONER, DESIGN
DEPARTMENT OF DESIGN AND CONSTRUCTION

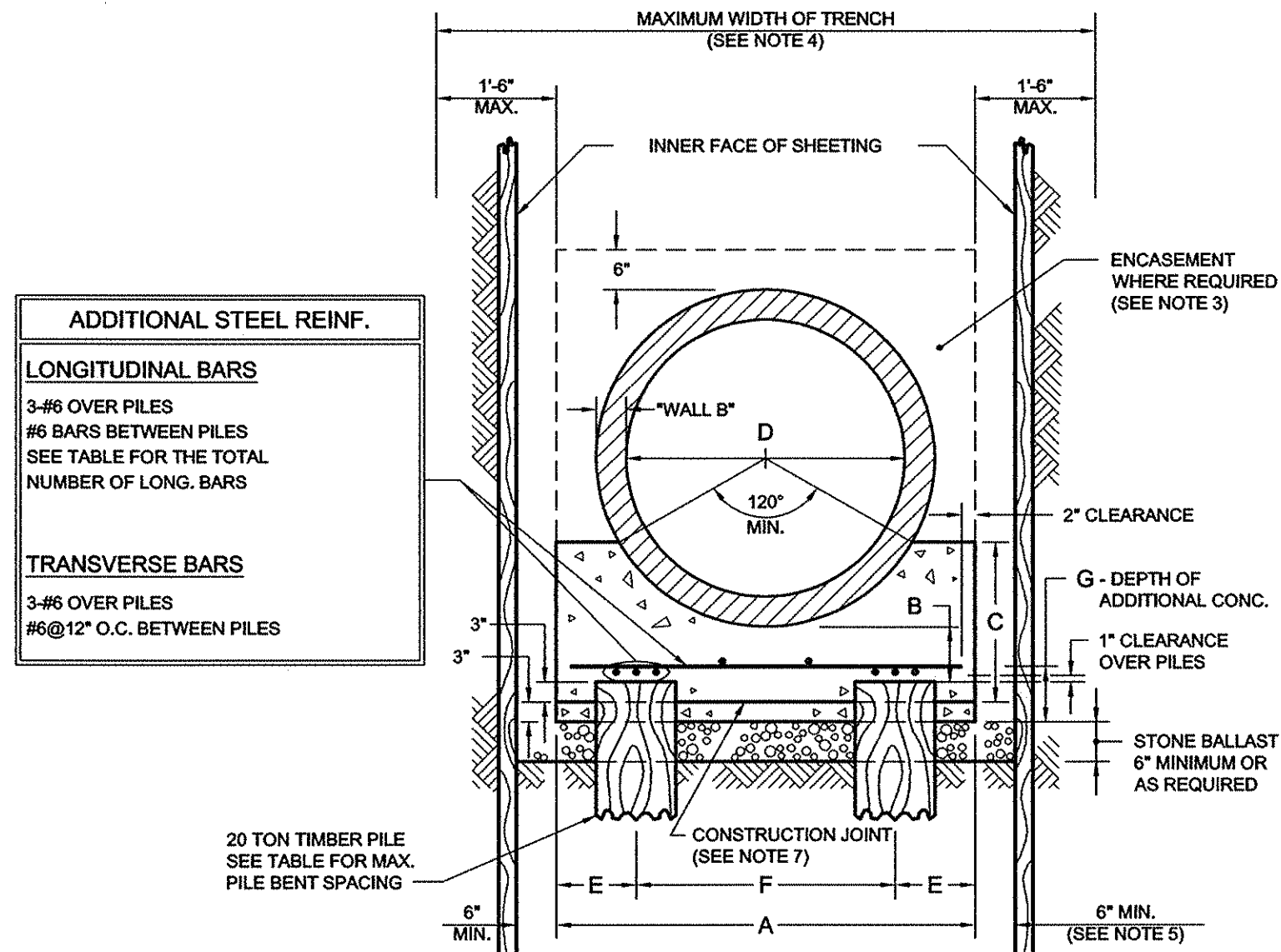
P.E.

8/14/18
DATE

Thomas Wynne
EXECUTIVE DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION

P.E.

8/14/18
DATE

CITY OF NEW YORK
DEPARTMENT OF ENVIRONMENTAL PROTECTIONSTANDARD FOR 24" DIA. TO 60" DIA. CIRCULAR REINFORCED
CONCRETE PIPE ON CONCRETE CRADLE ON PILES - 2 PILE BENTS
(5', 10' AND 15' COVER)

| D | A | B | C | E | F | G | MAXIMUM PILE BENT SPACING | | | #6 LONG. BARS | ADDITIONAL ITEMS/L.F. | | | | STONE BALLAST CU. YD. PER L.F. |
|-----|--------|-----|-------|-----|--------|----|---------------------------------|--------------|--------------|---------------------|----------------------------|--------------|--------------------------|--------------|---|
| | | | | | | | 5' COVER | 10' COVER | 15' COVER | | ADD. STL. REINF. (LBS.) | | ADD. CONC. CU. YD. | | |
| | | | | | | | | | | | 5' COVER | 10' COVER | | 15' COVER | |
| 24" | 3'-6" | 9" | 1'-8" | 9" | 2'-0" | 9" | 6'-0" | 6'-0" | 6'-0" | 7 | 16.86 | 16.86 | 16.86 | 0.0973 | 0.1204 |
| 30" | 4'-1" | 8" | 1'-9" | 9" | 2'-7" | 8" | 6'-0" | 6'-0" | 6'-0" | 7 | 18.03 | 18.03 | 18.03 | 0.1009 | 0.1312 |
| 36" | 4'-8" | 7" | 1'-9" | 12" | 2'-8" | 6" | 6'-0" | 6'-0" | 5'-6" | 7 | 19.20 | 19.20 | 18.80 | 0.0865 | 0.1420 |
| 42" | 5'-3" | 8" | 2'-0" | 12" | 3'-3" | 6" | 6'-0" | 6'-0" | 4'-9" | 8 | 21.87 | 21.87 | 22.90 | 0.0973 | 0.1528 |
| 48" | 5'-10" | 9" | 2'-3" | 12" | 3'-10" | 6" | 6'-0" | 5'-6" | 4'-3" | 9 | 24.54 | 24.04 | 25.19 | 0.1081 | 0.1636 |
| 54" | 6'-5" | 10" | 2'-6" | 12" | 4'-5" | 6" | 6'-0" | 4'-9" | 4'-0" | 9 | 25.70 | 26.99 | 27.23 | 0.1189 | 0.1744 |
| 60" | 7'-0" | 11" | 2'-8" | 12" | 5'-0" | 6" | 6'-0" | 4'-3" | 3'-6" | 10 | 28.38 | 29.16 | 29.33 | 0.1297 | 0.1852 |

NOTES:

- (1) CRADLE AND ENCASEMENT ARE CLASS 40 CONCRETE. REBARS- GRADE 60.
- (2) ENTIRE CRADLE OR ENCASEMENT IS TO BE PLACED MONOLITHICALLY ABOVE THE CONSTRUCTION JOINT.
- (3) ENCASEMENT REQUIRED ON PIPE WHICH HAS A COVER, FROM FINAL GRADE TO OUTER TOP OF THE PIPE, OF LESS THAN FOUR (4) FEET OR WHEN THE UPPER LIMIT OF COVER FOR CLASS V PIPE IS EXCEEDED.
- (4) UNLESS OTHERWISE APPROVED BY THE ENGINEER, THE MAX. WIDTH OF TRENCH SHALL BE SUCH THAT THE MAX. WIDTH BETWEEN INNER FACES OF THE LOWEST STAGE OF SHEETING OR ROCK CUT LINES, FROM SUBGRADE OF TRENCH TO A MIN. HEIGHT OF TWO (2) FEET ABOVE THE OUTER TOP OF THE PIPE, SHALL NOT BE GREATER THAN THE STANDARD CRADLE WIDTH PLUS EIGHTEEN (18) INCHES MAXIMUM EACH SIDE.
- (5) SIX (6) INCH MINIMUM SHALL BE MAINTAINED AT ALL TIMES, EXCEPT WHERE SHEETING IS TO BE USED AS FORMWORK.
- (6) CRADLE WIDTH "A" IS BASED ON MINIMUM WALL THICKNESS PER ASTM C76 FOR "WALL B" FOR CLASS III, IV & V - R.C.P.
- (7) CONSTRUCTION JOINT TO BE UTILIZED WHENEVER GROUND CONDITIONS PREVENT PROPER SUPPORT OF PIPE.

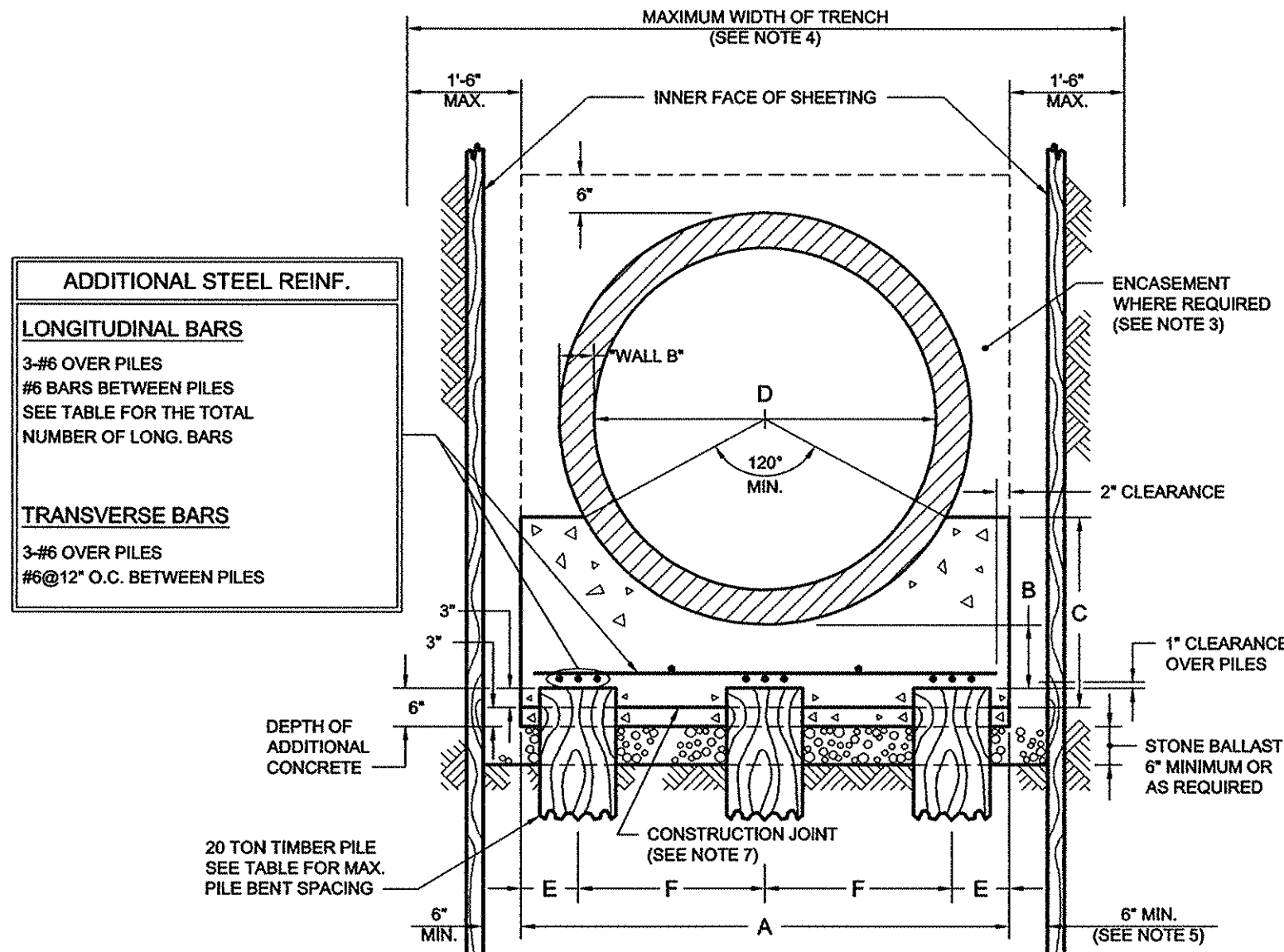
Gardner S. Savini
P.E.
ASSOCIATE COMMISSIONER, DESIGN
DEPARTMENT OF DESIGN AND CONSTRUCTION

8/14/18
DATE

Thomas W. Wynn
P.E.
EXECUTIVE DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION

8/14/18
DATE

STANDARD FOR 66" DIA. TO 96" DIA. CIRCULAR REINFORCED CONCRETE PIPE ON CONCRETE CRADLE ON PILES - 3 PILE BENTS (5', 10' AND 15' COVER)



| D | A | B | C | E | F | MAXIMUM PILE BENT SPACING | | | #6 LONG. BARS | ADDITIONAL ITEMS/L.F. | | | | STONE BALLAST CU. YD. PER L.F. |
|-----|--------|-----|--------|-----|------------|---------------------------------|--------------|--------------|---------------------|----------------------------|--------------|--------------|--------------------------|---|
| | | | | | | 5' COVER | 10' COVER | 15' COVER | | ADD. STL. REINF. (LBS.) | | | ADD. CONC. CU. YD. | |
| | | | | | | | | | | 5' COVER | 10' COVER | 15' COVER | | |
| 66" | 7'-7" | 12" | 2'-11" | 12" | 2'-9 1/2" | 6'-0" | 6'-0" | 4'-9" | 11 | 31.05 | 31.05 | 32.57 | 0.1401 | 0.1960 |
| 72" | 8'-2" | 13" | 3'-2" | 12" | 3'-1" | 6'-0" | 5'-6" | 4'-6" | 13 | 35.22 | 34.50 | 35.22 | 0.1513 | 0.2068 |
| 78" | 8'-9" | 14" | 3'-5" | 12" | 3'-4 1/2" | 6'-0" | 5'-0" | 4'-0" | 13 | 36.39 | 37.23 | 38.49 | 0.1621 | 0.2176 |
| 84" | 9'-4" | 15" | 3'-7" | 12" | 3'-8" | 6'-0" | 4'-6" | 3'-9" | 13 | 37.55 | 37.55 | 41.16 | 0.1729 | 0.2284 |
| 90" | 9'-11" | 17" | 3'-11" | 12" | 3'-11 1/2" | 5'-9" | 4'-3" | 3'-6" | 15 | 42.56 | 42.86 | 43.10 | 0.1837 | 0.2392 |
| 96" | 10'-6" | 18" | 4'-2" | 12" | 4'-3" | 5'-3" | 4'-0" | 3'-3" | 15 | 42.90 | 45.44 | 46.03 | 0.1945 | 0.2500 |

NOTES:

- (1) CRADLE AND ENCASEMENT ARE CLASS 40 CONCRETE. REBARS-GRADE 60.
- (2) ENTIRE CRADLE OR ENCASEMENT IS TO BE PLACED MONOLITHICALLY ABOVE THE CONSTRUCTION JOINT.
- (3) ENCASEMENT REQUIRED ON PIPE WHICH HAS A COVER, FROM FINAL GRADE TO OUTER TOP OF THE PIPE, OF LESS THAN FOUR (4) FEET OR WHEN THE UPPER LIMIT OF COVER FOR CLASS V PIPE IS EXCEEDED.
- (4) UNLESS OTHERWISE APPROVED BY THE ENGINEER, THE MAX. WIDTH OF TRENCH SHALL BE SUCH THAT THE MAX. WIDTH BETWEEN INNER FACES OF THE LOWEST STAGE OF SHEETING OR ROCK CUT LINES, FROM SUBGRADE OF TRENCH TO A MIN. HEIGHT OF TWO (2) FEET ABOVE THE OUTER TOP OF THE PIPE, SHALL NOT BE GREATER THAN THE STANDARD CRADLE WIDTH PLUS EIGHTEEN (18) INCHES MAXIMUM EACH SIDE.
- (5) SIX (6) INCH MINIMUM SHALL BE MAINTAINED AT ALL TIMES, EXCEPT WHERE SHEETING IS TO BE USED AS FORMWORK.
- (6) CRADLE WIDTH "A" IS BASED ON MINIMUM WALL THICKNESS PER ASTM C76 FOR "WALL B" FOR CLASS III, IV & V - R.C.P.
- (7) CONSTRUCTION JOINT TO BE UTILIZED WHENEVER GROUND CONDITIONS PREVENT PROPER SUPPORT OF PIPE.

Gurdeep S. Saini
ASSOCIATE COMMISSIONER, DESIGN
DEPARTMENT OF DESIGN AND CONSTRUCTION

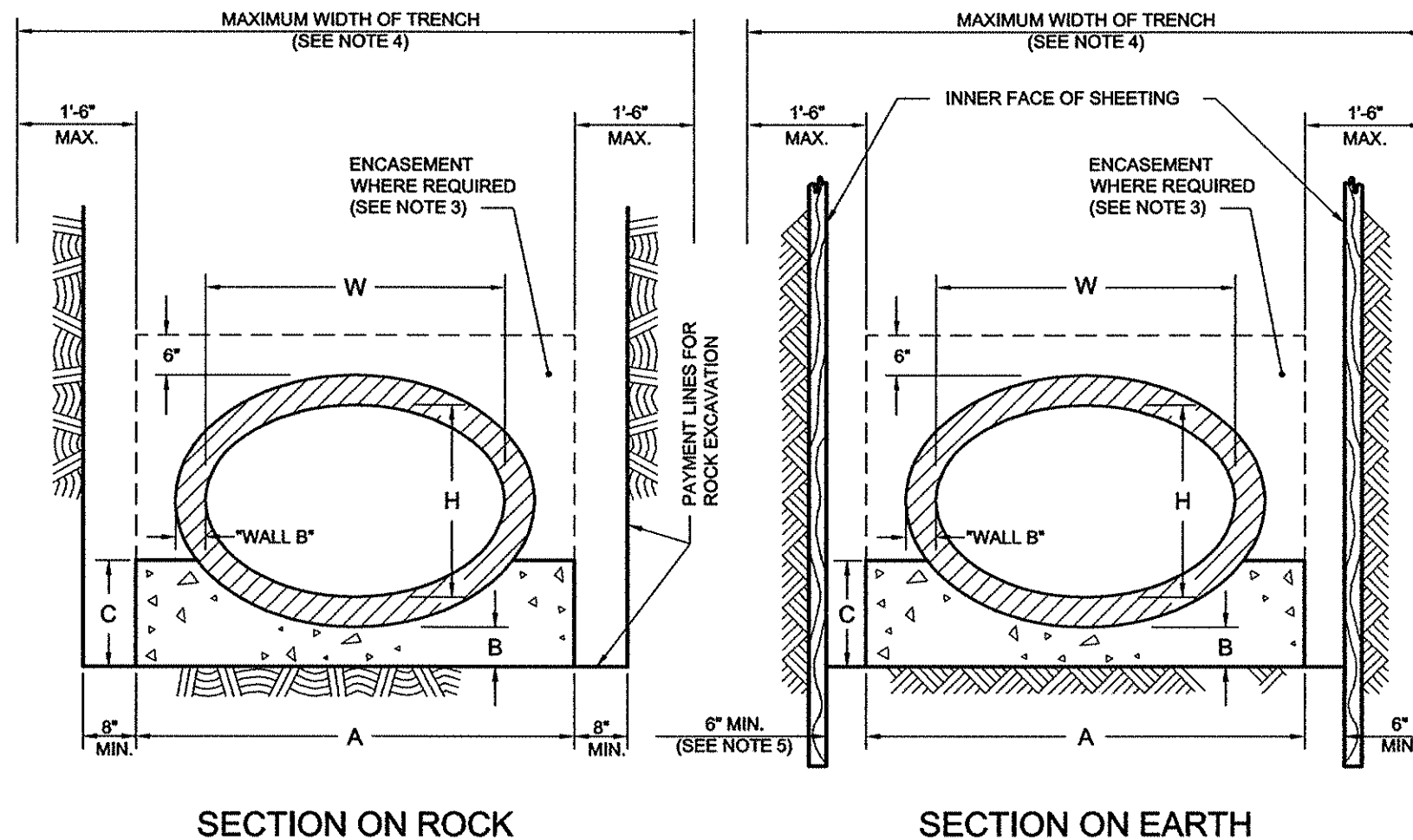
P.E.

8/14/18
DATE

Thomas Wayne
EXECUTIVE DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION

P.E.

8/14/18
DATE

STANDARD FOR HORIZONTAL ELLIPTICAL REINFORCED
CONCRETE PIPE ON CONCRETE CRADLE ON EARTH OR ON ROCK

| W | H | EQUIV. DIA. | A | B | C | CONC. CRADLE CU. YD./L.F. | CONC. ENCSMT. CU. YD./L.F. | MAXIMUM COVER FOR PIPE CLASS | |
|------|-----|----------------|---------|-----|--------|------------------------------|-------------------------------|---------------------------------|--------|
| | | | | | | | | HE-III | HE-IV |
| 23" | 14" | 18" | 3'-6" | 6" | 0'-11" | 0.0961 | 0.2281 | 12'-6" | 19'-0" |
| 30" | 19" | 24" | 4'-1" | 6" | 1'-1" | 0.1219 | 0.2846 | 13'-0" | 19'-6" |
| 38" | 24" | 30" | 4'-10" | 6" | 1'-2" | 0.1510 | 0.3594 | 13'-0" | 19'-6" |
| 45" | 29" | 36" | 5'-6" | 6" | 1'-4" | 0.1845 | 0.4343 | 13'-0" | 19'-6" |
| 53" | 34" | 42" | 6'-3" | 7" | 1'-6" | 0.2377 | 0.5395 | 13'-0" | 20'-0" |
| 60" | 38" | 48" | 6'-11" | 7" | 1'-7" | 0.2721 | 0.6207 | 13'-0" | 20'-0" |
| 68" | 43" | 54" | 7'-8" | 8" | 1'-10" | 0.3422 | 0.7437 | 13'-6" | 20'-6" |
| 76" | 48" | 60" | 8'-5" | 9" | 2'-0" | 0.4139 | 0.8774 | 13'-6" | 20'-6" |
| 83" | 53" | 66" | 9'-1" | 10" | 2'-3" | 0.4947 | 1.0137 | 13'-6" | 20'-6" |
| 91" | 58" | 72" | 9'-10" | 10" | 2'-4" | 0.5499 | 1.1376 | 14'-0" | 21'-0" |
| 98" | 63" | 78" | 10'-6" | 11" | 2'-7" | 0.6385 | 1.2725 | 14'-0" | 21'-0" |
| 106" | 68" | 84" | 11'-3" | 12" | 2'-10" | 0.7467 | 1.4638 | 14'-0" | 21'-0" |
| 113" | 72" | 90" | 11'-11" | 13" | 3'-0" | 0.8434 | 1.6266 | 14'-6" | 21'-0" |
| 121" | 77" | 96" | 12'-8" | 14" | 3'-2" | 0.9544 | 1.8192 | 15'-0" | 21'-6" |

NOTES:

- (1) CRADLE AND ENCASEMENT ARE CLASS 40 CONCRETE.
- (2) ENTIRE CRADLE OR ENCASEMENT IS TO BE PLACED MONOLITHICALLY.
- (3) ENCASEMENT REQUIRED ON PIPE WHICH HAS A COVER, FROM FINAL GRADE TO OUTER TOP OF THE PIPE, OF LESS THAN FOUR (4) FEET OR WHEN THE UPPER LIMIT OF COVER FOR CLASS HE-IV PIPE IS EXCEEDED.
- (4) UNLESS OTHERWISE APPROVED BY THE ENGINEER, THE MAX. WIDTH OF TRENCH SHALL BE SUCH THAT THE MAX. WIDTH BETWEEN INNER FACES OF THE LOWEST STAGE OF SHEETING OR ROCK CUT LINES, FROM SUBGRADE OF TRENCH TO A MIN. HEIGHT OF TWO (2) FEET ABOVE THE OUTER TOP OF THE PIPE, SHALL NOT BE GREATER THAN THE STANDARD CRADLE WIDTH PLUS EIGHTEEN (18) INCHES MAXIMUM EACH SIDE.
- (5) SIX (6) INCH MINIMUM SHALL BE MAINTAINED AT ALL TIMES, EXCEPT WHERE SHEETING IS TO BE USED AS FORMWORK.
- (6) CRADLE WIDTH "A" IS BASED ON MINIMUM WALL THICKNESS PER ASTM C507 FOR "WALL B" FOR CLASS HE-III AND HE-IV - R.C.P.

Gurdeep S. Saini
ASSOCIATE COMMISSIONER, DESIGN
DEPARTMENT OF DESIGN AND CONSTRUCTION

P.E.

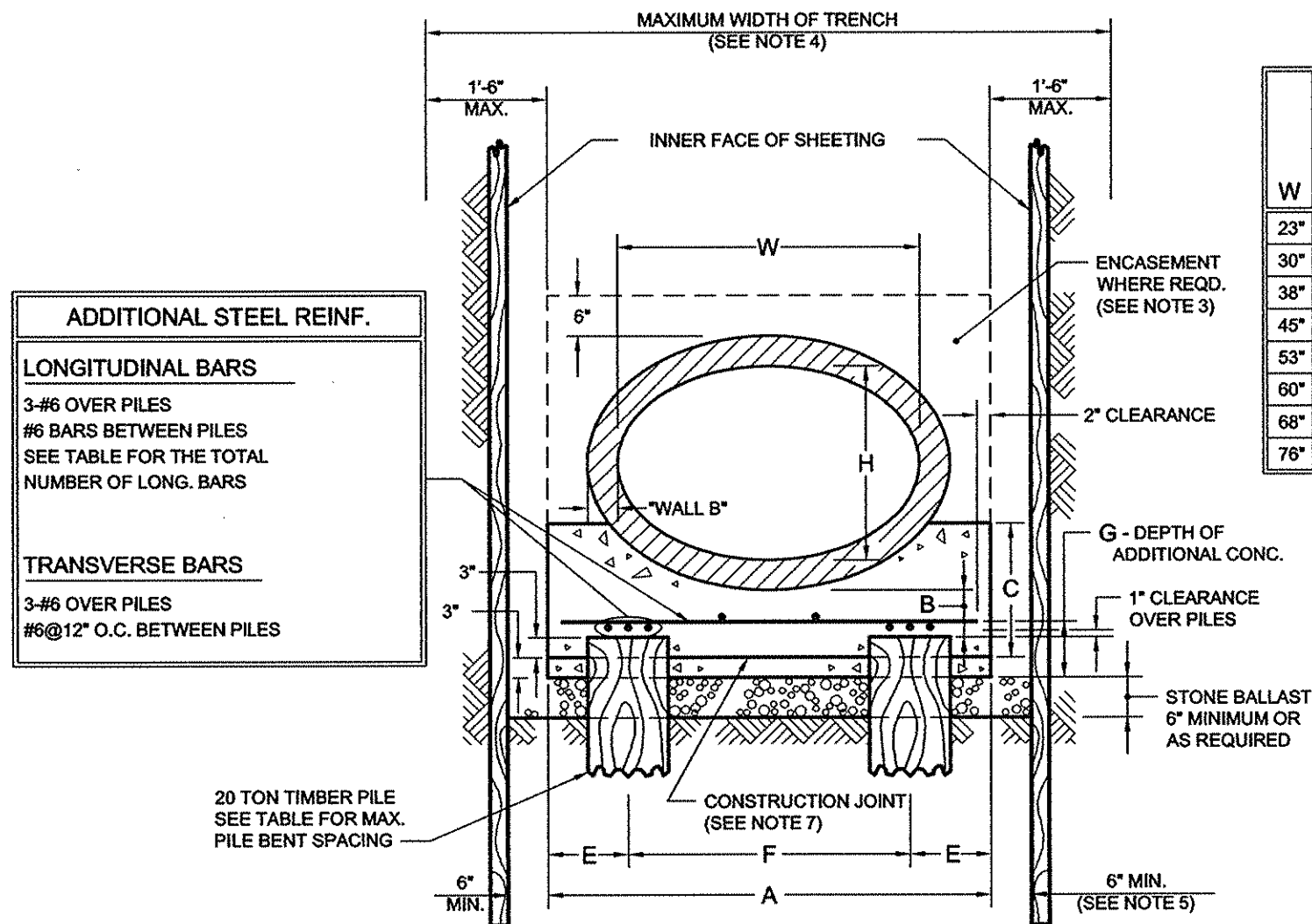
8/14/18
DATE

Thomas Wynne
EXECUTIVE DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION

P.E.

8/14/18
DATE

STANDARD FOR 23"W X 14"H TO 76"W X 48"H HORIZONTAL ELLIPTICAL REINFORCED CONCRETE PIPE ON CONCRETE CRADLE ON PILES - 2 PILE BENTS (5', 10' AND 15' COVER)

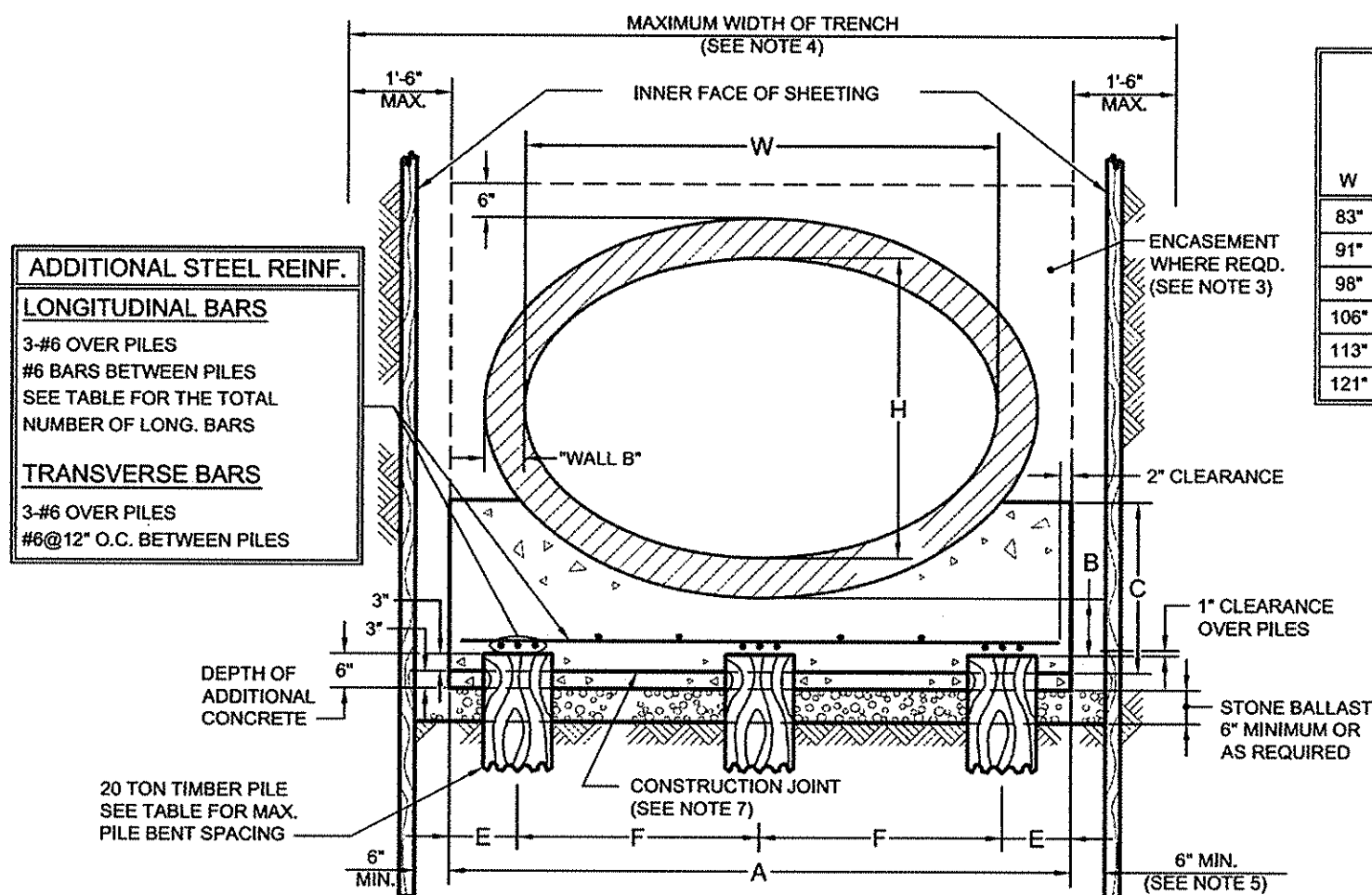


| W | H | EQUIV. DIA. | A | B | C | E | F | G | MAXIMUM PILE BENT SPACING | | | #6 LONG. BARS | ADDITIONAL ITEMS/L.F. | | | | STONE BALLAST CU. YD. PER L.F. |
|-----|-----|----------------|--------|-----|-------|-----|--------|----|---------------------------------|--------------|--------------|---------------------|----------------------------|--------------|--------------|--------------------------|---|
| | | | | | | | | | 5' COVER | 10' COVER | 15' COVER | | ADD. STL. REINF. (LBS.) | | | ADD. CONC. CU. YD. | |
| | | | | | | | | | | | | | 5' COVER | 10' COVER | 15' COVER | | |
| 23" | 14" | 18" | 3'-6" | 8" | 1'-4" | 9" | 2'-0" | 8" | 6'-0" | 6'-0" | 6'-0" | 7 | 16.86 | 16.86 | 16.86 | 0.0865 | 0.1204 |
| 30" | 19" | 24" | 4'-1" | 8" | 1'-6" | 9" | 2'-7" | 8" | 6'-0" | 6'-0" | 6'-0" | 7 | 18.03 | 18.03 | 18.03 | 0.1009 | 0.1312 |
| 38" | 24" | 30" | 4'-10" | 8" | 1'-7" | 12" | 2'-10" | 8" | 6'-0" | 6'-0" | 6'-0" | 8 | 21.03 | 21.03 | 21.03 | 0.1194 | 0.1451 |
| 45" | 29" | 36" | 5'-6" | 7" | 1'-8" | 12" | 3'-6" | 7" | 6'-0" | 6'-0" | 5'-3" | 8 | 22.37 | 22.37 | 22.37 | 0.1189 | 0.1574 |
| 53" | 34" | 42" | 6'-3" | 7" | 1'-9" | 12" | 4'-3" | 6" | 6'-0" | 5'-3" | 4'-6" | 9 | 25.37 | 25.37 | 25.37 | 0.1158 | 0.1713 |
| 60" | 38" | 48" | 6'-11" | 9" | 2'-0" | 12" | 4'-11" | 8" | 6'-0" | 4'-9" | 4'-0" | 10 | 28.21 | 29.60 | 29.86 | 0.1708 | 0.1836 |
| 68" | 43" | 54" | 7'-8" | 9" | 2'-2" | 15" | 5'-2" | 7" | 6'-0" | 4'-3" | 3'-6" | 10 | 29.71 | 30.57 | 30.76 | 0.1657 | 0.1975 |
| 76" | 48" | 60" | 8'-5" | 11" | 2'-5" | 15" | 5'-11" | 8" | 5'-9" | 4'-0" | 3'-3" | 11 | 33.42 | 34.74 | 35.20 | 0.2079 | 0.2114 |

NOTES:

- (1) CRADLE AND ENCASEMENT ARE CLASS 40 CONCRETE. REBARS-GRADE 60.
- (2) ENTIRE CRADLE OR ENCASEMENT IS TO BE PLACED MONOLITHICALLY ABOVE THE CONSTRUCTION JOINT.
- (3) ENCASEMENT REQUIRED ON PIPE WHICH HAS A COVER, FROM FINAL GRADE TO OUTER TOP OF THE PIPE, OF LESS THAN FOUR (4) FEET OR WHEN THE UPPER LIMIT OF COVER FOR CLASS HE-IV PIPE IS EXCEEDED.
- (4) UNLESS OTHERWISE APPROVED BY THE ENGINEER, THE MAX. WIDTH OF TRENCH SHALL BE SUCH THAT THE MAX. WIDTH BETWEEN INNER FACES OF THE LOWEST STAGE OF SHEETING OR ROCK CUT LINES, FROM SUBGRADE OF TRENCH TO A MIN. HEIGHT OF TWO (2) FEET ABOVE THE OUTER TOP OF THE PIPE, SHALL NOT BE GREATER THAN THE STANDARD CRADLE WIDTH PLUS EIGHTEEN (18) INCHES MAXIMUM EACH SIDE.
- (5) SIX (6) INCH MINIMUM SHALL BE MAINTAINED AT ALL TIMES, EXCEPT WHERE SHEETING IS TO BE USED AS FORMWORK.
- (6) CRADLE WIDTH "A" IS BASED ON MINIMUM WALL THICKNESS PER ASTM C507 FOR "WALL B" FOR CLASS HE-III AND HE-IV - R.C.P.
- (7) CONSTRUCTION JOINT TO BE UTILIZED WHENEVER GROUND CONDITIONS PREVENT PROPER SUPPORT OF PIPE.

STANDARD FOR 83"W x 53"H TO 121"W x 77"H HORIZONTAL ELLIPTICAL REINFORCED CONCRETE PIPE ON CONCRETE CRADLE ON PILES - 3 PILE BENTS (5', 10' AND 15' COVER)



| W | H | EQUIV. DIA. | A | B | C | E | F | MAXIMUM PILE BENT SPACING | | | #6 LONG. BARS | ADDITIONAL ITEMS/L.F. | | | | STONE BALLAS CU. YD PER L.F. |
|------|-----|----------------|---------|-----|--------|-----|------------|---------------------------------|--------------|--------------|---------------------|----------------------------|--------------|--------------|--------------------------|---------------------------------------|
| | | | | | | | | 5' COVER | 10' COVER | 15' COVER | | ADD. STL. REINF. (LBS.) | | | ADD. CONC. CU. YD. | |
| | | | | | | | | | | | | 5' COVER | 10' COVER | 15' COVER | | |
| 83" | 53" | 66" | 9'-1" | 10" | 2'-6" | 12" | 3'-6 1/2" | 6'-0" | 5'-3" | 4'-6" | 13 | 37.05 | 37.05 | 37.05 | 0.1682 | 0.2238 |
| 91" | 58" | 72" | 9'-10" | 10" | 2'-7" | 12" | 3'-11" | 6'-0" | 5'-0" | 4'-0" | 15 | 41.56 | 42.51 | 43.94 | 0.1821 | 0.2377 |
| 98" | 63" | 78" | 10'-6" | 11" | 2'-10" | 12" | 4'-3" | 6'-0" | 4'-6" | 3'-6" | 15 | 42.89 | 42.89 | 44.35 | 0.1945 | 0.2500 |
| 106" | 68" | 84" | 11'-3" | 12" | 3'-1" | 12" | 4'-7 1/2" | 5'-6" | 4'-0" | 3'-3" | 15 | 43.40 | 47.13 | 47.76 | 0.2084 | 0.2639 |
| 113" | 72" | 90" | 11'-11" | 13" | 3'-3" | 12" | 4'-11 1/2" | 5'-3" | 3'-9" | 3'-0" | 17 | 48.73 | 53.37 | 54.53 | 0.2207 | 0.2763 |
| 121" | 77" | 96" | 12'-8" | 14" | 3'-5" | 12" | 5'-4" | 4'-9" | 3'-6" | 2'-9" | 17 | 52.84 | 52.00 | 59.22 | 0.2346 | 0.2902 |

NOTES:

- (1) CRADLE AND ENCASEMENT ARE CLASS 40 CONCRETE. REBARS-GRADE 60.
- (2) ENTIRE CRADLE OR ENCASEMENT IS TO BE PLACED MONOLITHICALLY ABOVE THE CONSTRUCTION JOINT.
- (3) ENCASEMENT REQUIRED ON PIPE WHICH HAS A COVER, FROM FINAL GRADE TO OUTER TOP OF THE PIPE, OF LESS THAN FOUR (4) FEET OR WHEN THE UPPER LIMIT OF COVER FOR CLASS HE-IV PIPE IS EXCEEDED.
- (4) UNLESS OTHERWISE APPROVED BY THE ENGINEER, THE MAX. WIDTH OF TRENCH SHALL BE SUCH THAT THE MAX. WIDTH BETWEEN INNER FACES OF THE LOWEST STAGE OF SHEETING OR ROCK CUT LINES, FROM SUBGRADE OF TRENCH TO A MIN. HEIGHT OF TWO (2) FEET ABOVE THE OUTER TOP OF THE PIPE, SHALL NOT BE GREATER THAN THE STANDARD CRADLE WIDTH PLUS EIGHTEEN (18) INCHES MAXIMUM EACH SIDE.
- (5) SIX (6) INCH MINIMUM SHALL BE MAINTAINED AT ALL TIMES, EXCEPT WHERE SHEETING IS TO BE USED AS FORMWORK.
- (6) CRADLE WIDTH "A" IS BASED ON MINIMUM WALL THICKNESS PER ASTM C507 FOR "WALL B" FOR CLASS HE-III AND HE-IV - R.C.P.
- (7) CONSTRUCTION JOINT TO BE UTILIZED WHENEVER GROUND CONDITIONS PREVENT PROPER SUPPORT OF PIPE.

Gurdeep S. Saini
ASSOCIATE COMMISSIONER, DESIGN
DEPARTMENT OF DESIGN AND CONSTRUCTION

P.E.

8/14/18
DATE

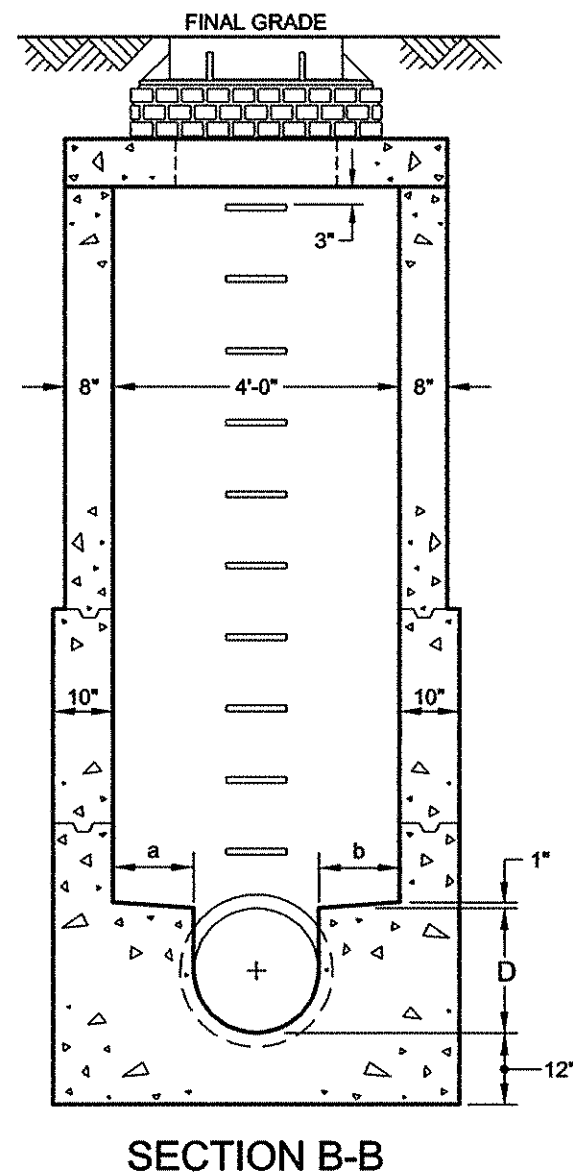
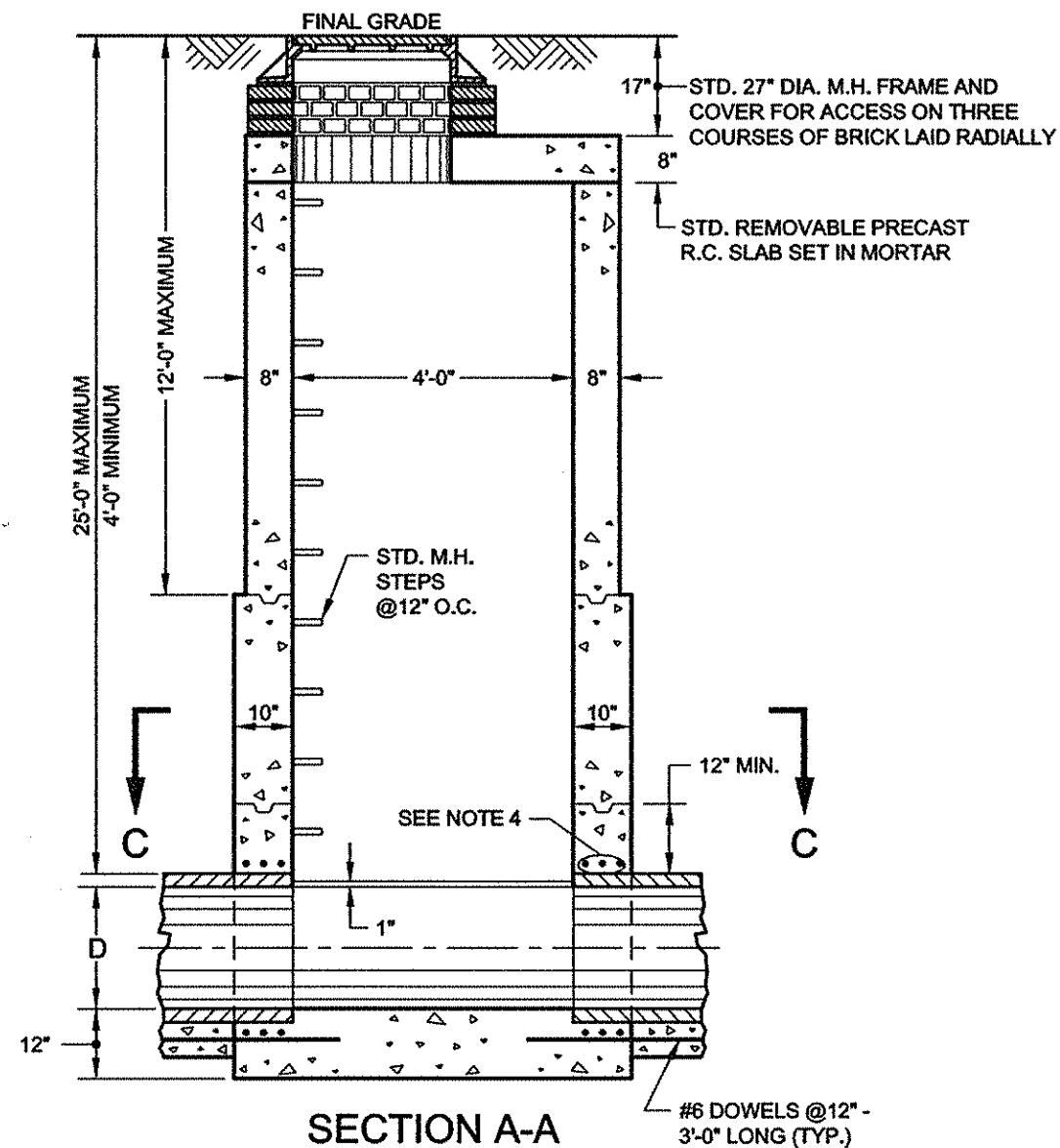
Thomas Leung
EXECUTIVE DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION

P.E.

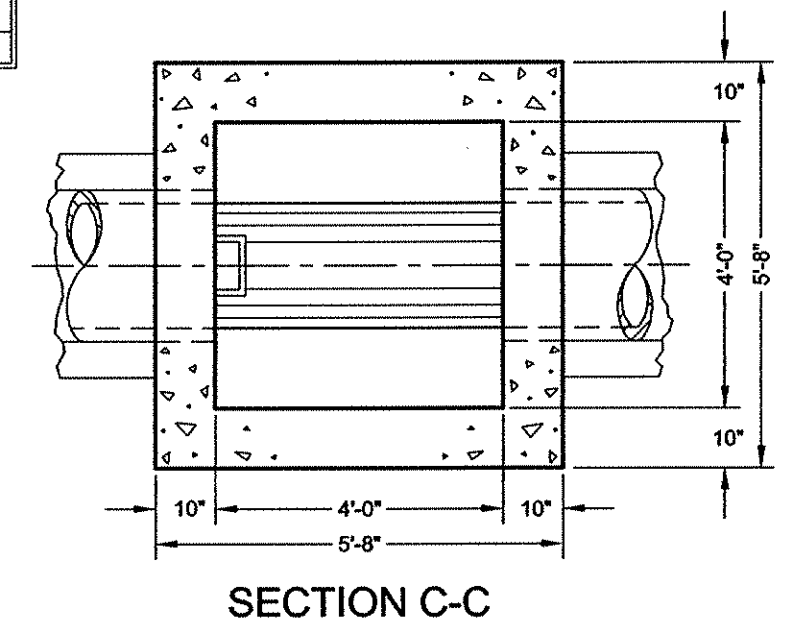
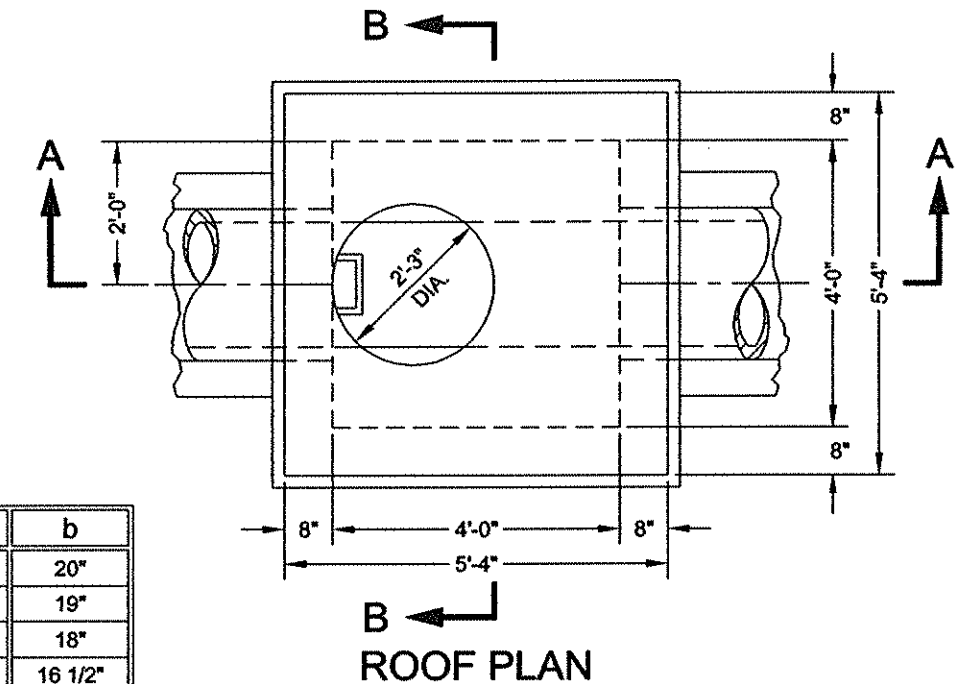
8/14/18
DATE

STANDARD FOR MANHOLE ON 8" DIA. TO 30" DIA. PIPE SEWERS IN DRY LOCATION

TYPE A-1 (12' MAX. COVER) AND TYPE A-2 (25' MAX. COVER)



| D | a | b |
|-----|---------|---------|
| 8" | 20" | 20" |
| 10" | 19" | 19" |
| 12" | 18" | 18" |
| 15" | 16 1/2" | 16 1/2" |
| 18" | 15" | 15" |
| 24" | 12" | 12" |
| 30" | 12" | 6" |



NOTES:

- (1) WHEN LEGAL GRADE IS BELOW FINAL GRADE SEE SEWER STANDARD NO. 38.
- (2) KEYED CONSTRUCTION JOINTS ARE REQUIRED BETWEEN ANY SUCCESSIVE POURS.
- (3) CONCRETE IS TO BE CLASS 40. REBARS- GRADE 60.
- (4) FOR ALL PIPE SEWERS EIGHTEEN (18) INCHES IN DIAMETER AND GREATER, ADD 3-#6@3" ABOVE AND BELOW THE PIPE.

Gandip S. Saini
ASSOCIATE COMMISSIONER, DESIGN
DEPARTMENT OF DESIGN AND CONSTRUCTION

P.E.

8/14/18
DATE

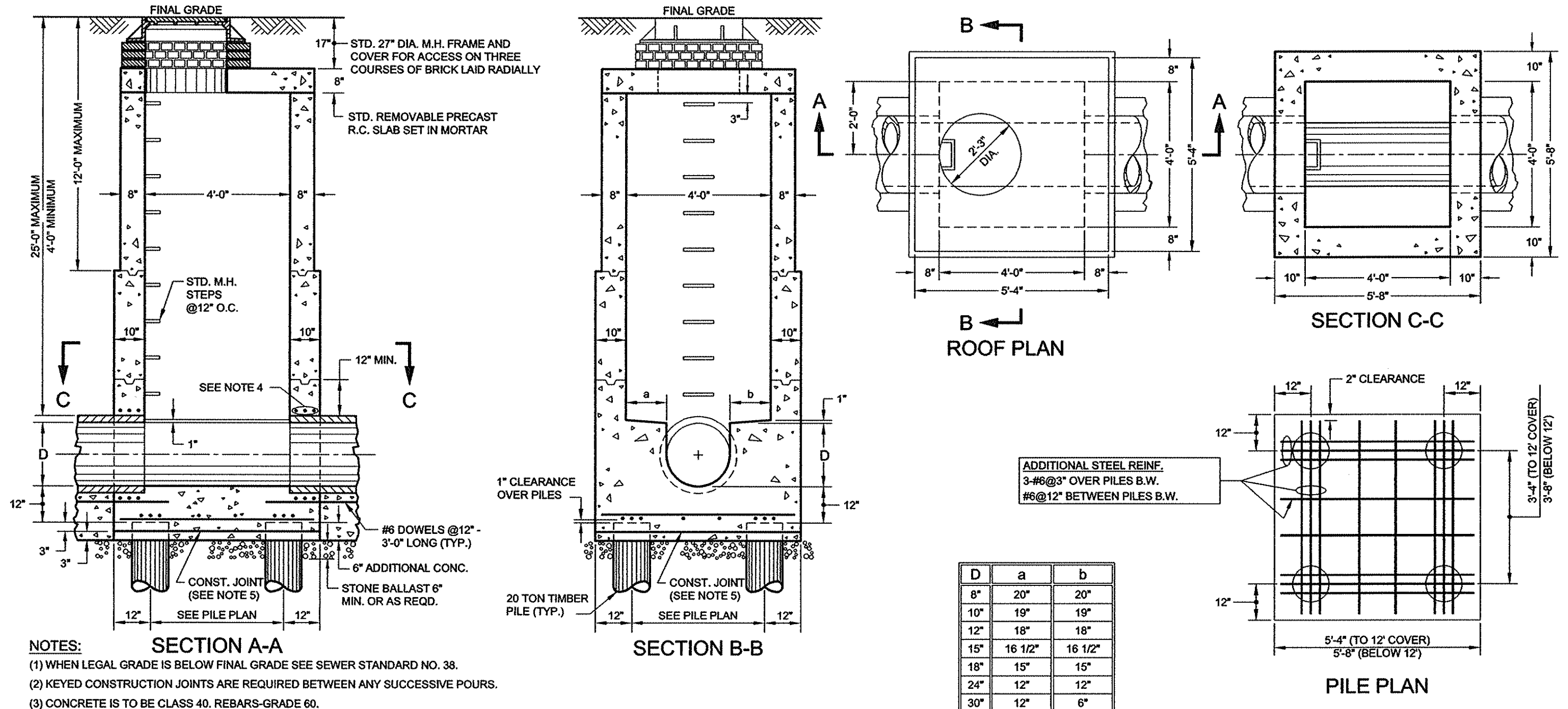
Thomas Wayne
EXECUTIVE DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION

P.E.

8/19/18
DATE

CITY OF NEW YORK
DEPARTMENT OF ENVIRONMENTAL PROTECTION

**STANDARD FOR MANHOLE ON 8" DIA. TO 30" DIA.
PIPE SEWERS ON PILE IN DRY LOCATION**
TYPE A-1 (12' MAX. COVER) AND TYPE A-2 (25' MAX. COVER)



NOTES:

- (1) WHEN LEGAL GRADE IS BELOW FINAL GRADE SEE SEWER STANDARD NO. 38.
- (2) KEYED CONSTRUCTION JOINTS ARE REQUIRED BETWEEN ANY SUCCESSIVE POURS.
- (3) CONCRETE IS TO BE CLASS 40. REBARS-GRADE 60.
- (4) FOR ALL PIPE SEWERS EIGHTEEN (18) INCHES IN DIAMETER AND GREATER, ADD 3-#6@3" ABOVE AND BELOW THE PIPE.
- (5) CONSTRUCTION JOINT TO BE UTILIZED WHENEVER GROUND CONDITIONS PREVENT SUPPORT OF PIPE.

Sundip S. Saini P.E.
ASSOCIATE COMMISSIONER, DESIGN
DEPARTMENT OF DESIGN AND CONSTRUCTION

8/14/18
DATE

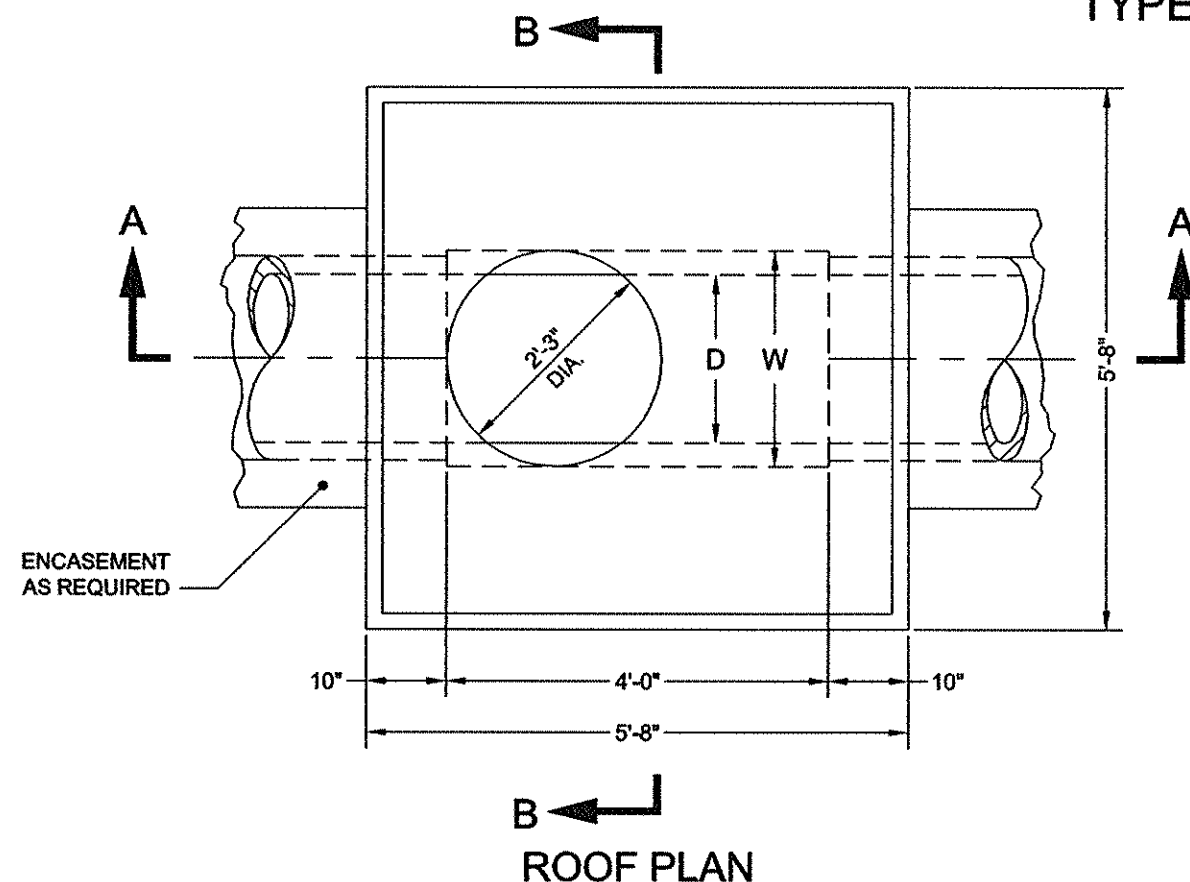
Thomas Wynne P.E.
EXECUTIVE DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION

8/14/18
DATE

CITY OF NEW YORK
DEPARTMENT OF ENVIRONMENTAL PROTECTION

STANDARD FOR SHALLOW MANHOLE ON 8" DIA. TO 30" DIA. PIPE SEWERS

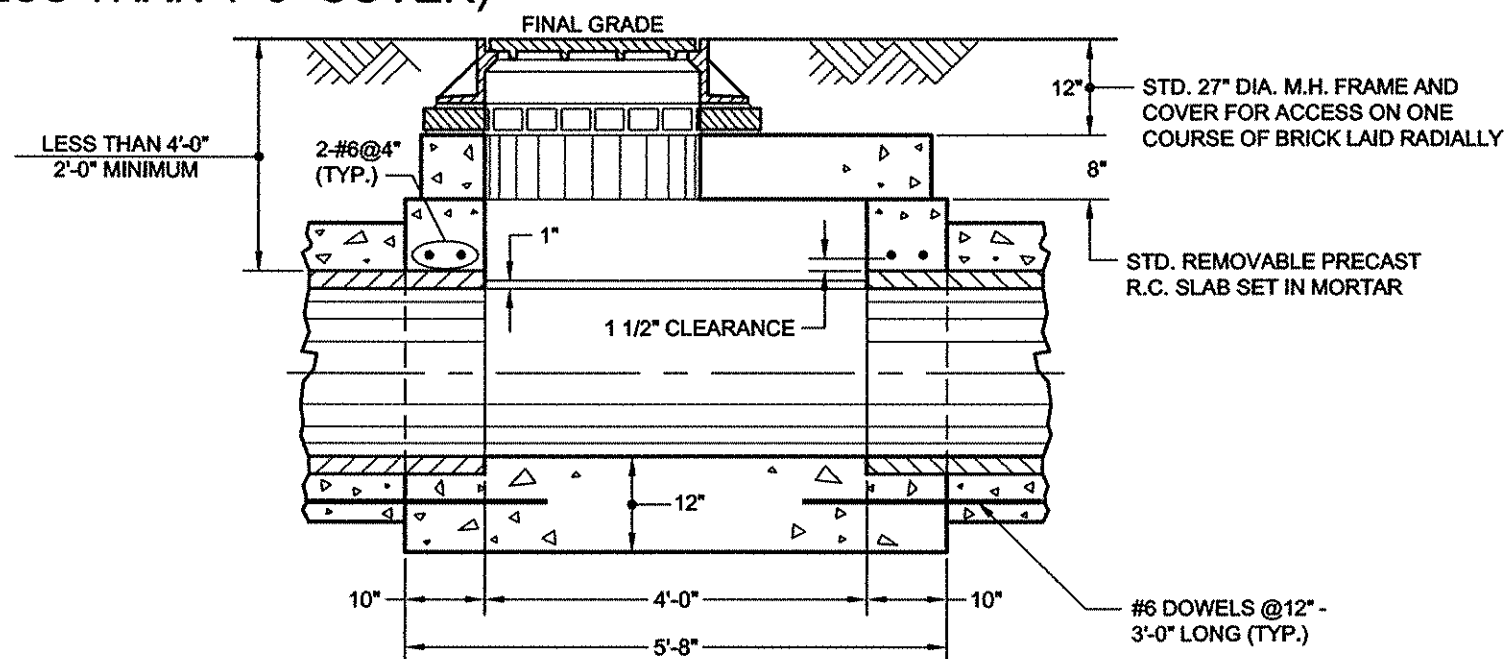
TYPE A-3 (LESS THAN 4'-0" COVER)



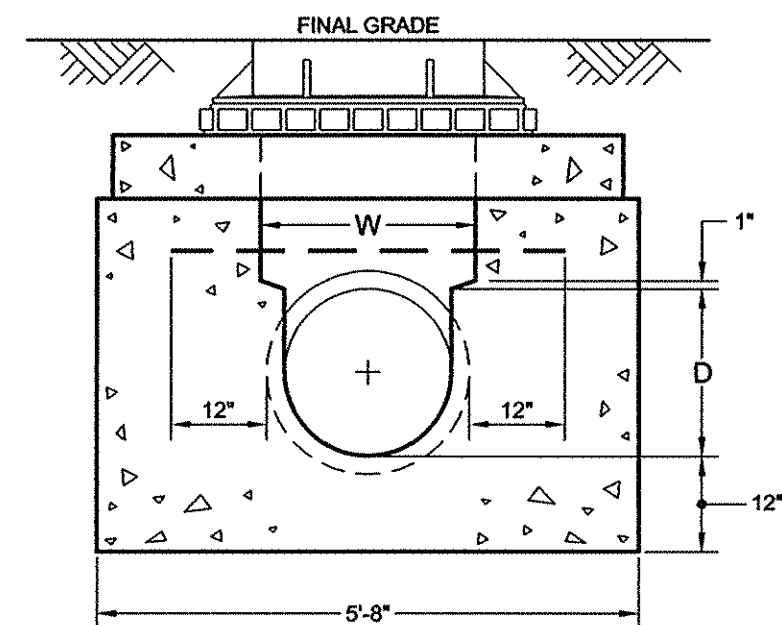
| D | W |
|--------|-----|
| 8"-24" | 27" |
| 30" | 30" |

NOTES:

- (1) WHEN PILES ARE REQUIRED, REFER TO STANDARD MANHOLE TYPE A-2 FOR PILE DETAILS.
- (2) CONCRETE IS TO BE CLASS 40. REBARS- GRADE 60.



SECTION A-A



SECTION B-B

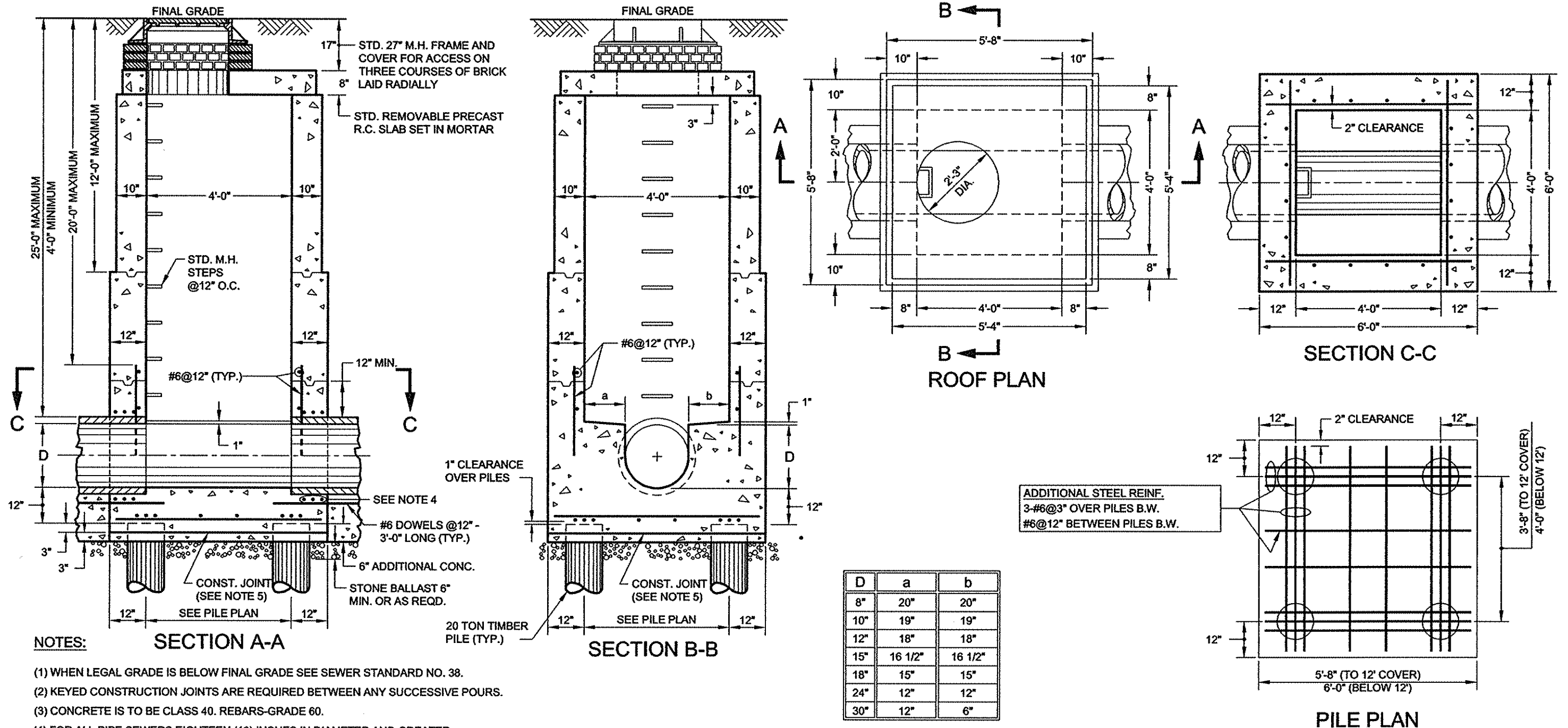
Gurdip S. Saini P.E.
ASSOCIATE COMMISSIONER, DESIGN
DEPARTMENT OF DESIGN AND CONSTRUCTION

8/14/18
DATE

Thomas Wynne P.E.
EXECUTIVE DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION

8/14/18
DATE

STANDARD FOR MANHOLE ON 8" DIA. TO 30" DIA. PIPE SEWERS ON PILES IN WET LOCATION TYPE B-1 (12' MAX. COVER) AND TYPE B-2 (25' MAX. COVER)



NOTES:

- (1) WHEN LEGAL GRADE IS BELOW FINAL GRADE SEE SEWER STANDARD NO. 38.
- (2) KEYED CONSTRUCTION JOINTS ARE REQUIRED BETWEEN ANY SUCCESSIVE POURS.
- (3) CONCRETE IS TO BE CLASS 40. REBARS-GRADE 60.
- (4) FOR ALL PIPE SEWERS EIGHTEEN (18) INCHES IN DIAMETER AND GREATER, ADD 3-#6@3" ABOVE AND BELOW THE PIPE.
- (5) CONSTRUCTION JOINT TO BE UTILIZED WHENEVER GROUND CONDITIONS PREVENT SUPPORT OF PIPE.

Sundip S. Saini
ASSOCIATE COMMISSIONER, DESIGN
DEPARTMENT OF DESIGN AND CONSTRUCTION

P.E.

DATE

Thomas L. Lynam
EXECUTIVE DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION

P.E.

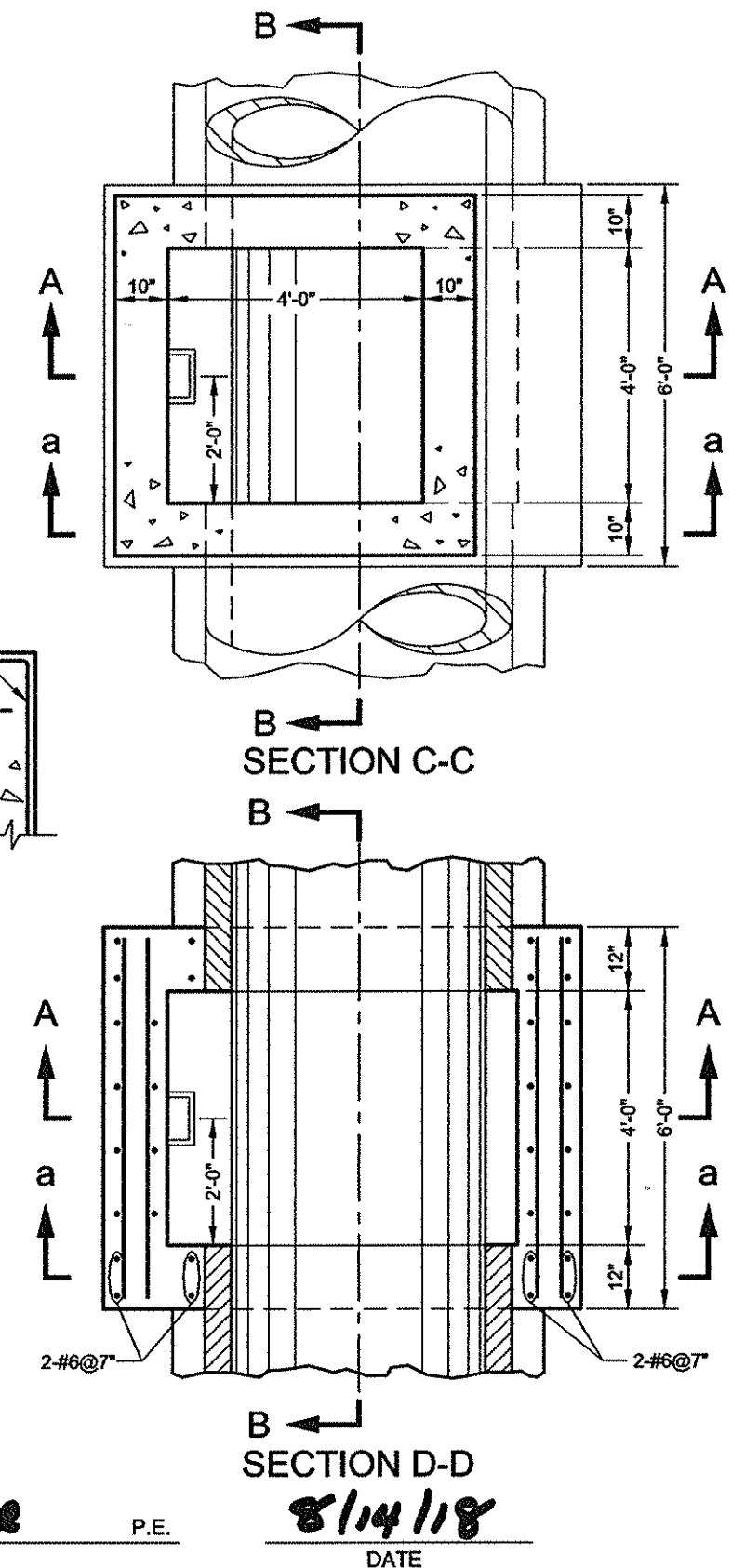
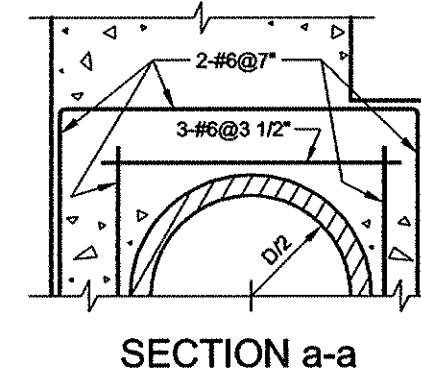
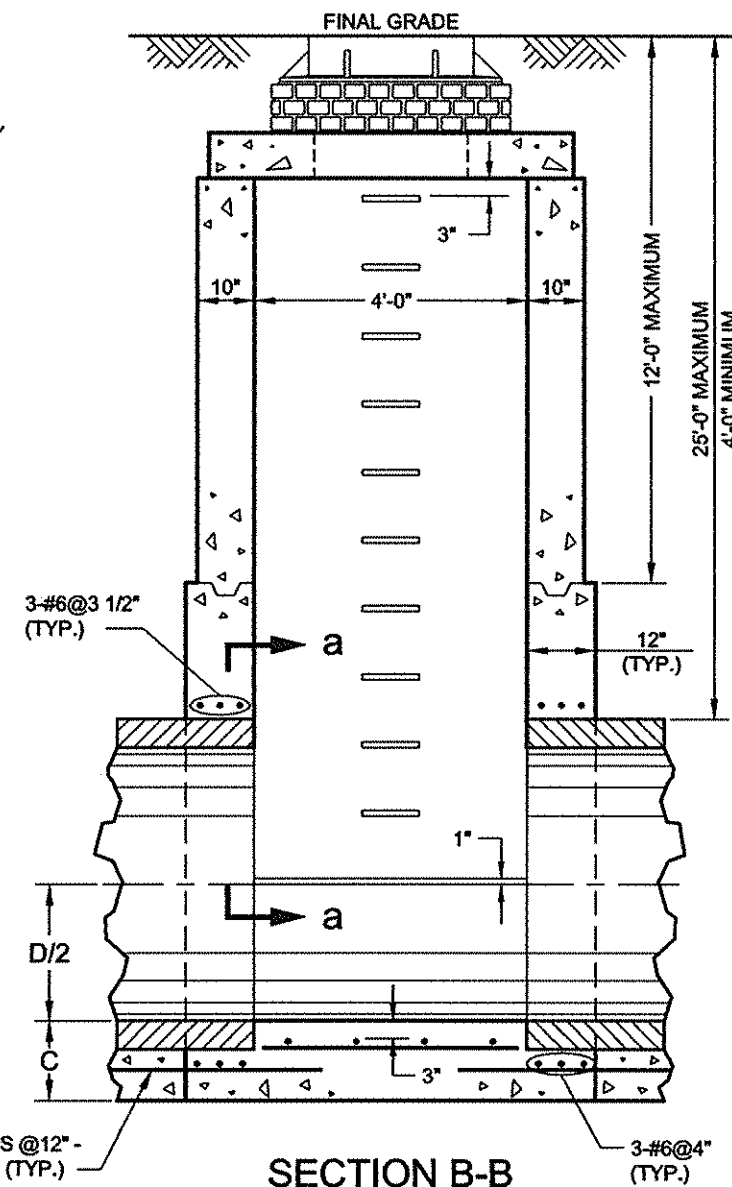
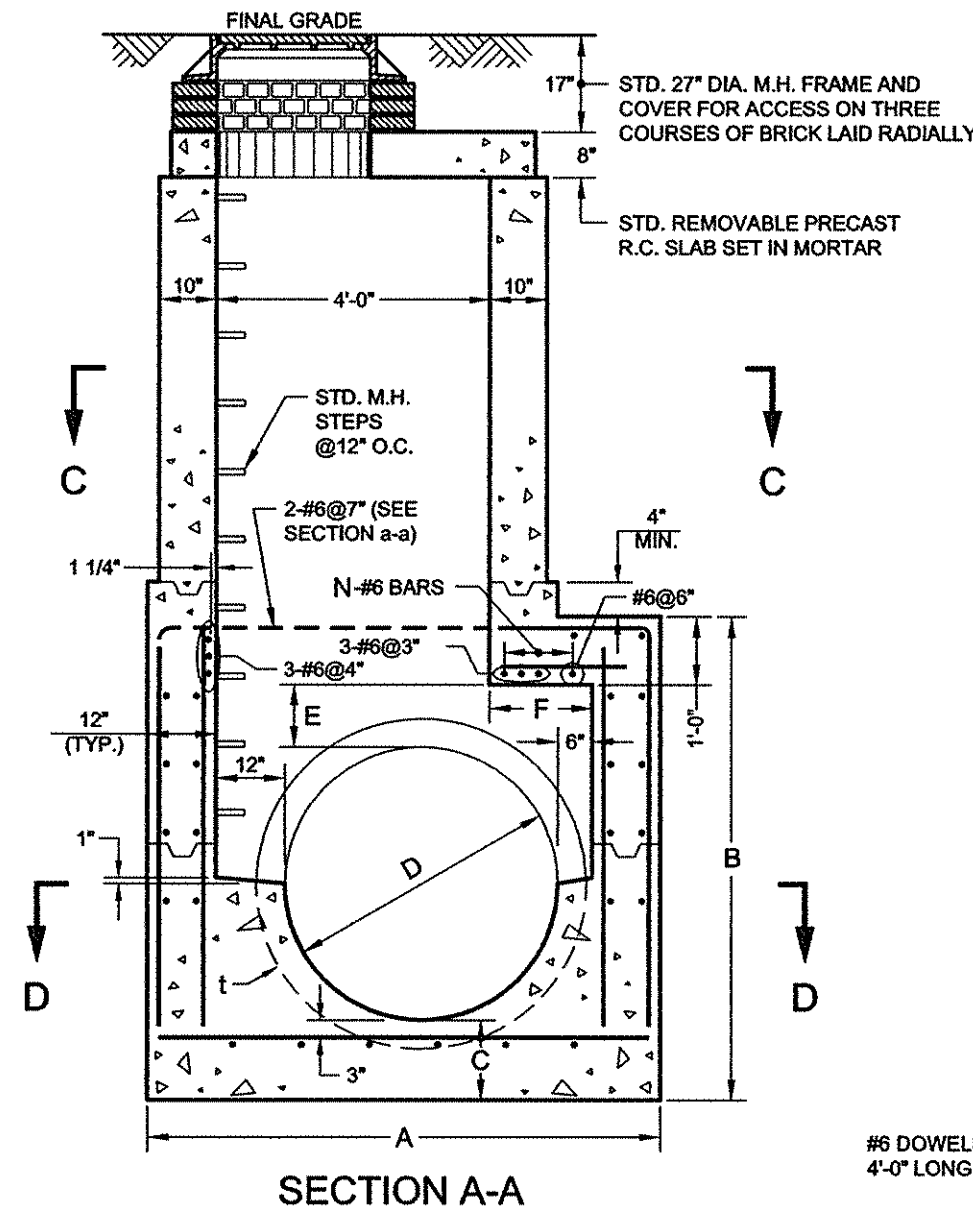
DATE

8/14/18

CITY OF NEW YORK
DEPARTMENT OF ENVIRONMENTAL PROTECTION

STANDARD FOR MANHOLE ON 36" DIA. TO 60" DIA. R.C.P. SEWERS

TYPE C-1 (12' MAX. COVER) AND TYPE C-2 (25' MAX. COVER)



NOTES:

- (1) WHEN LEGAL GRADE IS BELOW FINAL GRADE SEE SEWER STANDARD NO. 38.
- (2) KEYED CONSTRUCTION JOINTS ARE REQUIRED BETWEEN ANY SUCCESSIVE POURS.
- (3) CONCRETE IS TO BE CLASS 40. REBARS-GRADE 60.
- (4) STEEL REINFORCEMENT IS #6@12" UNLESS OTHERWISE SPECIFIED COVER FOR ALL REINFORCEMENT IS 2" CLEARANCE UNLESS OTHERWISE SPECIFIED.

| D | t | A | B | C | E | F | N |
|-----|--------|-------|--------|---------|---------|-------|---|
| 36" | 4" | 6'-6" | 5'-10" | 12" | 10" | 0'-6" | 1 |
| 42" | 4 1/2" | 7'-0" | 6'-5" | 12 1/2" | 10 1/2" | 1'-0" | 3 |
| 48" | 5" | 7'-6" | 7'-1" | 14" | 11" | 1'-6" | 4 |
| 54" | 5 1/2" | 8'-0" | 7'-9" | 15 1/2" | 11 1/2" | 2'-0" | 5 |
| 60" | 6" | 8'-6" | 8'-5" | 17" | 12" | 2'-6" | 6 |

Gurdeep S. Saini
ASSOCIATE COMMISSIONER, DESIGN
DEPARTMENT OF DESIGN AND CONSTRUCTION

P.E.

8/14/18
DATE

Thomas Wynne
EXECUTIVE DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION

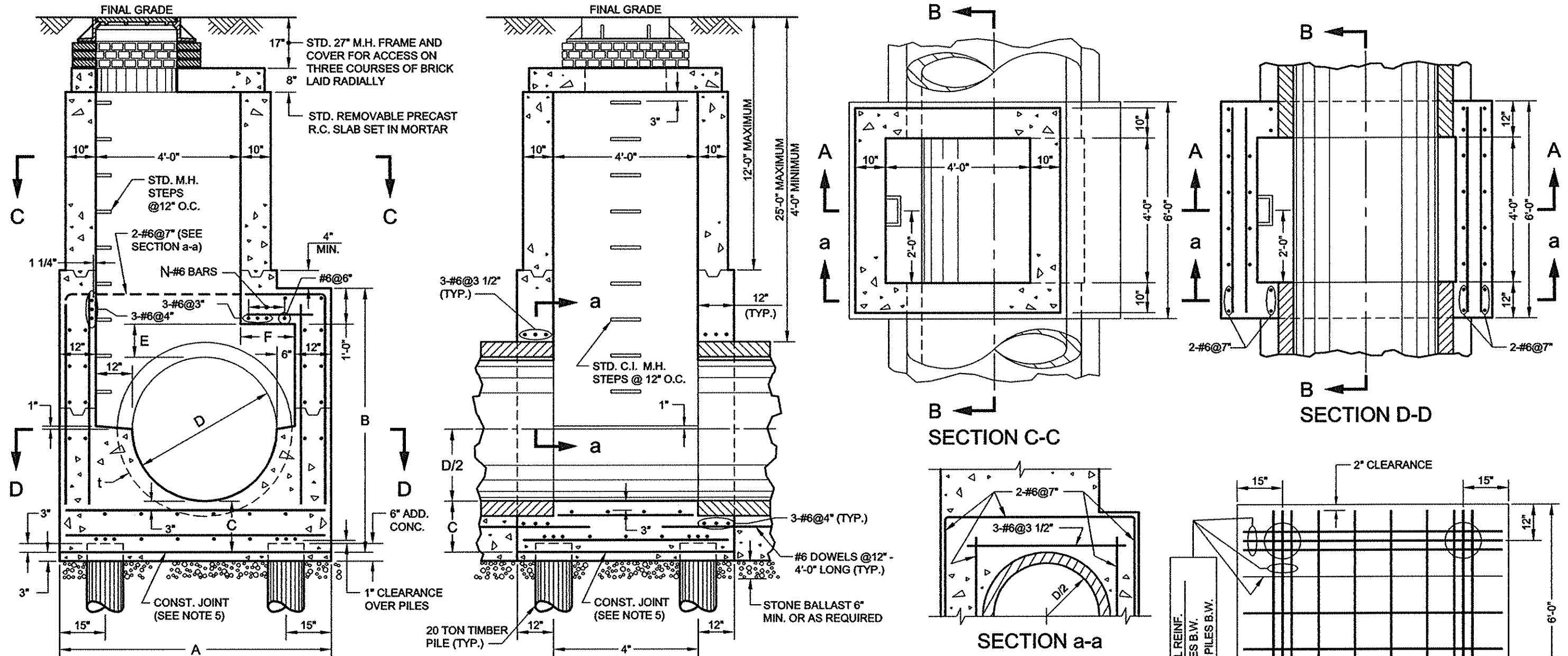
P.E.

8/14/18
DATE

CITY OF NEW YORK
DEPARTMENT OF ENVIRONMENTAL PROTECTION

STANDARD FOR MANHOLE ON 36" DIA. TO 60" DIA. R.C.P. SEWERS ON PILES

TYPE C-1 (12' MAX. COVER) AND TYPE C-2 (25' MAX. COVER)



NOTES:

SECTION A-A

- (1) WHEN LEGAL GRADE IS BELOW FINAL GRADE SEE SEWER STANDARD NO. 38.
- (2) KEYED CONSTRUCTION JOINTS ARE REQUIRED BETWEEN ANY SUCCESSIVE POURS.
- (3) CONCRETE IS TO BE CLASS 40. REBARS-GRADE 60.
- (4) STEEL REINFORCEMENT IS #6@12" UNLESS OTHERWISE SPECIFIED. COVER FOR ALL REINFORCEMENT IS 2" CLEARANCE UNLESS OTHERWISE SPECIFIED.
- (5) CONSTRUCTION JOINT TO BE UTILIZED WHENEVER GROUND CONDITIONS PREVENT SUPPORT OF PIPE.

| D | t | A | B | C | E | F | N |
|-----|--------|-------|-------|---------|---------|-------|---|
| 36" | 4" | 6'-6" | 6'-0" | 14" | 10" | 0'-6" | 1 |
| 42" | 4 1/2" | 7'-0" | 6'-8" | 15 1/2" | 10 1/2" | 1'-0" | 3 |
| 48" | 5" | 7'-6" | 7'-4" | 17" | 11" | 1'-6" | 4 |
| 54" | 5 1/2" | 8'-0" | 8'-0" | 18 1/2" | 11 1/2" | 2'-0" | 5 |
| 60" | 6" | 8'-6" | 8'-8" | 20" | 12" | 2'-6" | 6 |

Gurdeep S. Saini
ASSOCIATE COMMISSIONER, DESIGN
DEPARTMENT OF DESIGN AND CONSTRUCTION

8/14/18
DATE

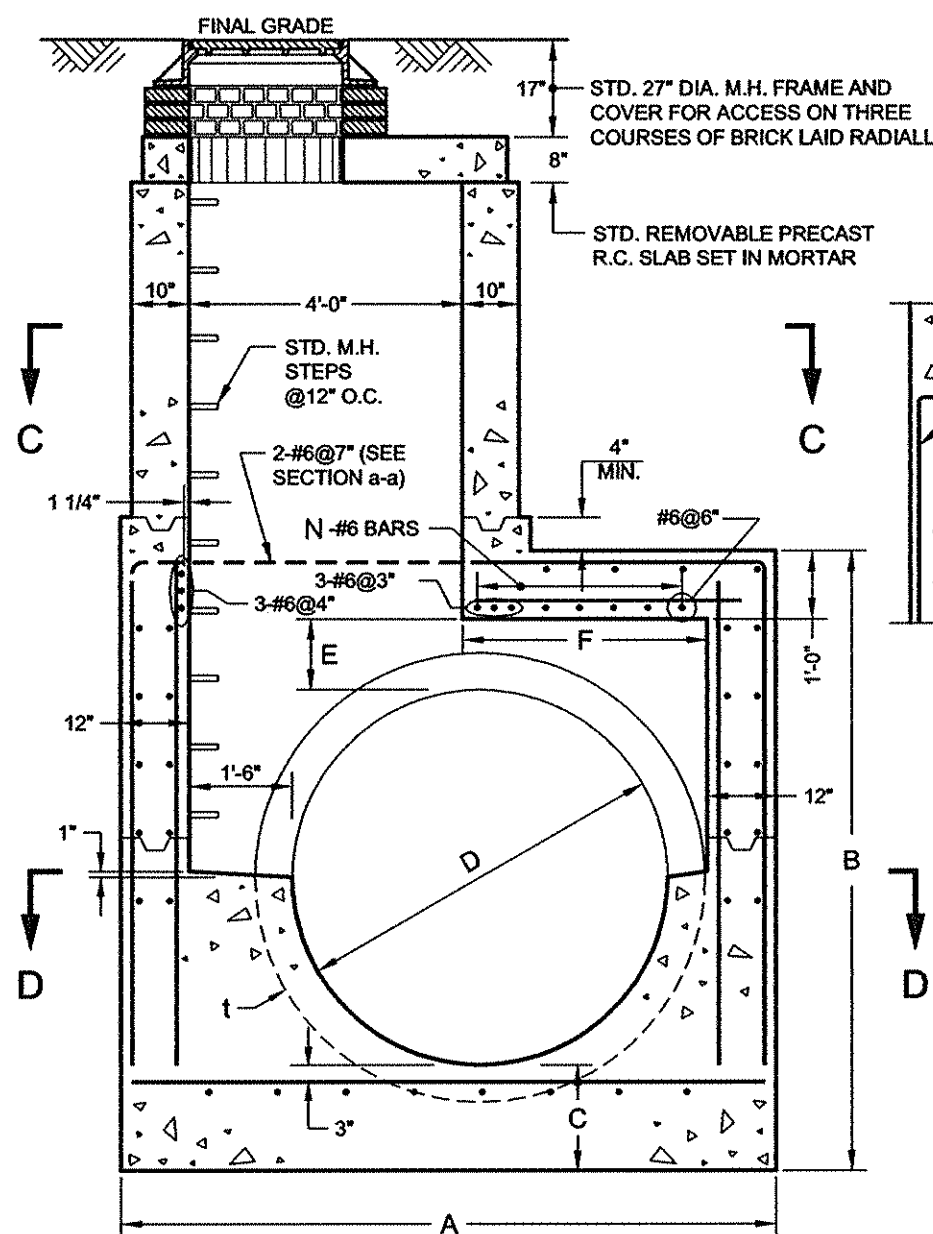
Thomas Wynne
EXECUTIVE DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION

8/14/18
DATE

CITY OF NEW YORK
DEPARTMENT OF ENVIRONMENTAL PROTECTION

STANDARD FOR MANHOLE ON 66" DIA. TO 96" DIA. R.C.P. SEWERS

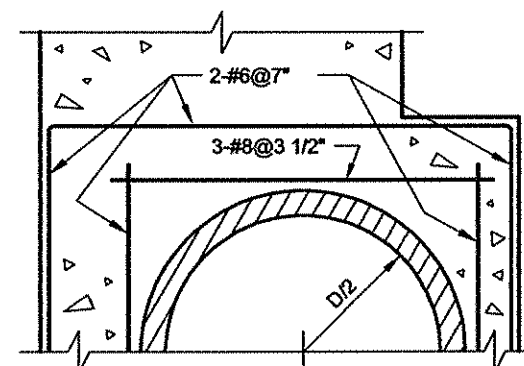
TYPE D-1 (12' MAX. COVER) AND TYPE D-2 (25' MAX. COVER)



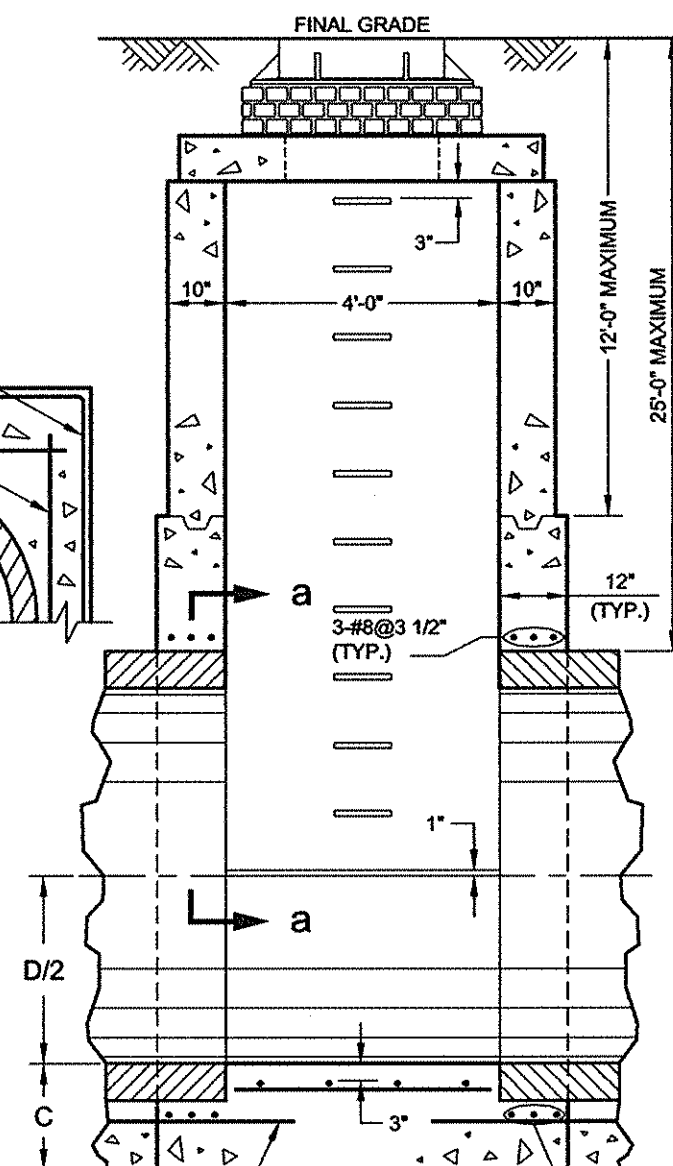
SECTION A-A

NOTES:

- (1) WHEN LEGAL GRADE IS BELOW FINAL GRADE SEE SEWER STANDARD NO. 38.
- (2) KEYED CONSTRUCTION JOINTS ARE REQUIRED BETWEEN ANY SUCCESSIVE POURS.
- (3) CONCRETE IS TO BE CLASS 40. REBARS-GRADE 60.
- (4) STEEL REINFORCEMENT IS #6@12" UNLESS OTHERWISE SPECIFIED. COVER FOR ALL REINFORCEMENT IS 2" CLEARANCE UNLESS OTHERWISE SPECIFIED.

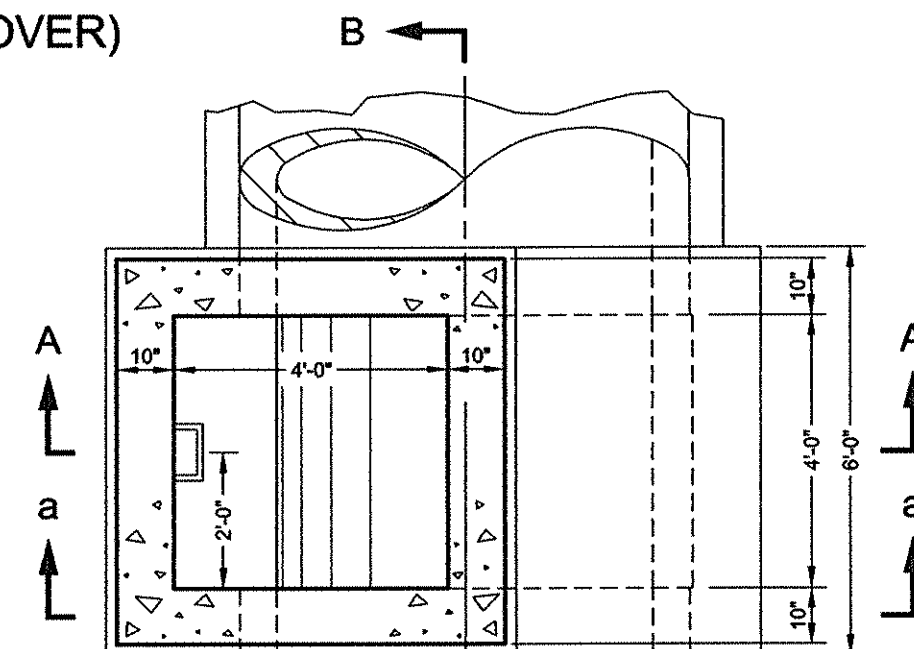


SECTION a-a

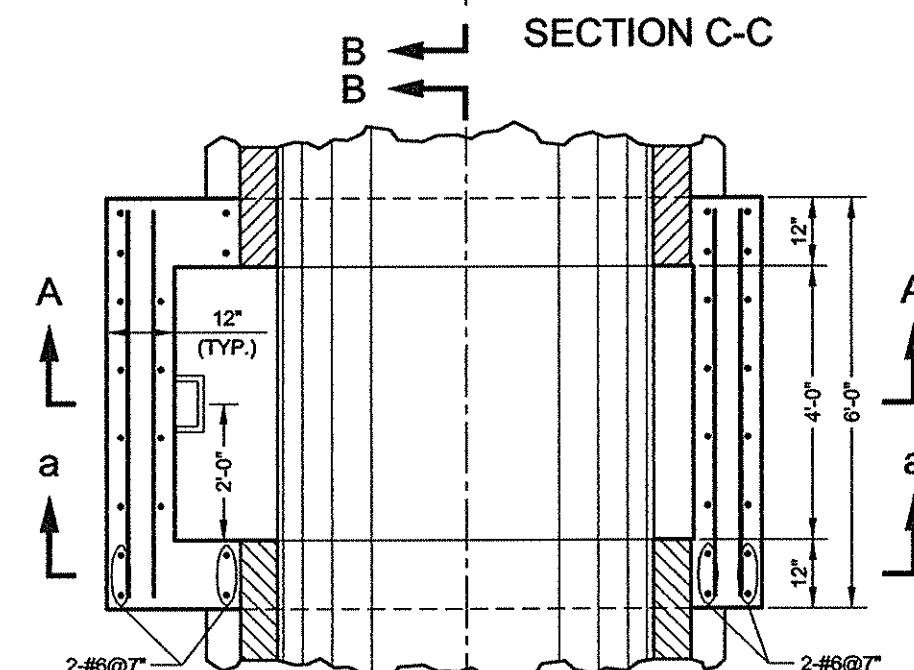


SECTION B-B

| D | t | A | B | C | E | F | N |
|-----|--------|--------|---------|---------|---------|-------|----|
| 66" | 6 1/2" | 9'-7" | 9'-1" | 18 1/2" | 12 1/2" | 3'-7" | 8 |
| 72" | 7" | 10'-1" | 9'-9" | 20" | 13" | 4'-1" | 9 |
| 78" | 7 1/2" | 10'-8" | 10'-5" | 21 1/2" | 13 1/2" | 4'-8" | 10 |
| 84" | 8" | 11'-2" | 11'-1" | 23" | 14" | 5'-2" | 11 |
| 90" | 8 1/2" | 11'-9" | 11'-10" | 25 1/2" | 14 1/2" | 5'-9" | 12 |
| 96" | 9" | 12'-3" | 12'-5" | 27" | 15" | 6'-3" | 13 |



SECTION C-C



SECTION D-D

Surdeep S. Saini

P.E.

ASSOCIATE COMMISSIONER, DESIGN
DEPARTMENT OF DESIGN AND CONSTRUCTION

8/14/18

DATE

Thomas Wayne

P.E.

EXECUTIVE DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION

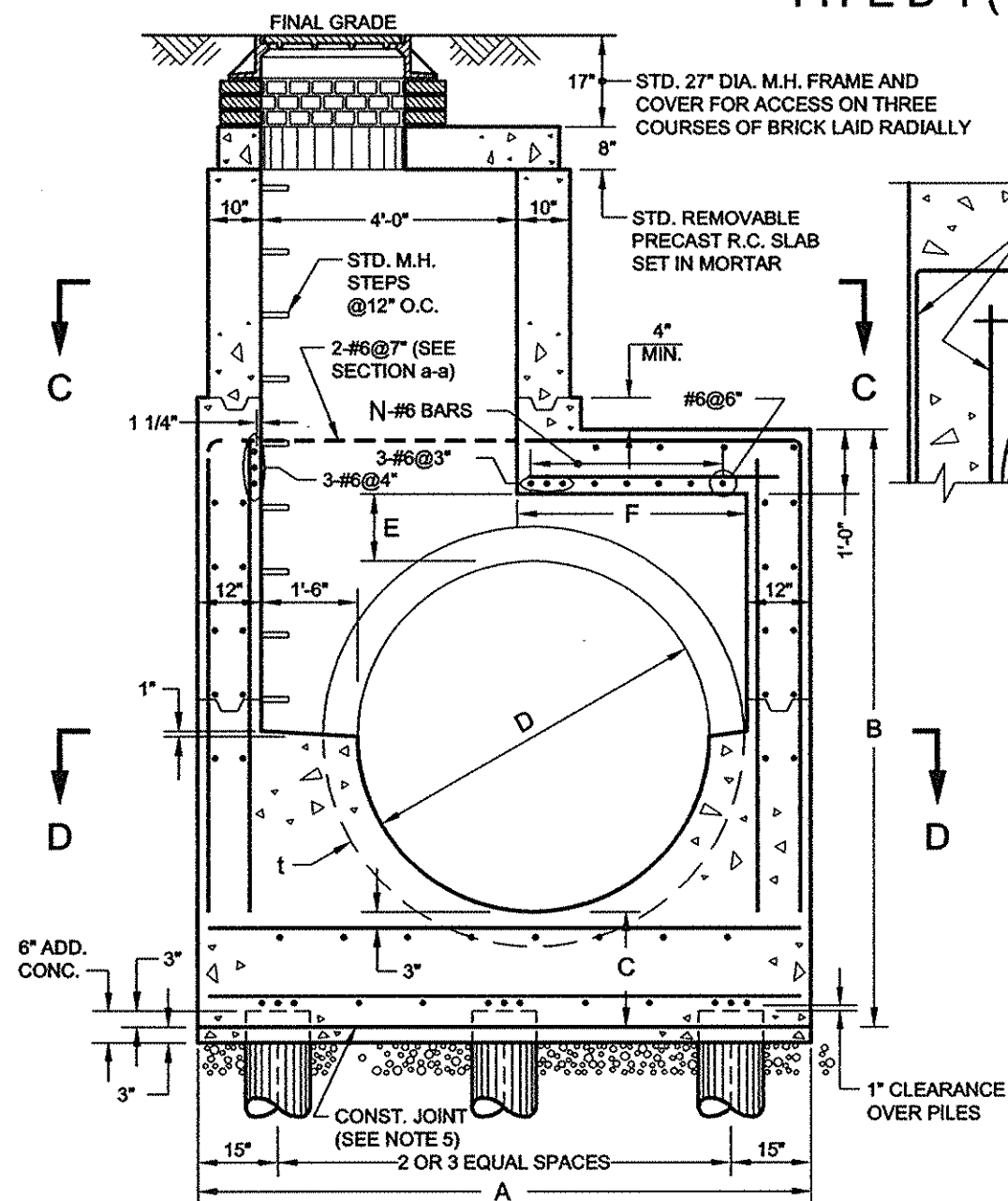
8/19/18

DATE

CITY OF NEW YORK
DEPARTMENT OF ENVIRONMENTAL PROTECTION

STANDARD FOR MANHOLE ON 66" DIA. TO 96" DIA. R.C.P. SEWERS ON PILES

TYPE D-1 (12' MAX. COVER) AND TYPE D-2 (25' MAX. COVER)



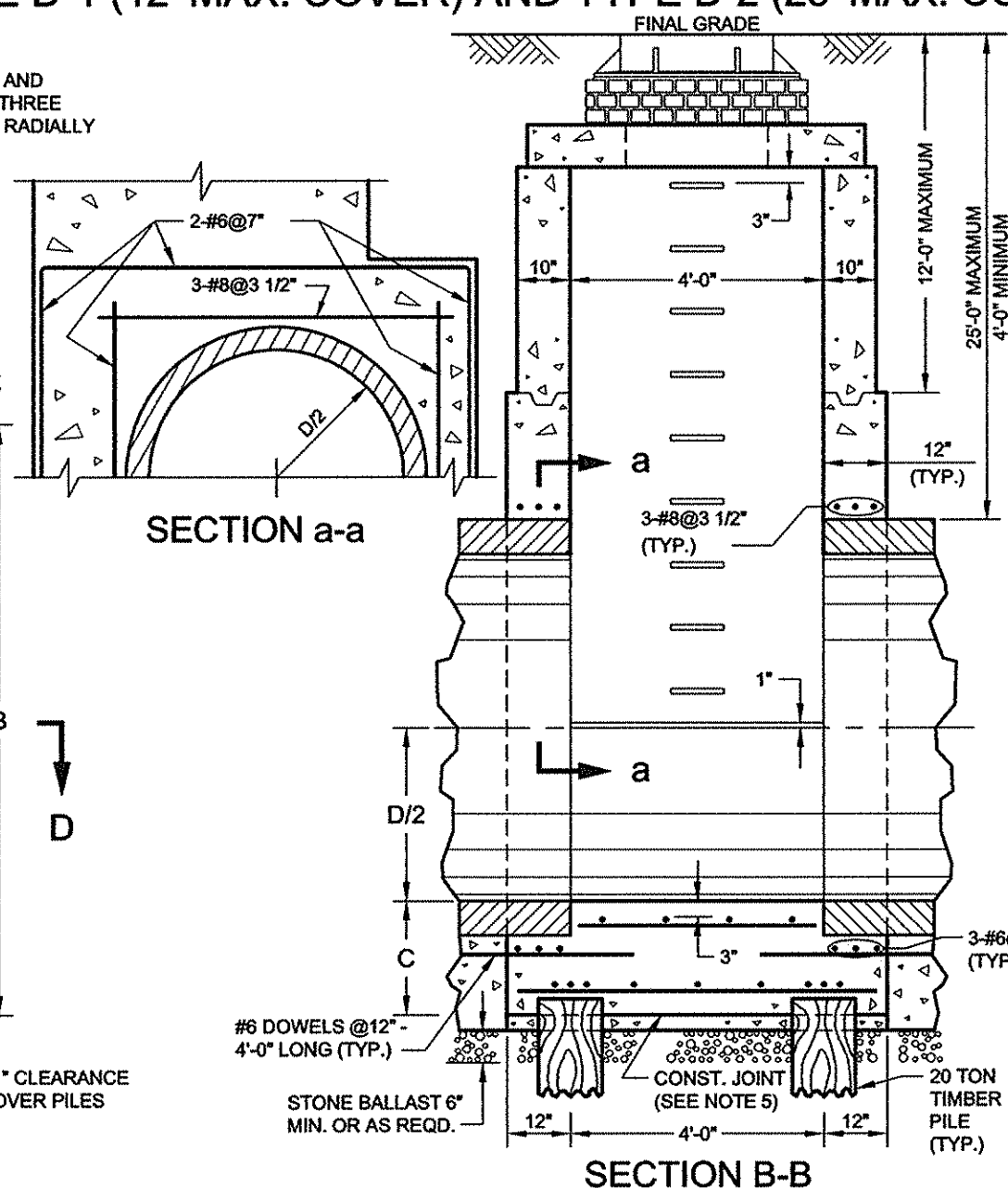
SECTION A-A

NOTES:

- (1) WHEN LEGAL GRADE IS BELOW FINAL GRADE SEE SEWER STANDARD NO. 38.
- (2) KEYED CONSTRUCTION JOINTS ARE REQUIRED BETWEEN ANY SUCCESSIVE POURS.
- (3) CONCRETE IS TO BE CLASS 40. REBARS- GRADE 60.
- (4) STEEL REINFORCEMENT IS #6@12" UNLESS OTHERWISE SPECIFIED. COVER FOR ALL REINFORCEMENT IS 2" CLEARANCE UNLESS OTHERWISE SPECIFIED.
- (5) CONSTRUCTION JOINT TO BE UTILIZED WHENEVER GROUND CONDITIONS PREVENT SUPPORT OF PIPE.

Gurdeep S. Saini P.E.
ASSOCIATE COMMISSIONER, DESIGN
DEPARTMENT OF DESIGN AND CONSTRUCTION

8/14/18
DATE

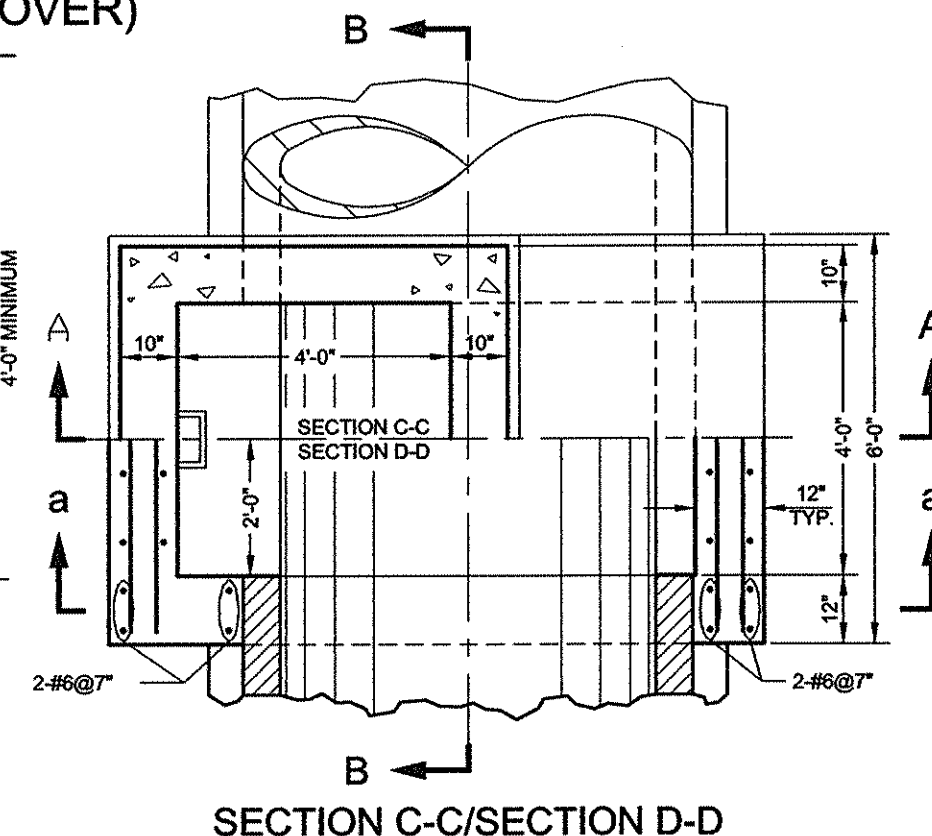


SECTION B-B

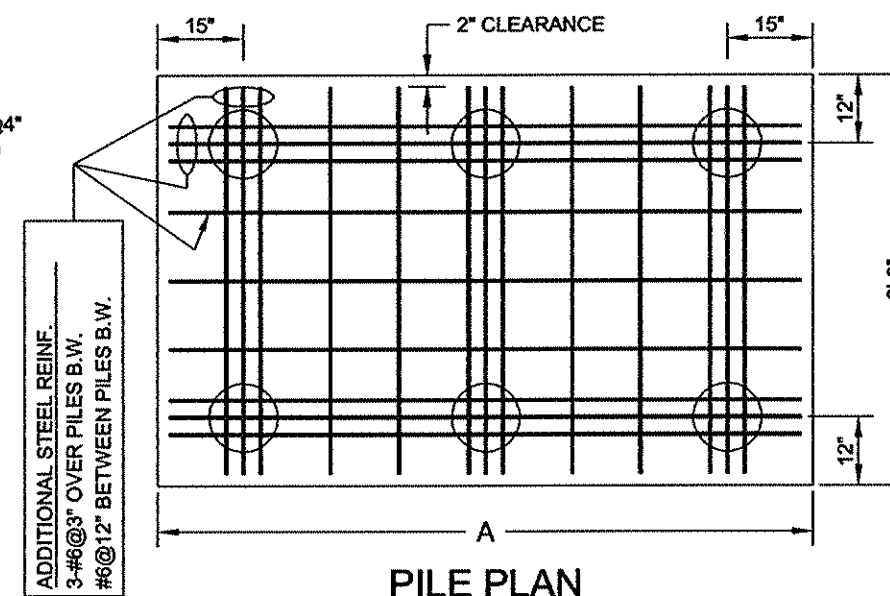
| D | t | A | B | C | E | F | N | PILES/ BENT |
|-----|--------|--------|--------|---------|---------|-------|----|----------------|
| 66" | 6 1/2" | 9'-7" | 9'-4" | 21 1/2" | 12 1/2" | 3'-7" | 8 | 3 |
| 72" | 7" | 10'-1" | 10'-0" | 23" | 13" | 4'-1" | 9 | 3 |
| 78" | 7 1/2" | 10'-8" | 10'-8" | 24 1/2" | 13 1/2" | 4'-8" | 10 | 3* |
| 84" | 8" | 11'-2" | 11'-4" | 26" | 14" | 5'-2" | 11 | 3* |
| 90" | 8 1/2" | 11'-9" | 12'-1" | 28 1/2" | 14 1/2" | 5'-9" | 12 | 3* |
| 96" | 9" | 12'-3" | 12'-8" | 30" | 15" | 6'-3" | 13 | 3* |

* USE FOUR PILES PER BENT FOR COVER OVER 15'.

Thomas Wynne P.E.
EXECUTIVE DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION



SECTION C-C/SECTION D-D



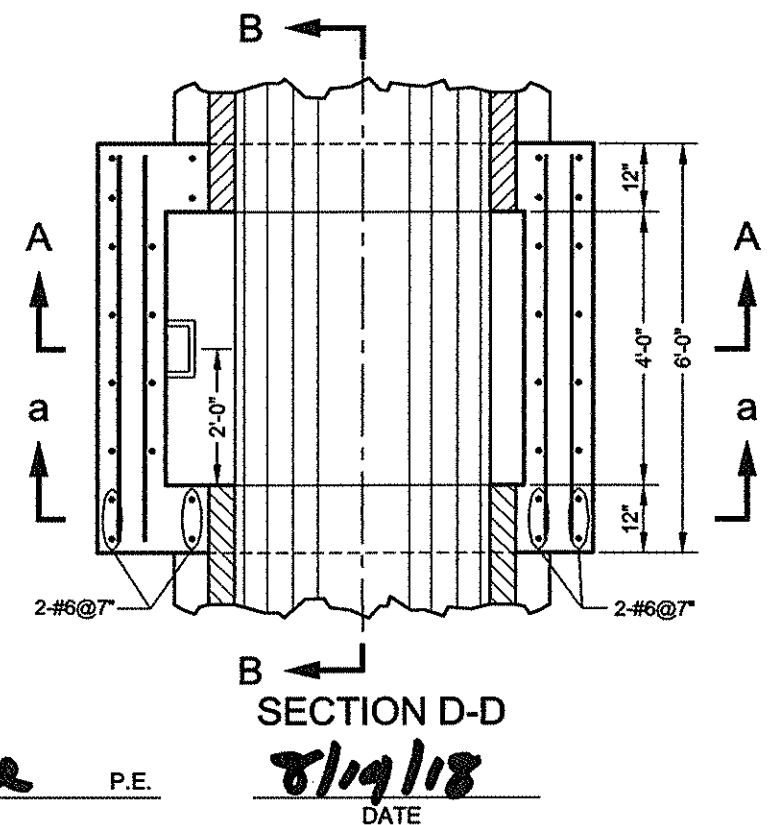
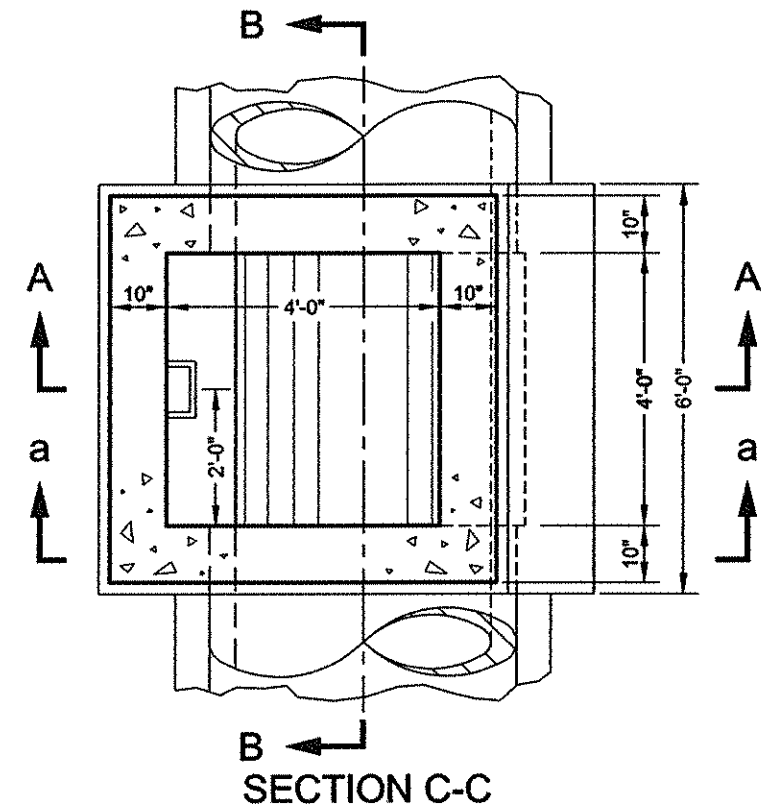
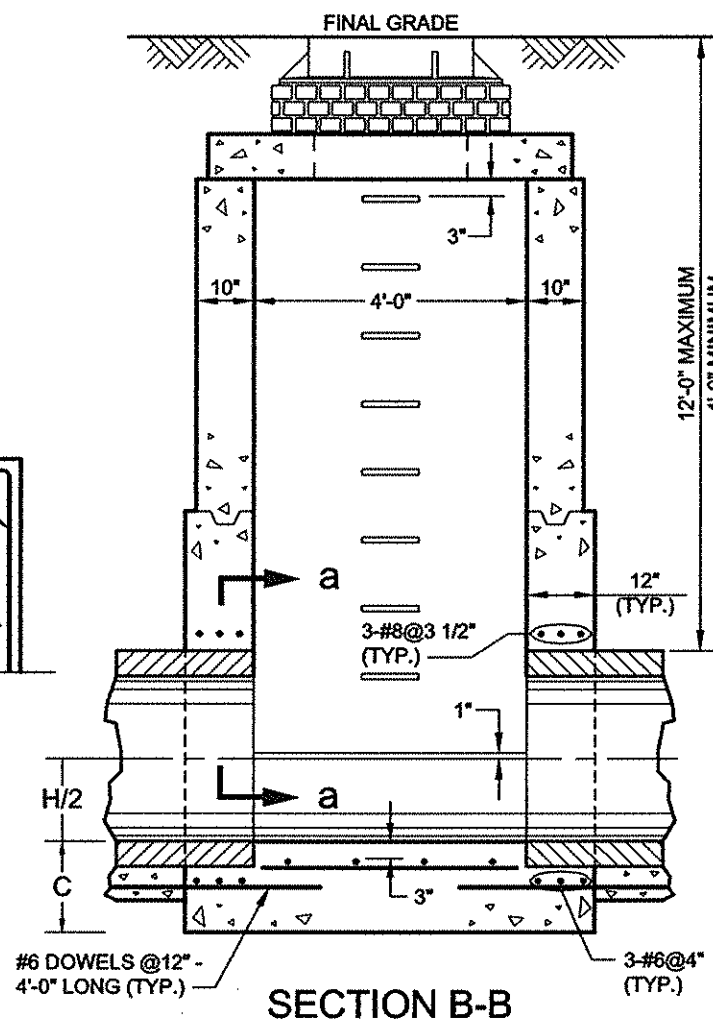
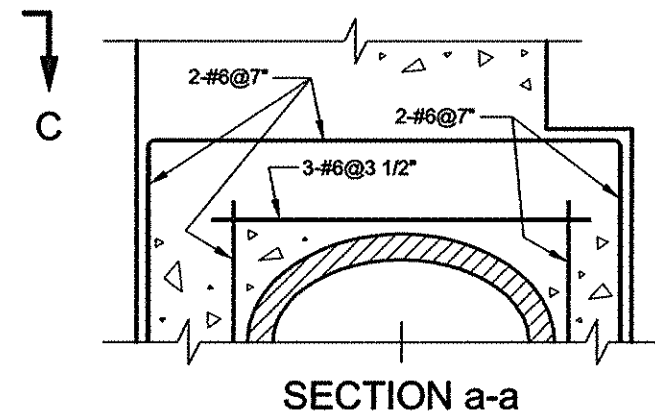
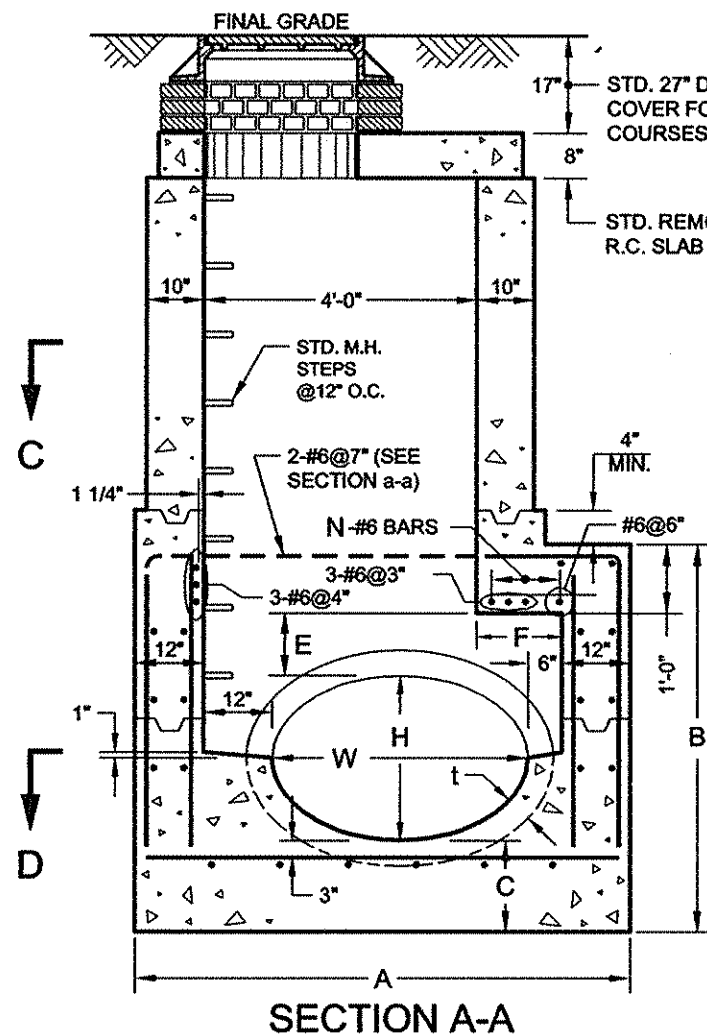
PILE PLAN

8/14/18
DATE

STANDARD FOR MANHOLE ON 23"W x 14"H TO 60"W x 38"H

HORIZONTAL ELLIPTICAL R.C.P. SEWERS

TYPE E-1 (12' MAX. COVER)



NOTES:

- (1) WHEN LEGAL GRADE IS BELOW FINAL GRADE SEE SEWER STANDARD NO. 38.
- (2) KEYED CONSTRUCTION JOINTS ARE REQUIRED BETWEEN ANY SUCCESSIVE POURS.
- (3) CONCRETE IS TO BE CLASS 40. REBARS- GRADE 60.
- (4) STEEL REINFORCEMENT IS #6@12" UNLESS OTHERWISE SPECIFIED. COVER FOR ALL REINFORCEMENT IS 2" CLEARANCE UNLESS OTHERWISE SPECIFIED.

| W | H | t | A | B | C | E | F | N |
|-----|-----|--------|--------|-------|-----|-----|--------|---|
| 23" | 14" | 2 3/4" | 6'-0" | 4'-1" | 14" | 9" | - | - |
| 30" | 19" | 3 1/4" | 6'-0" | 4'-7" | 14" | 10" | - | - |
| 38" | 24" | 3 3/4" | 6'-8" | 5'-1" | 15" | 10" | 0'-8" | 2 |
| 45" | 29" | 4 1/2" | 7'-3" | 5'-8" | 16" | 11" | 1'-3" | 4 |
| 53" | 34" | 5" | 7'-11" | 6'-1" | 16" | 11" | 1'-11" | 5 |
| 60" | 38" | 5 1/2" | 8'-6" | 6'-7" | 17" | 12" | 2'-6" | 6 |

Gurdeep S. Saini
P.E.
ASSOCIATE COMMISSIONER, DESIGN
DEPARTMENT OF DESIGN AND CONSTRUCTION

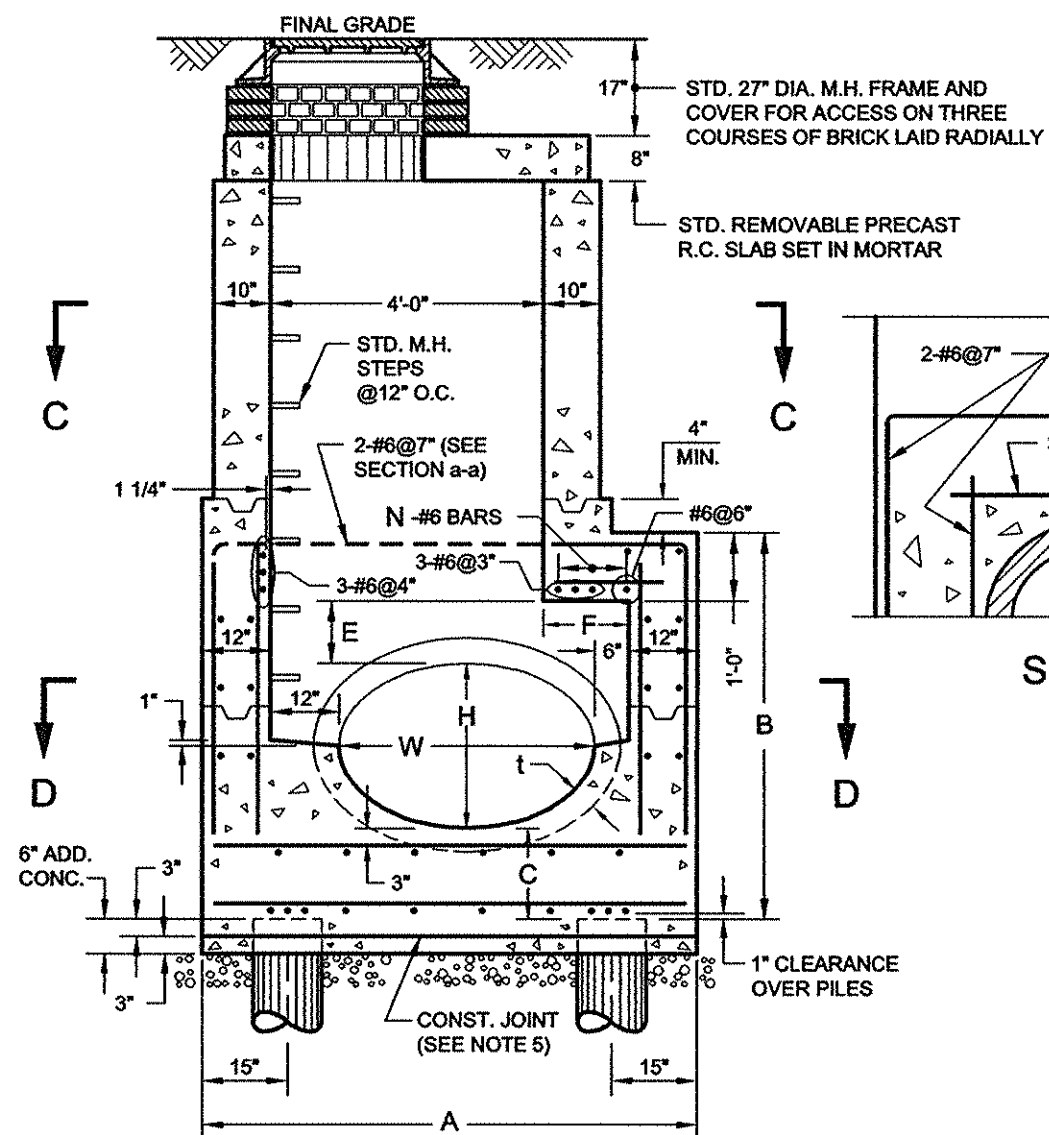
8/14/18
DATE

Thomas Wynne
P.E.
EXECUTIVE DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION

8/19/18
DATE

CITY OF NEW YORK
DEPARTMENT OF ENVIRONMENTAL PROTECTION

STANDARD FOR MANHOLE ON 23"W x 14"H TO 60"W x 38"H
HORIZONTAL ELLIPTICAL R.C.P. SEWERS ON PILES
TYPE E-1 (12' MAX. COVER)



SECTION A-A

NOTES:

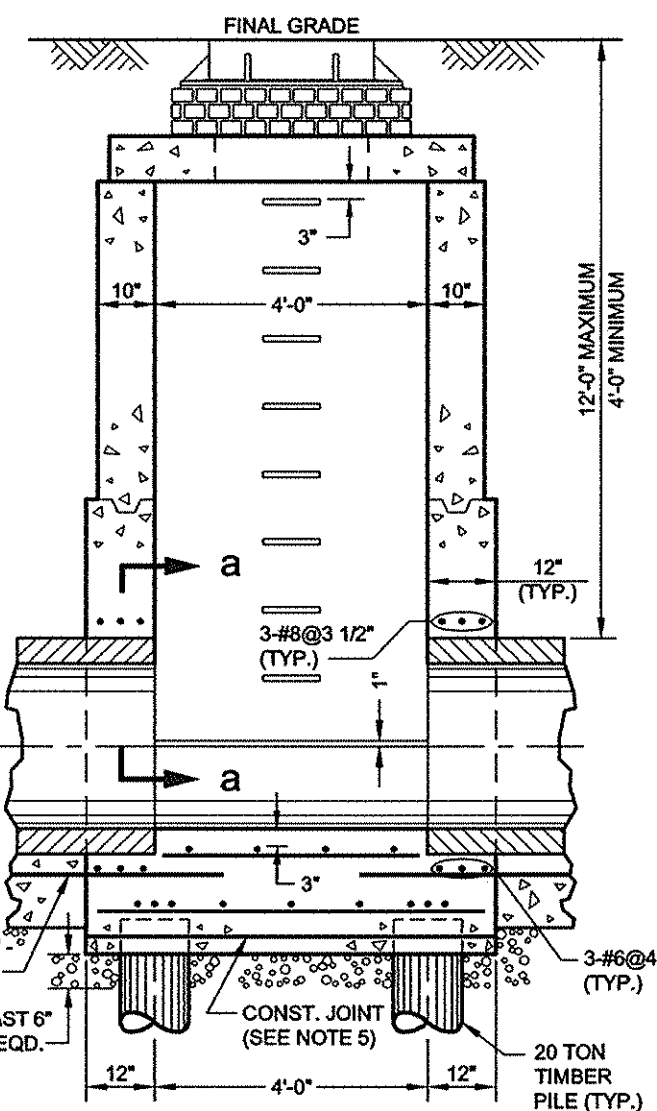
- (1) WHEN LEGAL GRADE IS BELOW FINAL GRADE SEE SEWER STANDARD NO. 38.
- (2) KEYED CONSTRUCTION JOINTS ARE REQUIRED BETWEEN ANY SUCCESSIVE POURS.
- (3) CONCRETE IS TO BE CLASS 40. REBARS-GRADE 60.
- (4) STEEL REINFORCEMENT IS #6@12" UNLESS OTHERWISE SPECIFIED.
COVER FOR ALL REINFORCEMENT IS 2" CLEARANCE UNLESS OTHERWISE SPECIFIED.
- (5) CONSTRUCTION JOINT TO BE UTILIZED WHENEVER GROUND CONDITIONS PREVENT SUPPORT OF PIPE.

P.E.

ASSOCIATE COMMISSIONER, DESIGN
DEPARTMENT OF DESIGN AND CONSTRUCTION

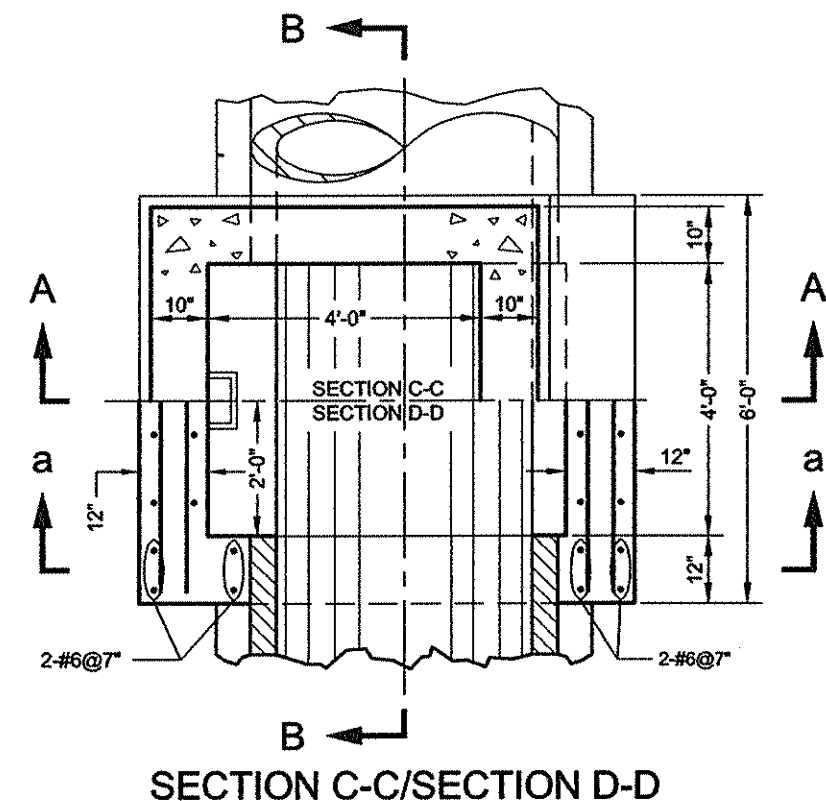
DATE

8/14/18

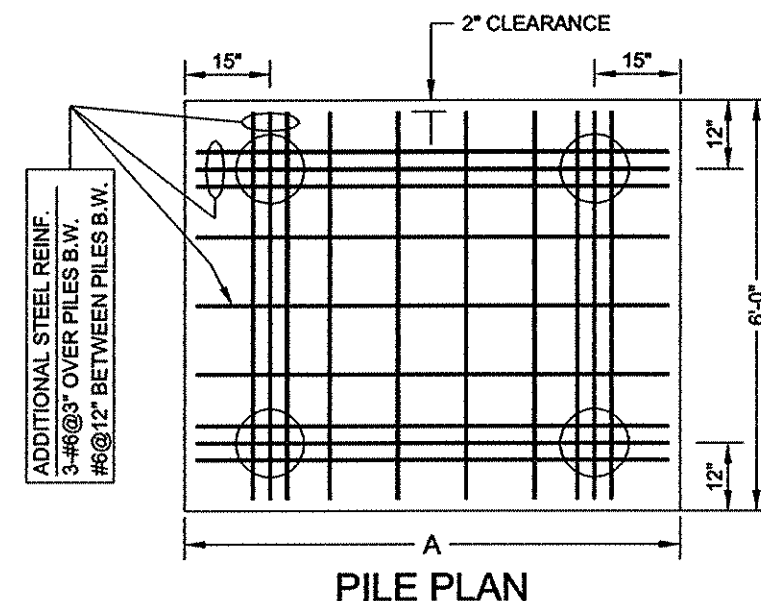


SECTION B-B

| W | H | t | A | B | C | E | F | N |
|-----|-----|--------|--------|-------|-----|-----|--------|---|
| 23" | 14" | 2 3/4" | 6'-0" | 4'-1" | 14" | 9" | - | - |
| 30" | 19" | 3 1/4" | 6'-0" | 4'-7" | 14" | 10" | - | - |
| 38" | 24" | 3 3/4" | 6'-8" | 5'-1" | 15" | 10" | 0'-8" | 2 |
| 45" | 29" | 4 1/2" | 7'-3" | 5'-8" | 16" | 11" | 1'-3" | 4 |
| 53" | 34" | 5" | 7'-11" | 6'-1" | 16" | 11" | 1'-11" | 5 |
| 60" | 38" | 5 1/2" | 8'-6" | 6'-7" | 17" | 12" | 2'-6" | 6 |



SECTION C-C/SECTION D-D



PILE PLAN

P.E.

EXECUTIVE DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION

DATE

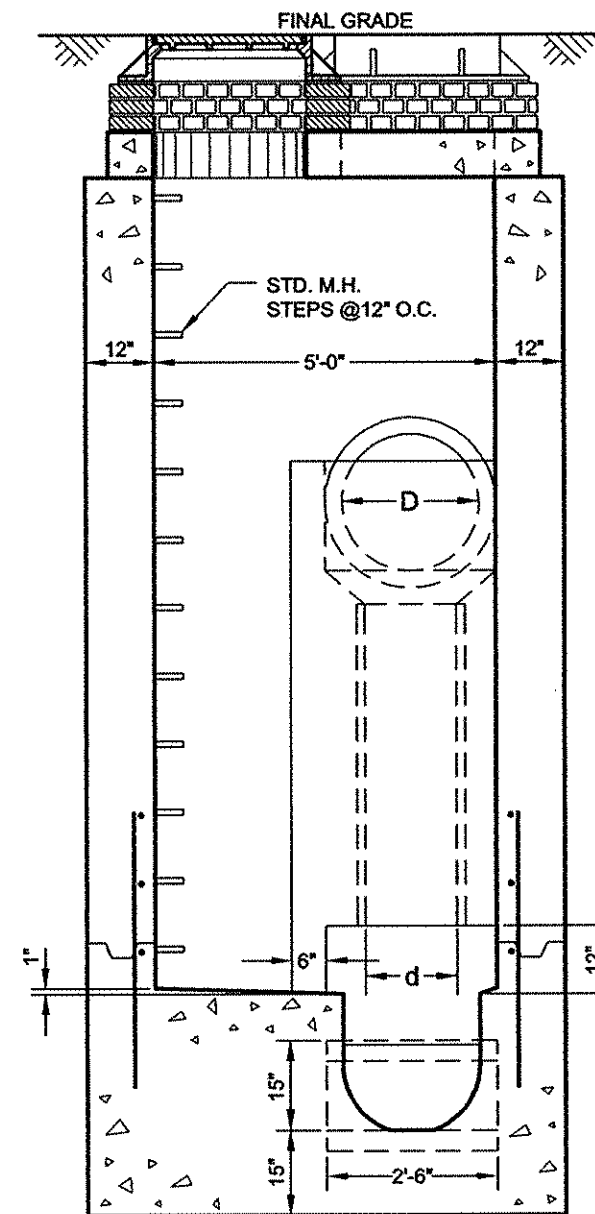
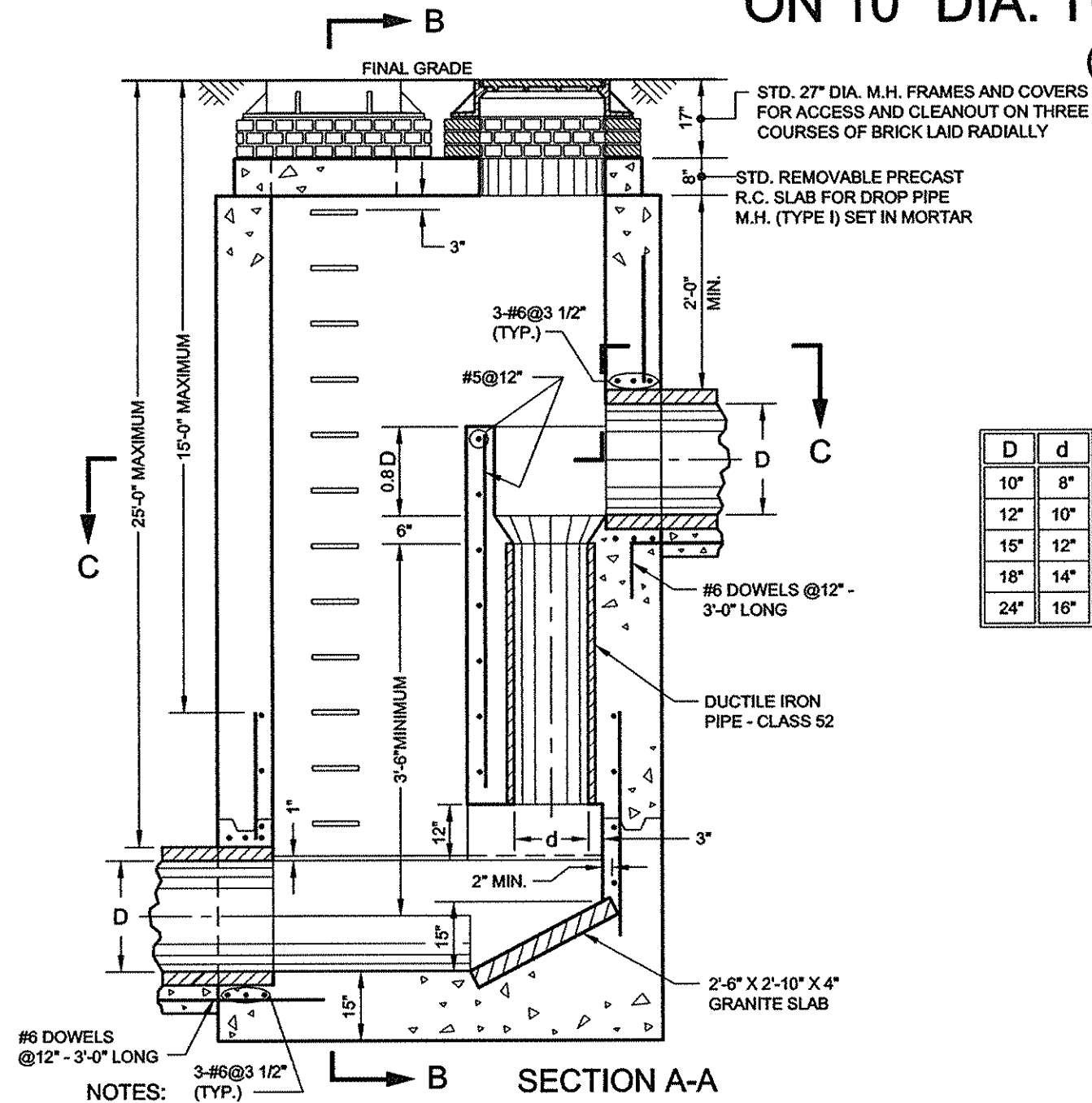
8/14/18

8/14/18
DATE

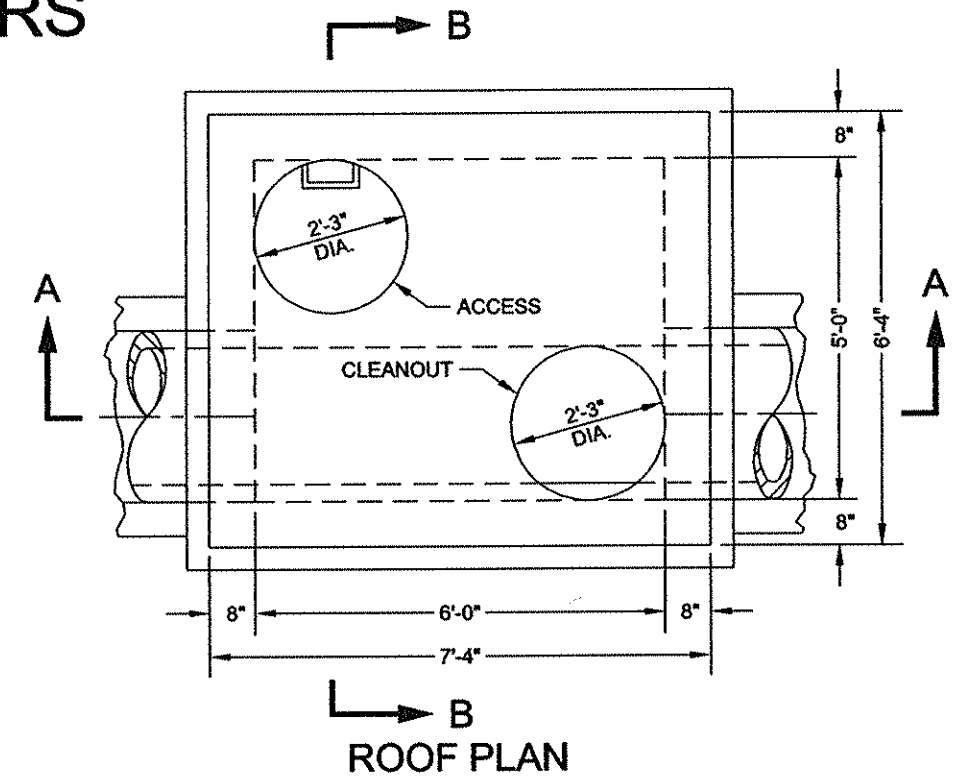
DATE _____

CITY OF NEW YORK
DEPARTMENT OF ENVIRONMENTAL PROTECTION

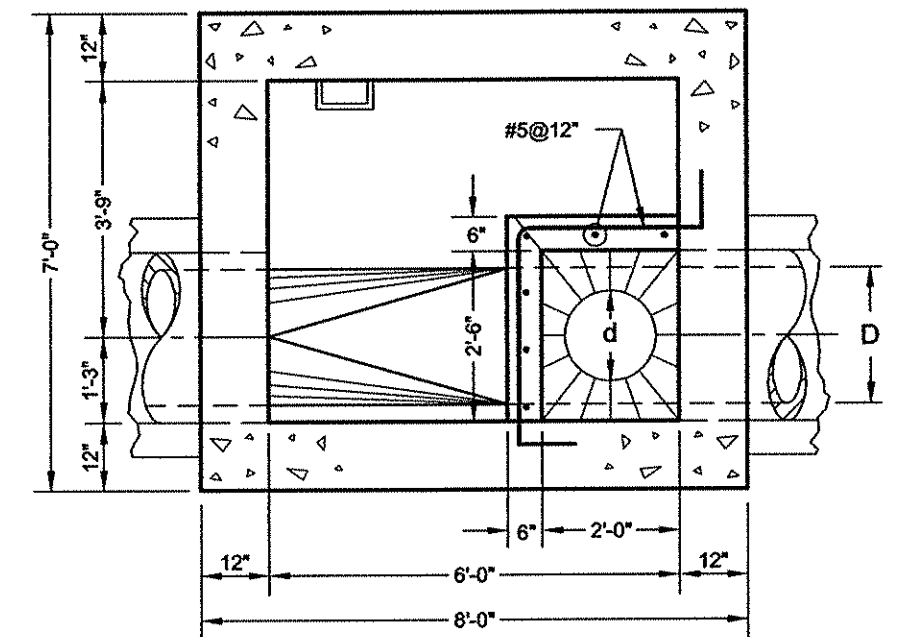
STANDARD FOR DROP PIPE MANHOLE (TYPE I)
ON 10" DIA. TO 24" DIA. PIPE SEWERS
(25' MAX. COVER)



SECTION B-B

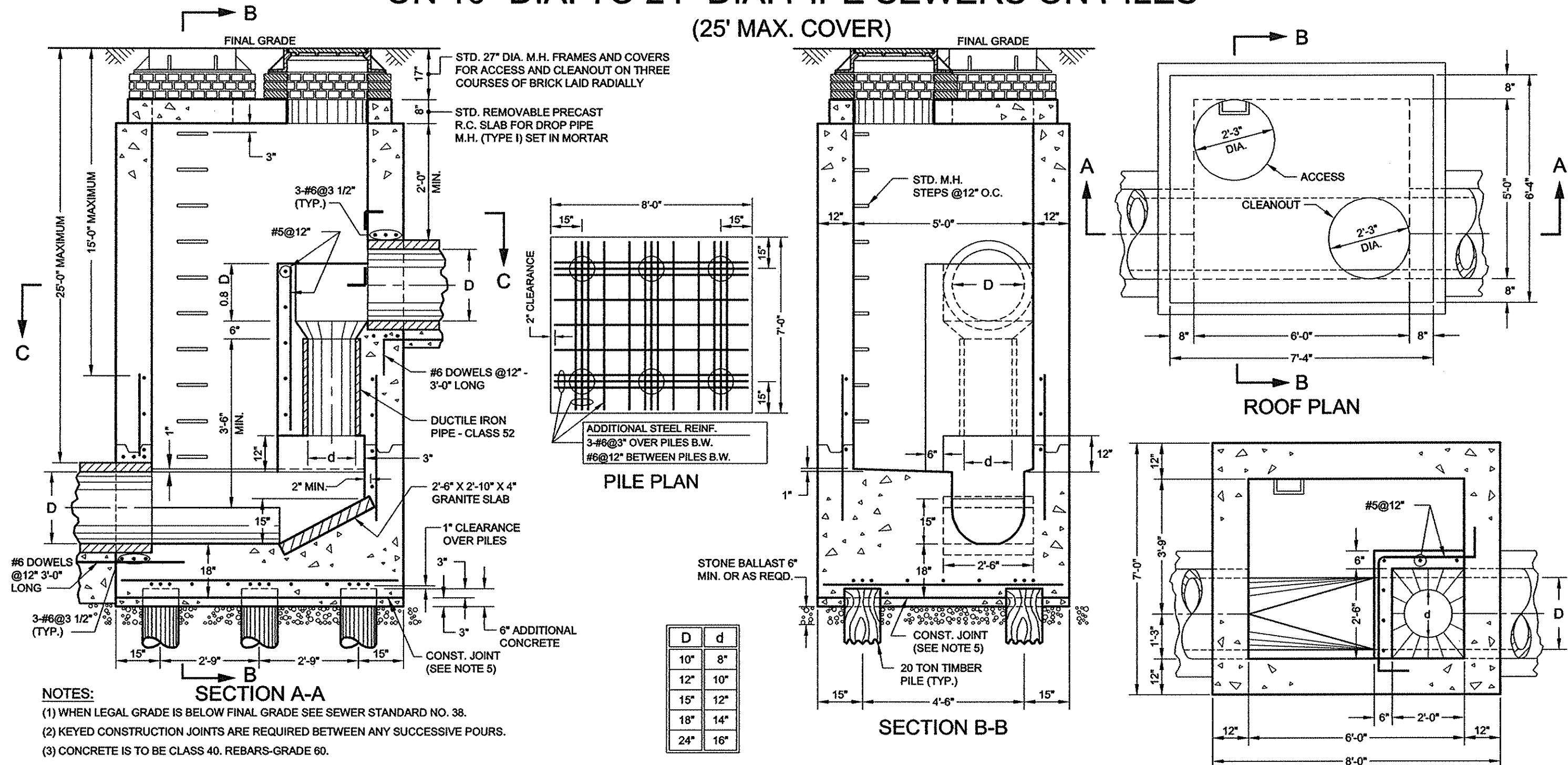


SECTION C-C



CITY OF NEW YORK
DEPARTMENT OF ENVIRONMENTAL PROTECTION

STANDARD FOR DROP PIPE MANHOLE (TYPE I) ON 10" DIA. TO 24" DIA. PIPE SEWERS ON PILES (25' MAX. COVER)



REVISED DECEMBER 2017: P. LEUNG
W. PATALANO/P. MOY

Gurdeep S. Saini
ASSOCIATE COMMISSIONER, DESIGN
DEPARTMENT OF DESIGN AND CONSTRUCTION

P.E.

8/14/18
DATE

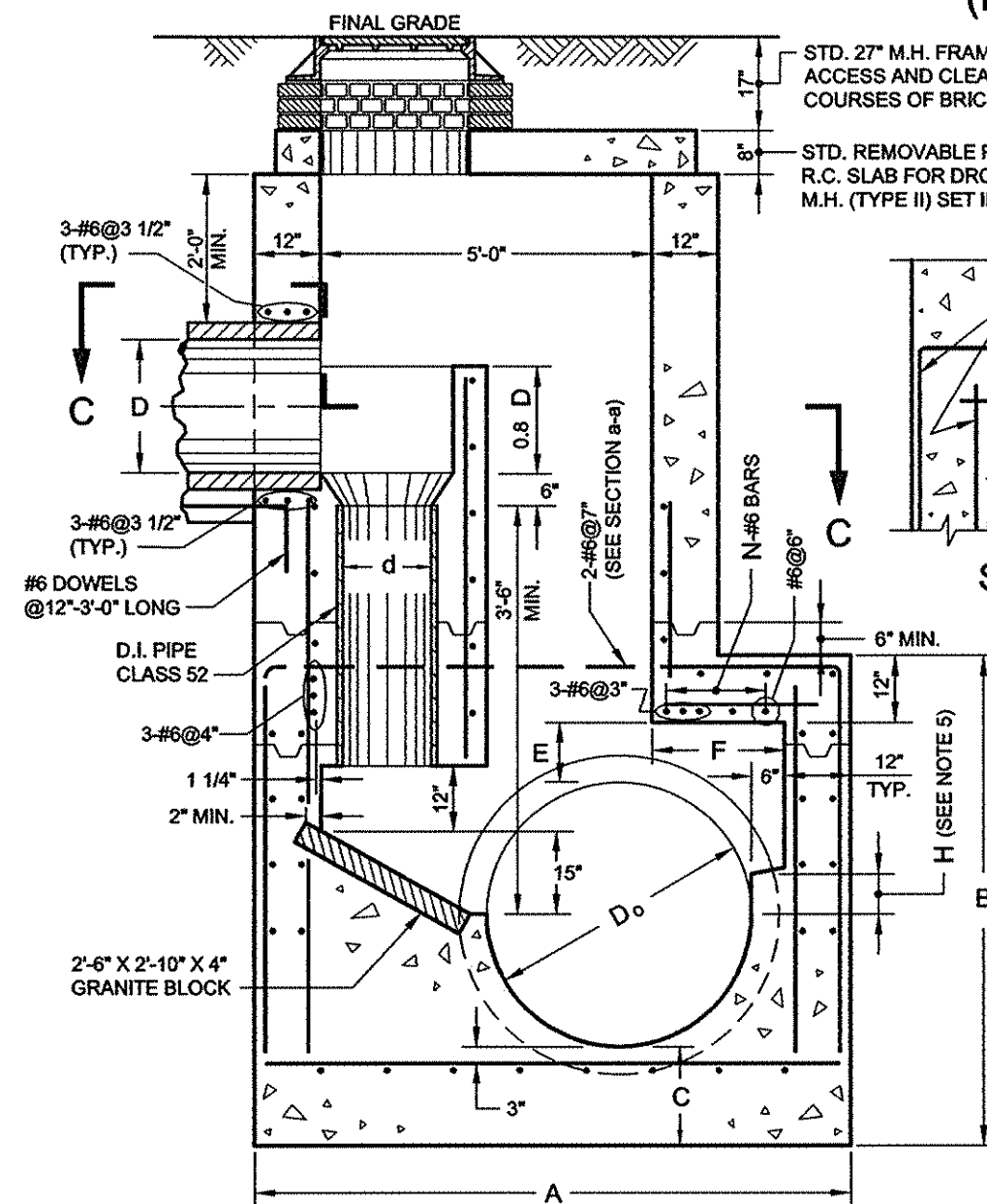
Thomas Wynne
EXECUTIVE DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION

P.E.

8/14/18
DATE

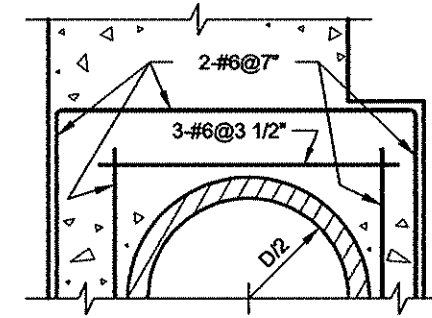
CITY OF NEW YORK
DEPARTMENT OF ENVIRONMENTAL PROTECTION

STANDARD FOR DROP PIPE MANHOLE (TYPE II) (FOR 10" TO 24" INCOMING DROP PIPE SEWERS)

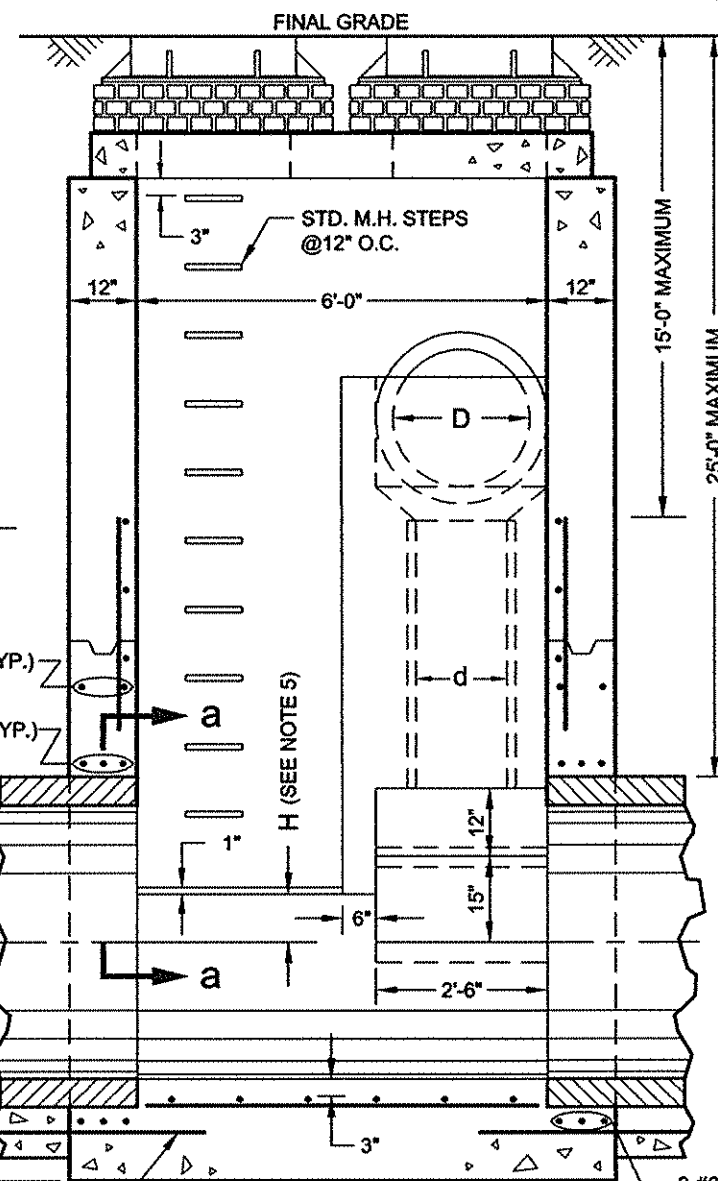


STD. 27" M.H. FRAMES AND COVERS FOR ACCESS AND CLEANOUT ON THREE COURSES OF BRICK LAID RADIALLY

STD. REMOVABLE PRECAST R.C. SLAB FOR DROP PIPE M.H. (TYPE II) SET IN MORTAR



SECTION a-a



SECTION B-B

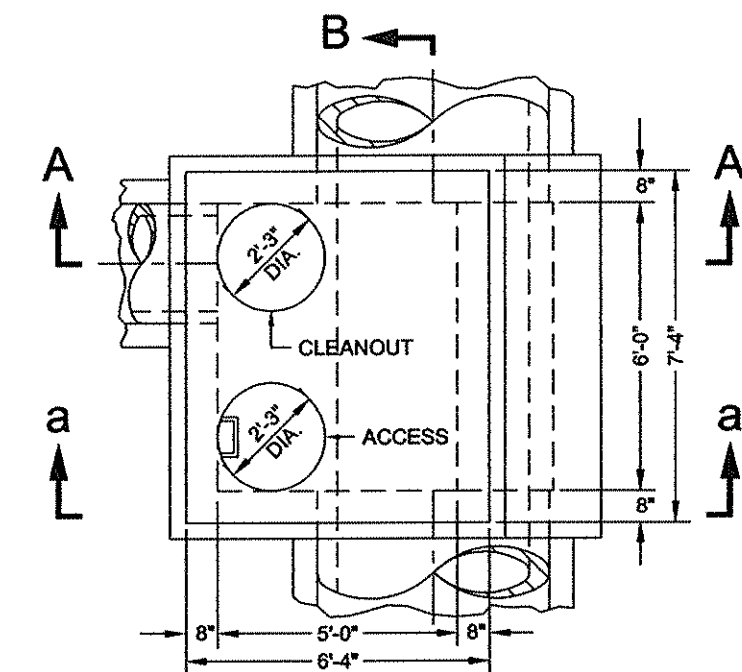
NOTES:

- (1) WHEN LEGAL GRADE IS BELOW FINAL GRADE SEE SEWER STANDARD NO. 38.
- (2) KEYED CONSTRUCTION JOINTS ARE REQUIRED BET. ANY SUCCESSIVE POURS.
- (3) CONCRETE IS TO BE CLASS 40. REBARS-GRADE 60.
- (4) STEEL REINFORCEMENT IS #6@12" UNLESS OTHERWISE SPECIFIED. COVER FOR ALL REINFORCEMENT IS 2" CLEARANCE UNLESS OTHERWISE SPECIFIED.
- (5) FOR PIPE SEWERS 10" TO 30" IN DIAMETER 'H' SHALL BE $D_o/2$ FOR PIPE SEWERS 36" TO 60" IN DIAMETER 'H' SHALL BE ZERO.

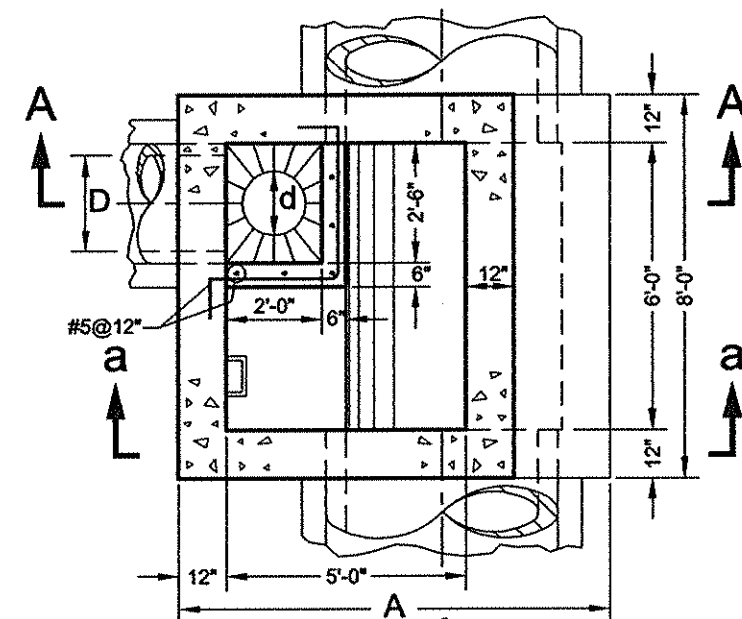
SECTION A-A

| D_o | A | B | C | E | F | N |
|------------|--------|--------|---------|---------|-------|----|
| 10" TO 24" | 7'-0" | NA | 12 1/2" | NA | NA | NA |
| 30" | 7'-6" | 5'-6" | 14" | 10" | 0'-6" | 1 |
| 36" | 8'-0" | 6'-2" | 16" | 10" | 1'-0" | 3 |
| 42" | 8'-6" | 6'-10" | 17 1/2" | 10 1/2" | 1'-6" | 4 |
| 48" | 9'-0" | 7'-5" | 18" | 11" | 2'-0" | 5 |
| 54" | 9'-6" | 8'-0" | 18 1/2" | 11 1/2" | 2'-6" | 6 |
| 60" | 10'-0" | 8'-8" | 20" | 12" | 3'-0" | 7 |

| D | d |
|-----|-----|
| 10" | 8" |
| 12" | 10" |
| 15" | 12" |
| 18" | 14" |
| 24" | 16" |



ROOF PLAN



SECTION C-C

Gurdeep S. Sarin
ASSOCIATE COMMISSIONER, DESIGN
DEPARTMENT OF DESIGN AND CONSTRUCTION

P.E.

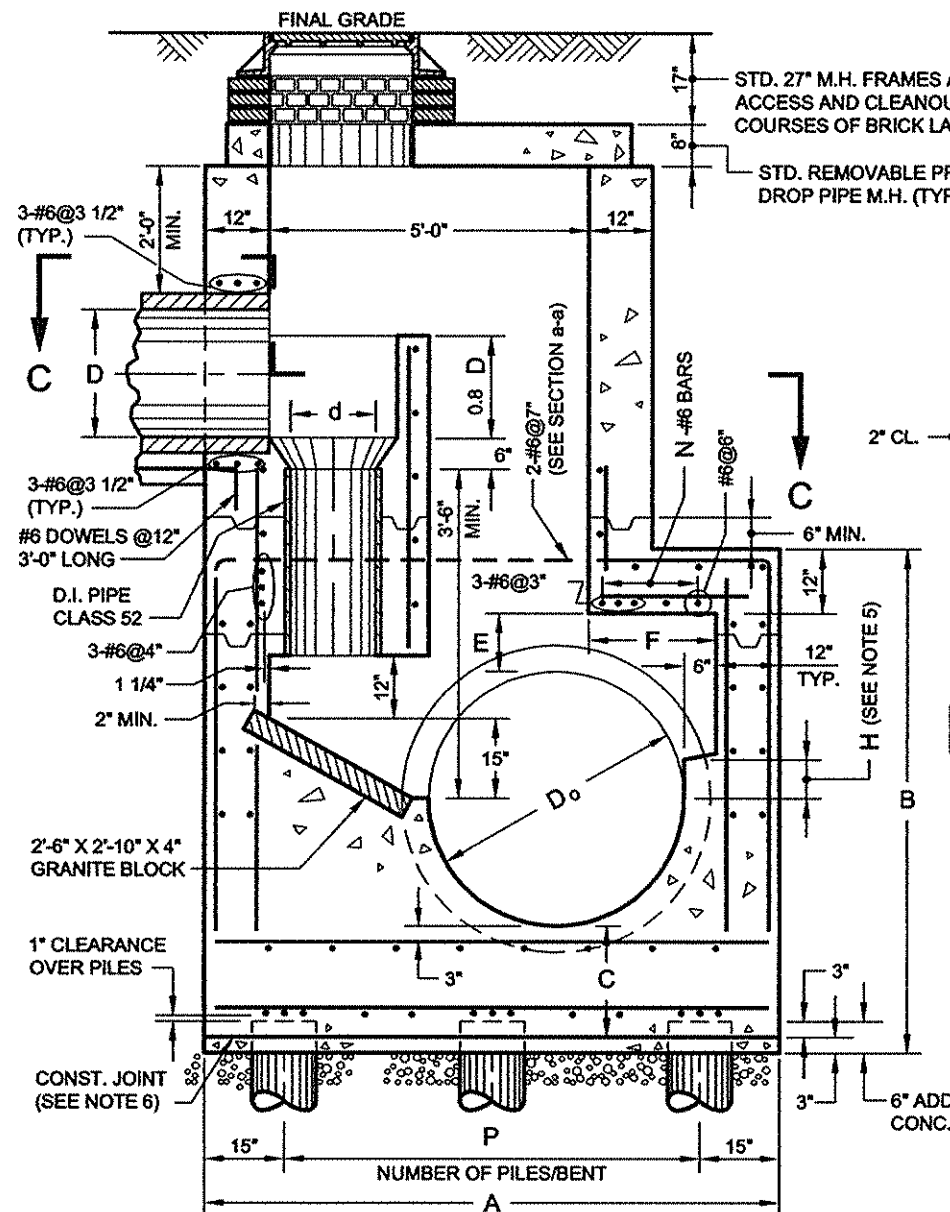
8/14/18
DATE

Thomas Wynne
EXECUTIVE DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION

P.E.

8/14/18
DATE

STANDARD FOR DROP PIPE MANHOLE (TYPE II) ON PILES (FOR 10" TO 24" INCOMING DROP PIPE SEWERS)



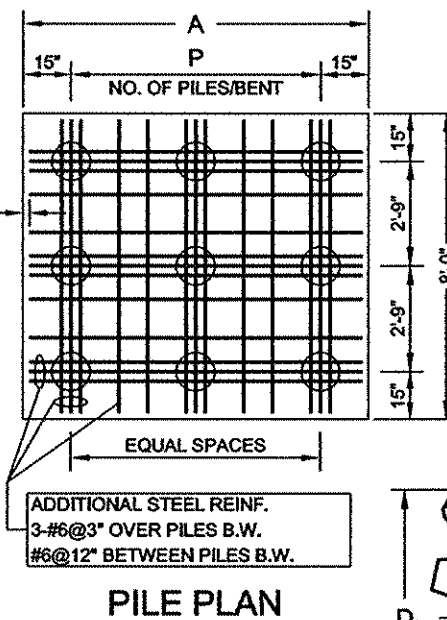
NOTES:

- (1) WHEN LEGAL GRADE IS BELOW FINAL GRADE SEE SEWER STANDARD NO. 38.
- (2) KEYED CONSTRUCTION JOINTS ARE REQUIRED BET. ANY SUCCESSIVE POURS.
- (3) CONCRETE IS TO BE CLASS 40. REBARS-GRADE 60.
- (4) STEEL REINFORCEMENT IS #6@12" UNLESS OTHERWISE SPECIFIED.
COVER FOR ALL REINFORCEMENT IS 2" CLEARANCE UNLESS OTHERWISE SPECIFIED.
- (5) FOR PIPE SEWERS 10" TO 30" IN DIAMETER 'H' SHALL BE $D_o/2$
FOR PIPE SEWERS 36" TO 60" IN DIAMETER 'H' SHALL BE ZERO.
- (6) CONSTRUCTION JOINT TO BE UTILIZED WHENEVER GROUND CONDITIONS PREVENT SUPPORT OF PIPE.

Gurdeep S. Saini
ASSOCIATE COMMISSIONER, DESIGN
DEPARTMENT OF DESIGN AND CONSTRUCTION

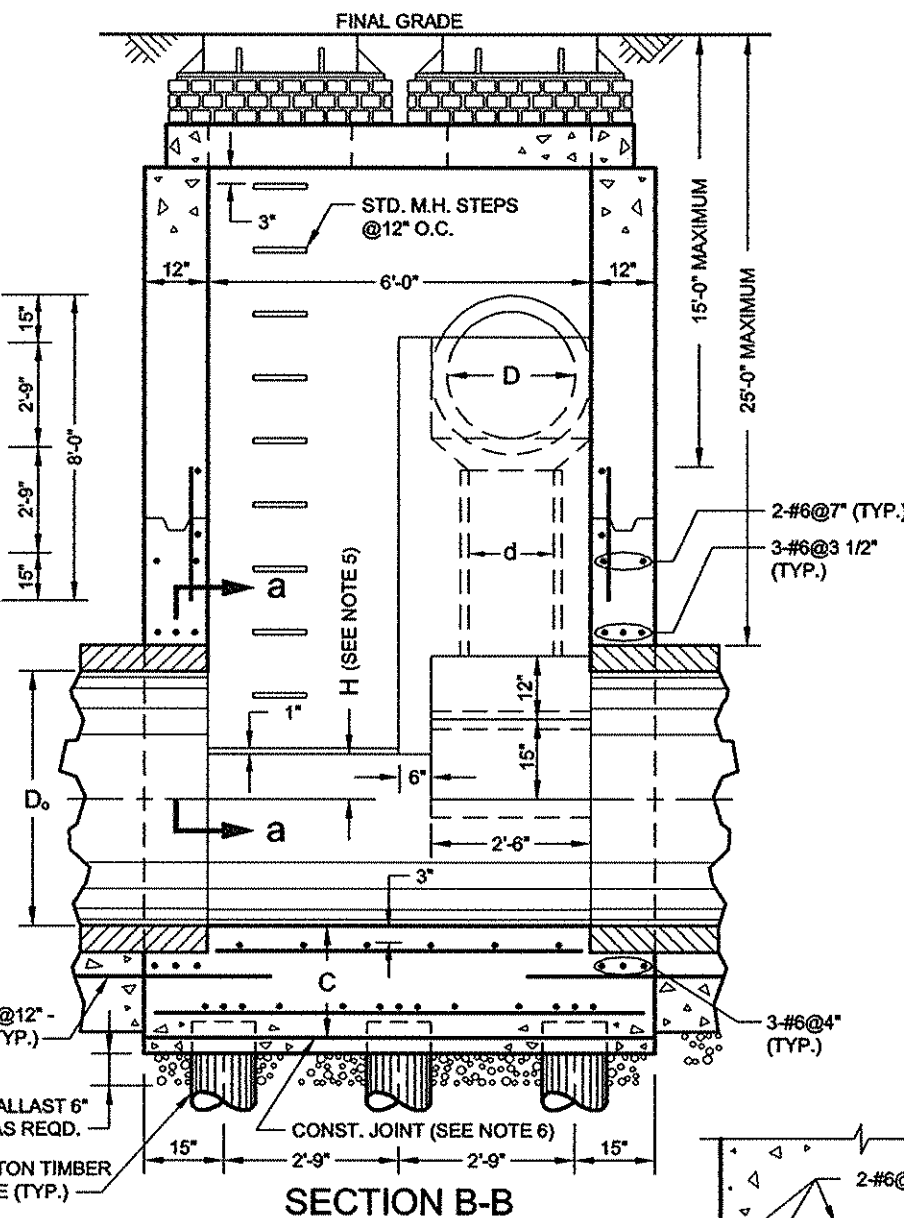
P.E.

8/14/18
DATE

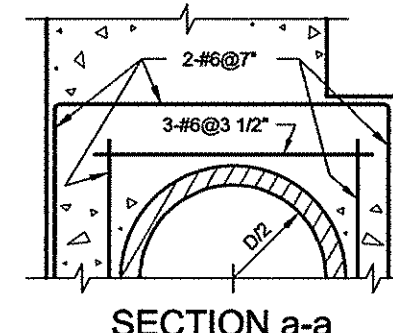


| D_o | A | B | C | E | F | N | P |
|------------|--------|--------|---------|---------|-------|----|---|
| 10" TO 24" | 7'-0" | NA | 15 1/2" | NA | NA | NA | 2 |
| 30" | 7'-6" | 5'-9" | 17" | 10" | 0'-6" | 1 | 3 |
| 36" | 8'-0" | 6'-5" | 19" | 10" | 1'-0" | 3 | 3 |
| 42" | 8'-6" | 7'-1" | 20 1/2" | 10 1/2" | 1'-6" | 4 | 3 |
| 48" | 9'-0" | 7'-8" | 21" | 11" | 2'-0" | 5 | 3 |
| 54" | 9'-6" | 8'-3" | 21 1/2" | 11 1/2" | 2'-6" | 6 | 3 |
| 60" | 10'-0" | 8'-11" | 23" | 12" | 3'-0" | 7 | 3 |

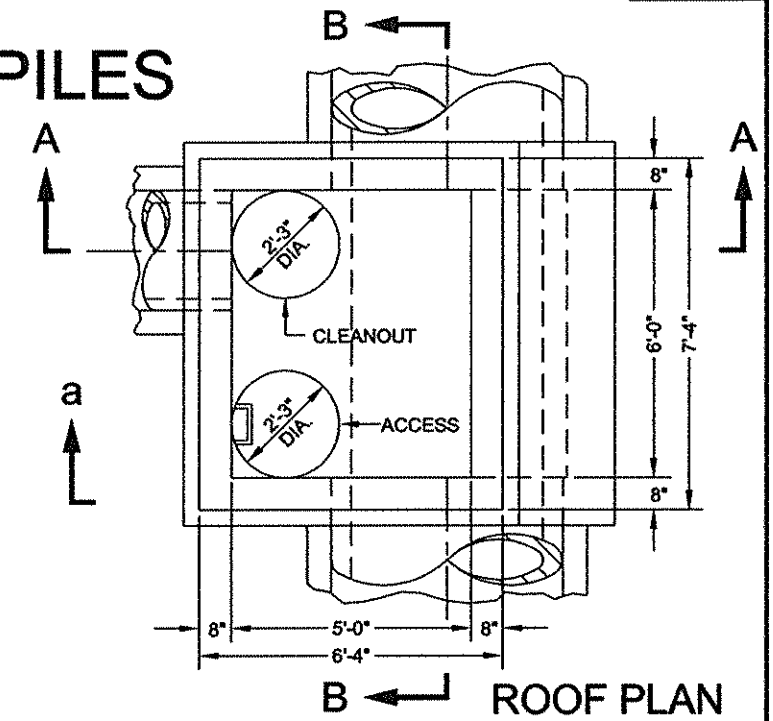
| D | d |
|-----|-----|
| 10" | 8" |
| 12" | 10" |
| 15" | 12" |
| 18" | 14" |
| 24" | 16" |



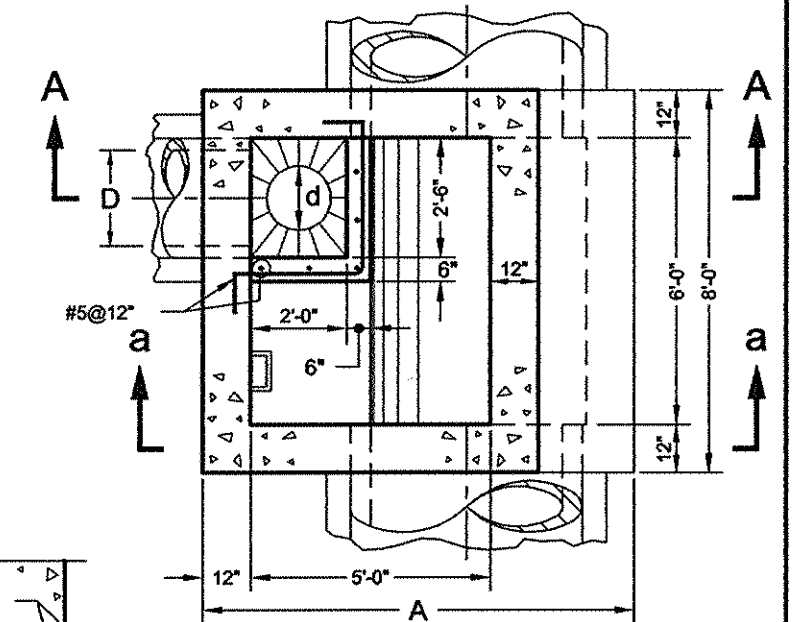
SECTION B-B



SECTION a-a



ROOF PLAN



SECTION C-C

Thomas Wynne
EXECUTIVE DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION

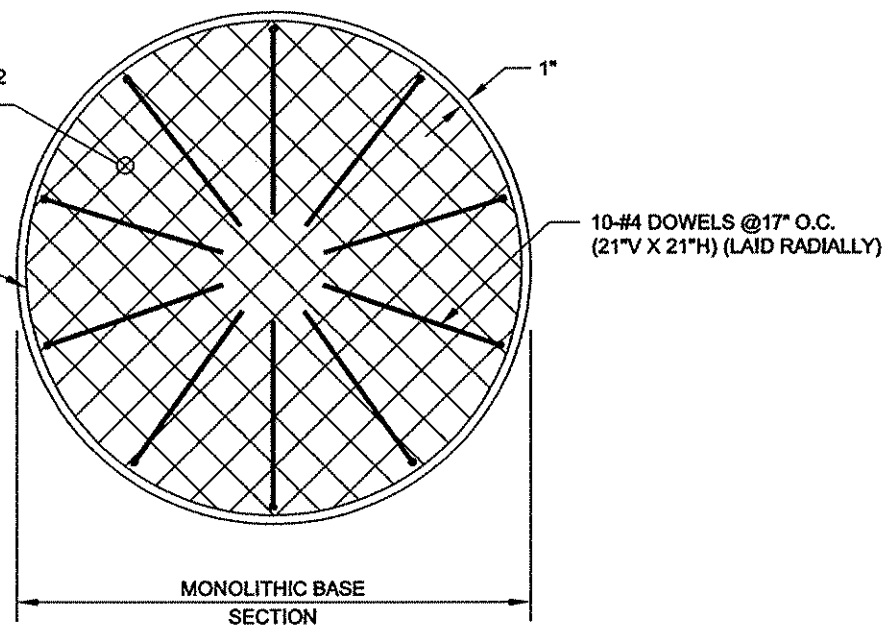
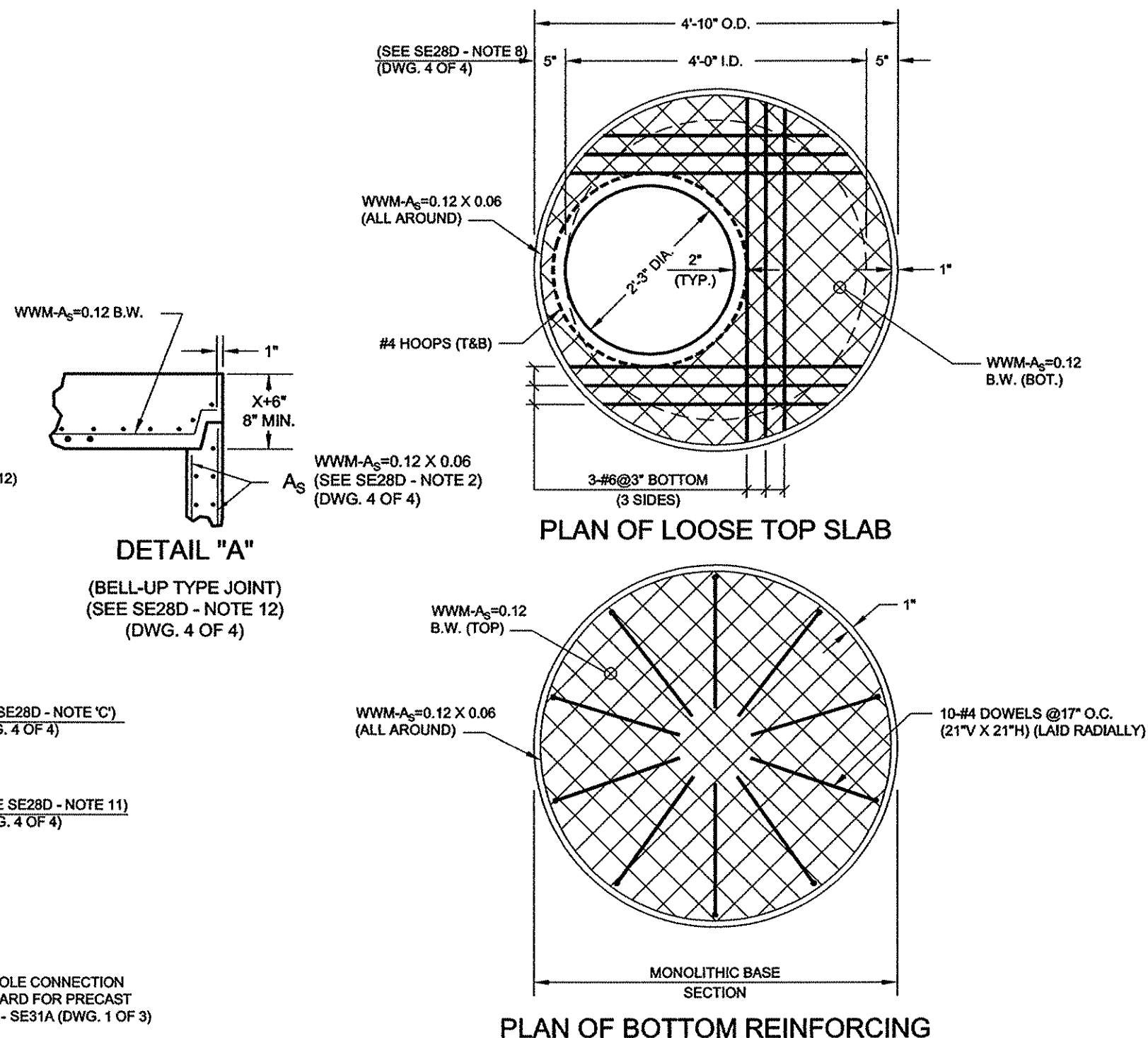
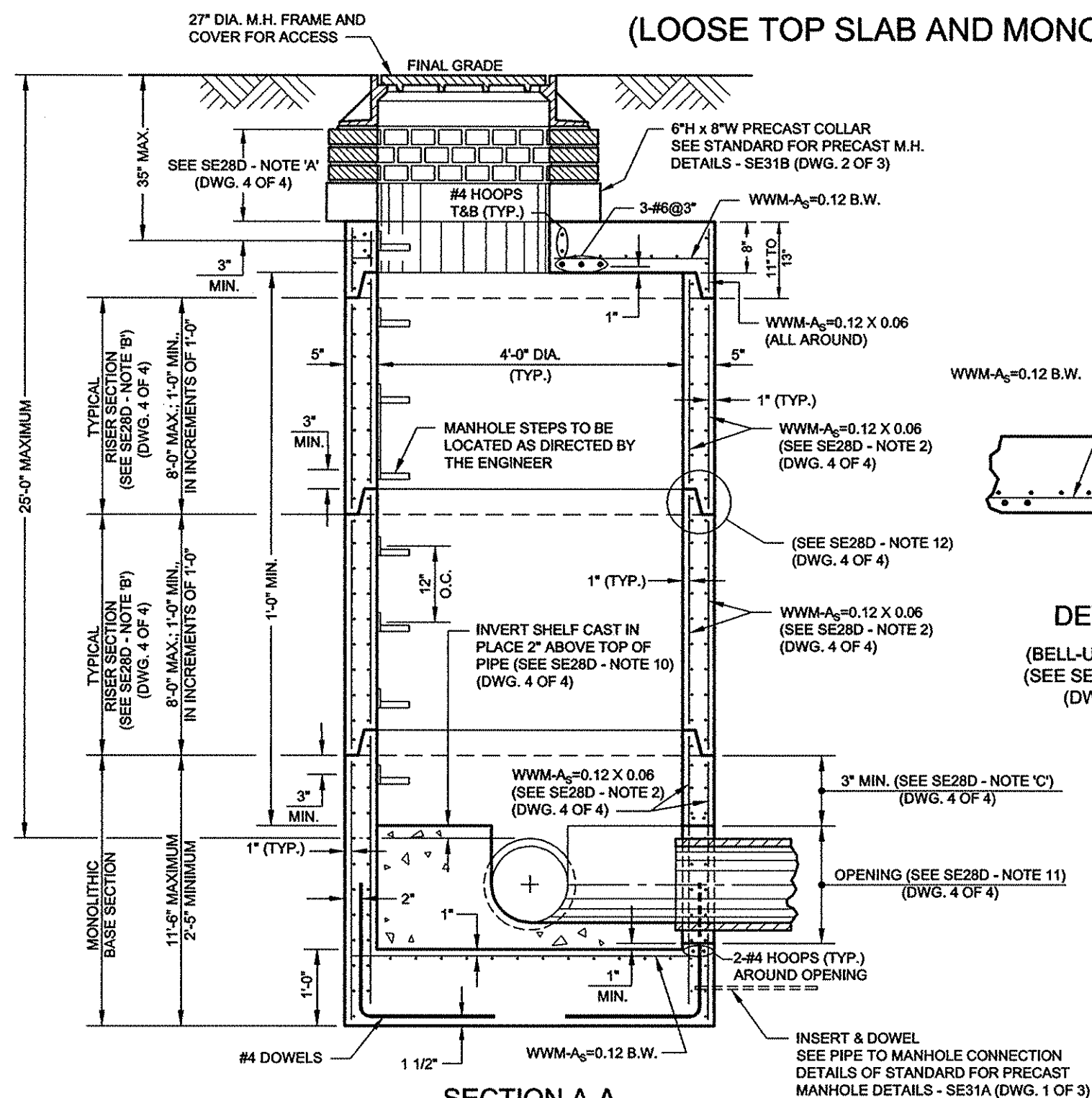
P.E.

8/14/18
DATE

CITY OF NEW YORK
DEPARTMENT OF ENVIRONMENTAL PROTECTION

STANDARD FOR 4'-0" DIAMETER PRECAST MANHOLE (DWG. 1 OF 4)

(LOOSE TOP SLAB AND MONOLITHIC BASE SECTION)



REVISED JULY 2018; C. LAM
W. PATALANO/P. MOY

Surdip S. Sauri.
ASSOCIATE COMMISSIONER, DESIGN
DEPARTMENT OF DESIGN AND CONSTRUCTION

8/14/18
DATE

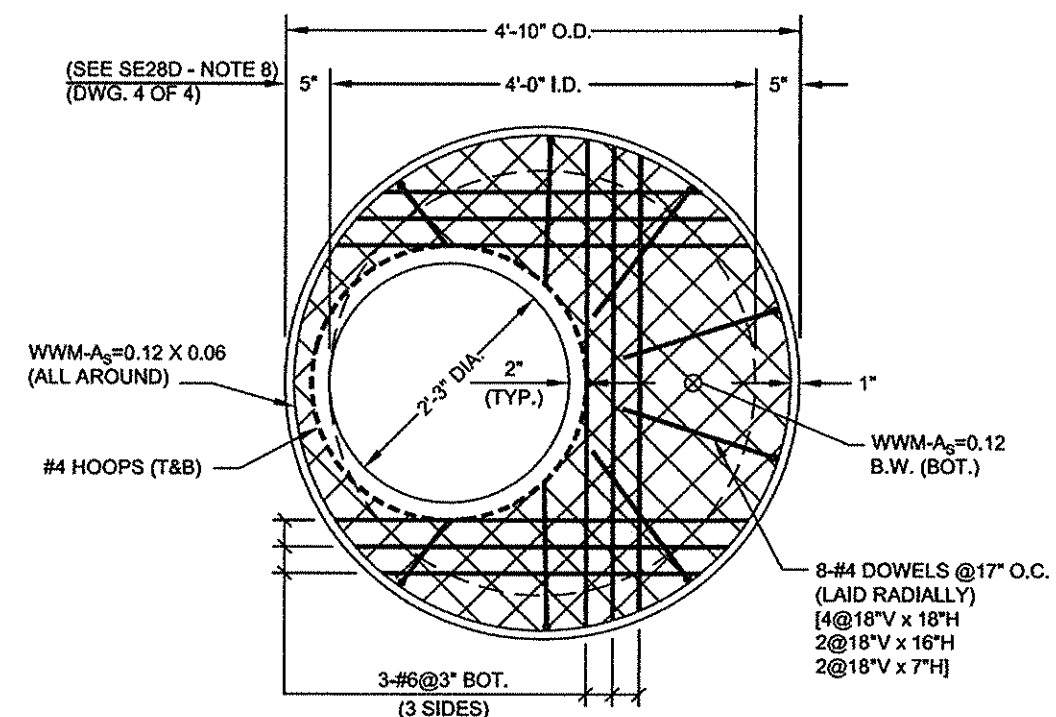
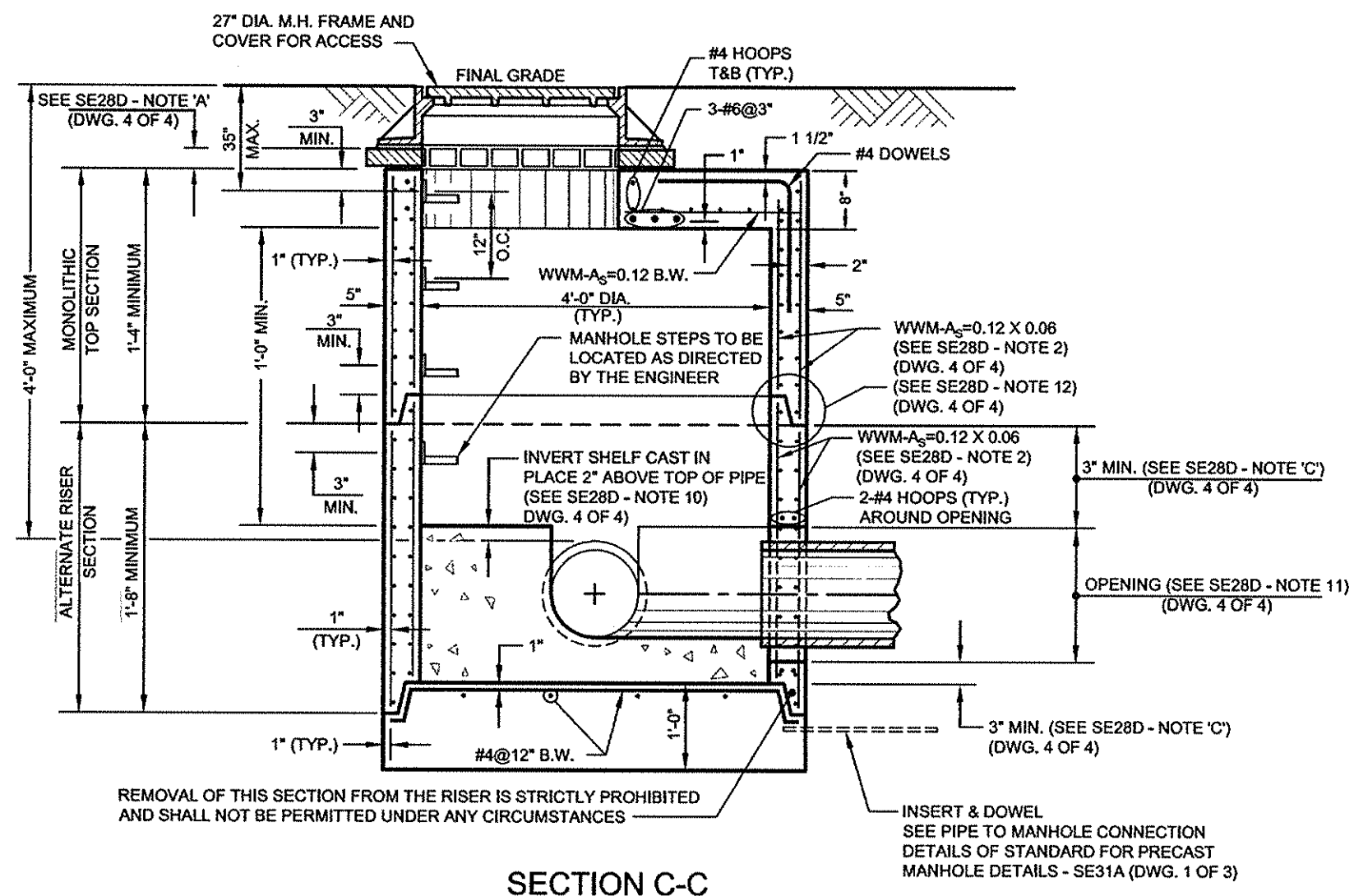
Thomas Wayne
EXECUTIVE DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION

8/14/18
DATE

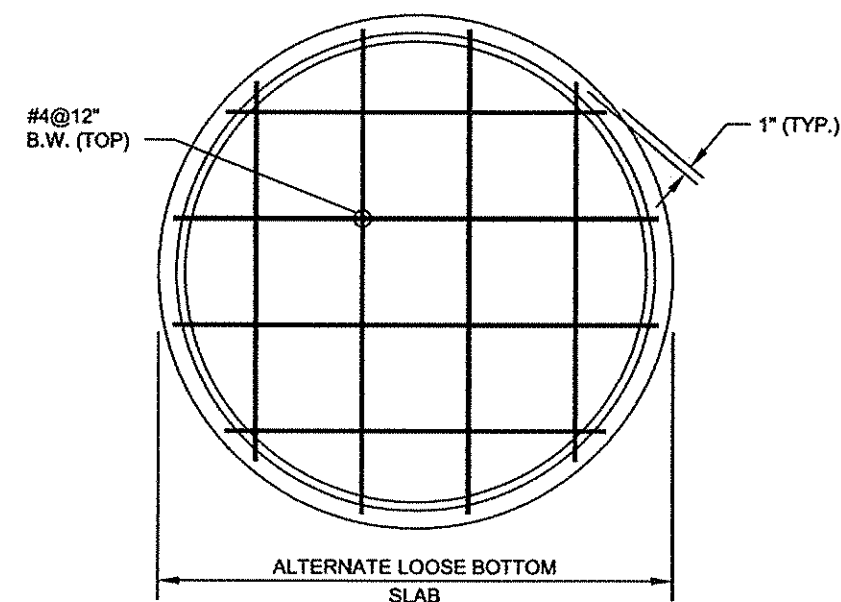
CITY OF NEW YORK
DEPARTMENT OF ENVIRONMENTAL PROTECTION

STANDARD FOR 4'-0" DIAMETER PRECAST MANHOLE (DWG. 3 OF 4)

(MONOLITHIC TOP SECTION AND ALTERNATE LOOSE BOTTOM SLAB)



PLAN OF MONOLITHIC TOP SECTION



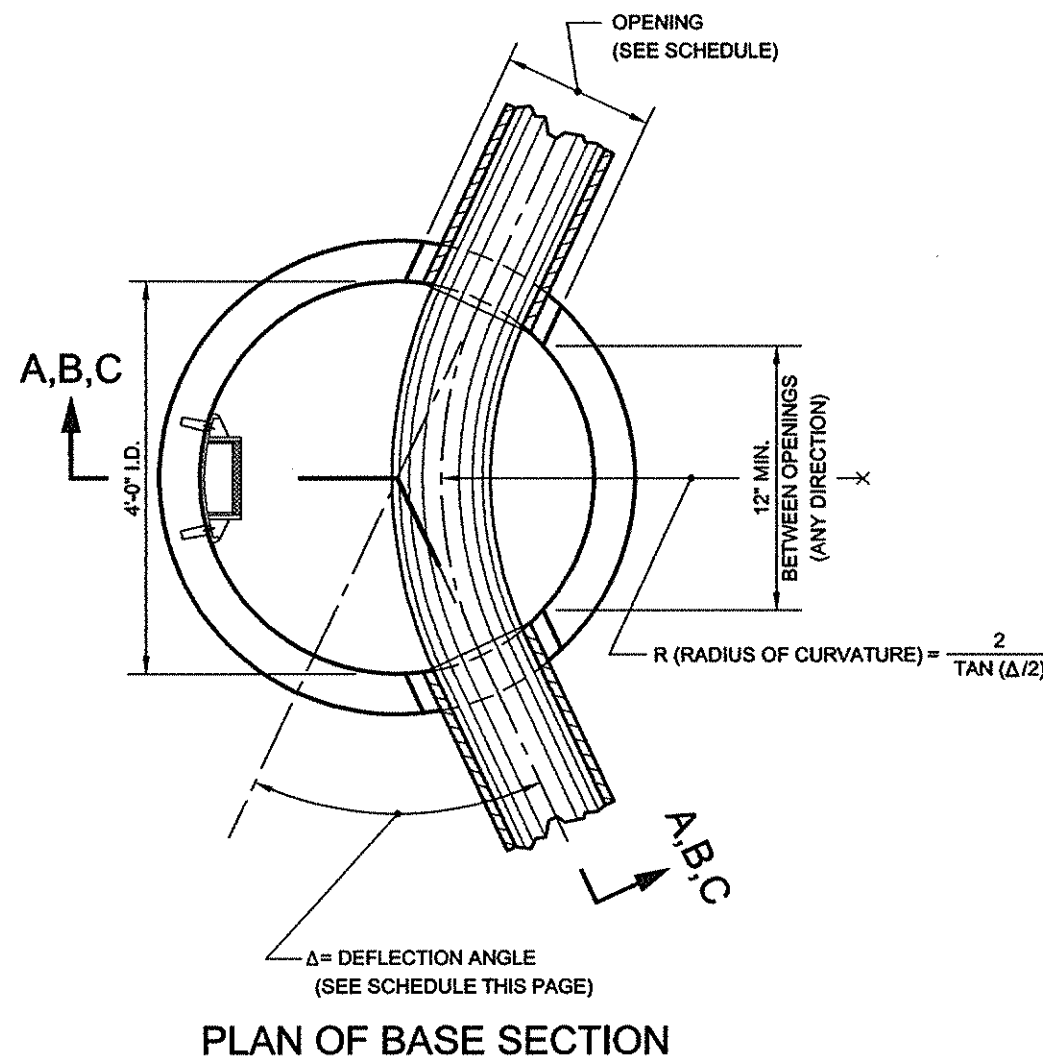
PLAN OF BOTTOM REINFORCING
SEE SE28D - NOTE 'B' (DWG. 4 OF 4)

Gurdeep S. Sami
P.E.
ASSOCIATE COMMISSIONER, DESIGN
DEPARTMENT OF DESIGN AND CONSTRUCTION

8/14/18
DATE

Thomas L. Lyane
P.E.
EXECUTIVE DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION

8/14/18
DATE

CITY OF NEW YORK
DEPARTMENT OF ENVIRONMENTAL PROTECTIONSTANDARD FOR 4'-0" DIAMETER PRECAST MANHOLE (DWG. 4 OF 4)
(MISCELLANEOUS DETAIL, NOTES AND SCHEDULE)

PLAN OF BASE SECTION

NOTE 'A':

9" MIN. TO 20" MAX.; 9" BRICK MIN. LAID RADIALLY, USE 1 OR 2 PRECAST COLLARS OR BRICK AS REQUIRED. (4" BRICK MIN. ONLY FOR SHALLOW MANHOLE CONSTRUCTION.)

NOTE 'B':

ALTERNATE LOOSE BOTTOM SLAB TO BE USED ONLY IN SHALLOW MANHOLE CONSTRUCTION.

MANHOLE RISER MAY NOT BE REQUIRED IN SHALLOW MANHOLE CONSTRUCTION.

A SHALLOW MANHOLE IS A MANHOLE ON A SEWER WHICH HAS A COVER FROM FINAL GRADE TO THE OUTER TOP OF THE PIPE OF LESS THAN 4'-0". USE OF LOOSE BOTTOM SLAB IN CONJUNCTION WITH LOOSE TOP SLAB WILL NOT BE PERMITTED.

NOTE 'C':

PIPE OPENINGS WILL NOT BE PERMITTED THROUGH JOINTS. DISTANCE FROM TOP OR BOTTOM OF ANY SECTION SHALL BE A MINIMUM OF 3" PLUS THE JOINT DEPTH FOR CAST PIPE OPENINGS AND A MINIMUM OF 12" PLUS THE JOINT DEPTH FOR CORED OPENINGS FOR BASIN CONNECTIONS.

NOTE 'D':

THE MANUFACTURER SHALL ENSURE THAT ALL PRECAST MANHOLE SECTIONS ARE ADDITIONALLY REINFORCED WHERE REQUIRED TO RESIST DAMAGE FROM HANDLING, SHIPPING AND INSTALLATION STRESSES.

| SCHEDULE | | |
|-----------|----------|--------|
| PIPE DIA. | OPENING* | Δ MAX. |
| 8" | 14" | 117° |
| 10" | 16" | 112° |
| 12" | 19" | 104° |
| 15" | 22" | 93° |
| 18" | 26" | 83° |
| 24" | 34" | 60° |

* SEE NOTE 11

GENERAL NOTES:

- (1) THIS 4'-0" DIA. PRECAST MANHOLE MAY BE SUBSTITUTED FOR STANDARD MANHOLE TYPES A-1, A-2, B-1 AND B-2 ON SEWERS 24" IN DIAMETER AND LESS ONLY.
- (2) MANHOLE RISER REINFORCING COMPLIES WITH AREA REQUIREMENTS OF ASTM C478, EXCEPT THAT ALL WALL SECTIONS SHALL BE REINFORCED WITH WWM, $A_s=0.12$ CIR. X 0.06 LONG. - E.F. WITH 2-#4 HOOPS AROUND ALL CAST PIPE OPENINGS (1-E.F.). (THE 2-#4 HOOPS WILL NOT BE REQUIRED AT CORED OPENINGS FOR BASIN CONNECTIONS.) (ALL VALUES OF AREA OF STEEL (A_s) ARE IN SQUARE INCHES AND ARE A MINIMUM.)
- (3) CORED OPENINGS WILL BE PERMITTED FOR 12" DIA. BASIN CONNECTIONS ONLY. THE MAXIMUM CORED OPENING SHALL BE 16" FOR THESE BASIN CONNECTIONS. CORED OPENING WILL NOT BE PERMITTED FOR SHALLOW MANHOLES.
- (4) FOR DETAILS OF STEPS, JOINTS, GASKETS, PRECAST COLLARS, PIPE TO MANHOLE CONNECTIONS, PILE CAP AND POURED IN PLACE ALTERNATE MONOLITHIC BASE SECTION SEE STANDARD FOR PRECAST MANHOLE DETAILS, STANDARD FOR MANHOLE STEPS AND STANDARD FOR ALTERNATE MONOLITHIC BASE SECTIONS FOR PRECAST MANHOLES (POURED IN PLACE).
- (5) THE MAXIMUM DEPTH OF COVER OF THE 4'-0" DIA. PRECAST MANHOLE, FROM FINAL GRADE TO THE OUTER TOP OF THE PIPE, SHALL BE TWENTY-FIVE (25) FEET.
- (6) ALL COVER DISTANCES SHOWN FOR REINFORCEMENT ARE CLEAR DISTANCES.
- (7) LIFTING HOLES SHALL BE LOCATED IN THE SECTIONS AS PER MANUFACTURER'S RECOMMENDATIONS AND GROUTED PRIOR TO BACKFILLING.
- (8) THE VALUES OF THE WALL AND SLAB THICKNESSES ARE A MINIMUM.
- (9) CONCRETE DESIGN MIX = 5,000 PSI (MIN. 28 DAY STRENGTH = 4,000 PSI; MAX. W/C = 0.47). REBARS - $F_s = 60,000$ PSI. WWM - $F_s = 65,000$ PSI.
- (10) INVERT SHELVES SHALL HAVE A 1/2" PER LINEAR FOOT PITCH TOWARDS THE SEWER.
- (11) THE OPENING DIAMETERS SHOWN IN THE SCHEDULE ARE MAXIMUM VALUES. THE MINIMUM OPENING DIAMETERS SHALL BE AS FOLLOWS: 8" TO 24" DIA. PIPES = O.D.+3".
- (12) BELL-UP TYPE JOINTS SHALL BE ALLOWED FOR 4'-0" DIA. PRECAST MANHOLE, WITH THE FOLLOWING MODIFICATION TO THE LOOSE TOP SLAB:
(A) THE MINIMUM SLAB THICKNESS SHALL BE X+6" (WHERE 'X' IS JOINT DEPTH), BUT IN NO CASE SHALL IT BE LESS THAN 8" THICK AND (B) THE EMBEDMENT LENGTH SHALL BE t-1" (WHERE 't' IS THE THICKNESS OF RISER WALL); SEE DETAIL "A" ON DWG. 1 OF 4.

Gurdeep S. Saini

P.E.

ASSOCIATE COMMISSIONER, DESIGN
DEPARTMENT OF DESIGN AND CONSTRUCTION

8/14/18

DATE

Thomas Wynne

P.E.

EXECUTIVE DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION

8/14/18

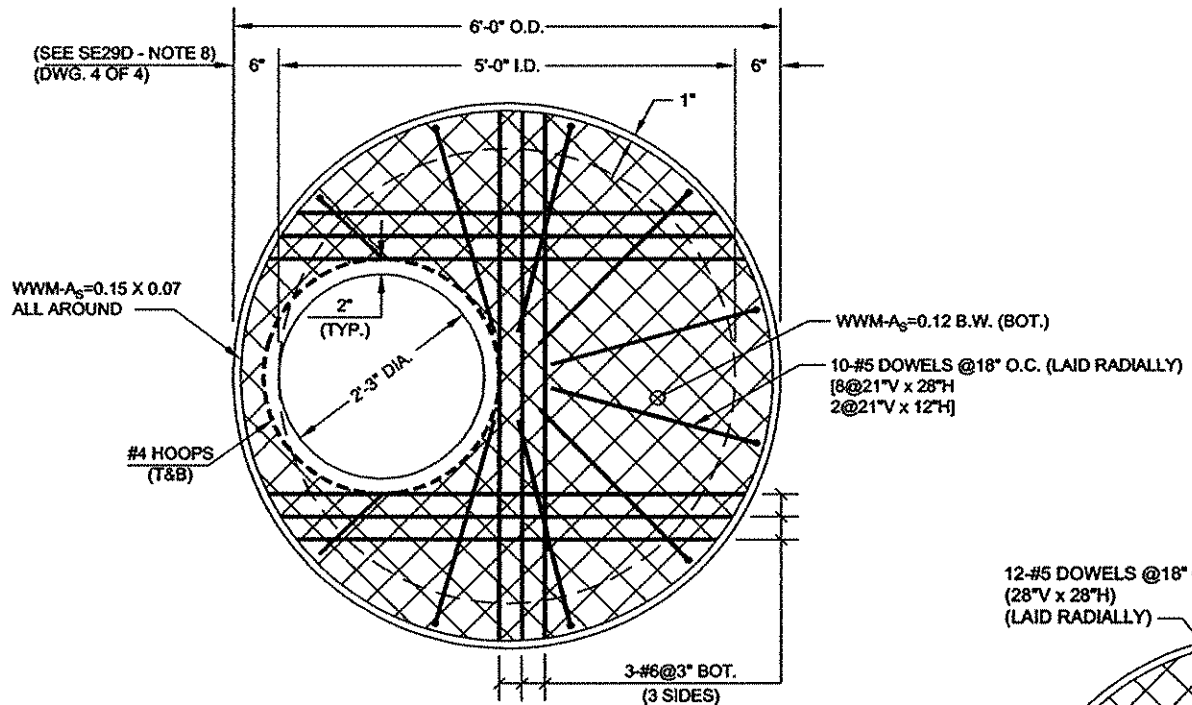
DATE

W. PATALANO/P. MOY

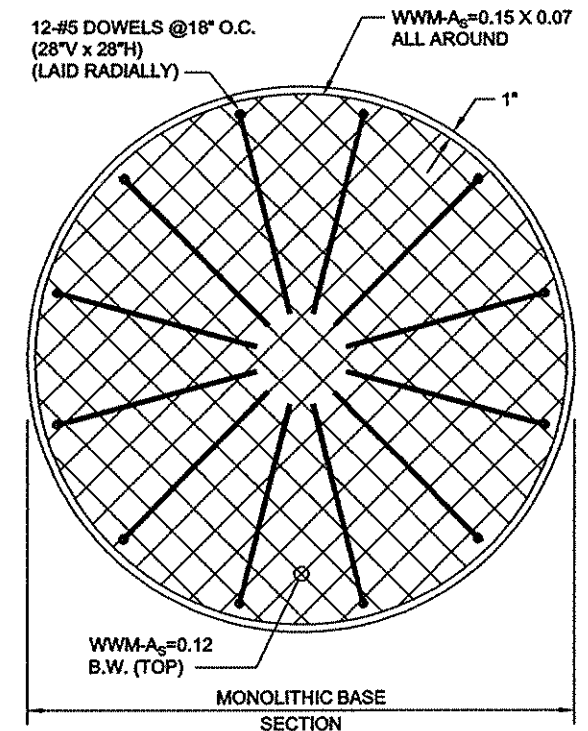
W. PATALANO/P. MOY

STANDARD FOR 5'-0" DIAMETER PRECAST MANHOLE (DWG. 2 OF 4)

(MONOLITHIC TOP SECTION AND MONOLITHIC BASE SECTION)



PLAN OF MONOLITHIC TOP SECTION



PLAN OF BOTTOM REINFORCING

Gurdip S. Saini
ASSOCIATE COMMISSIONER, DESIGN
DEPARTMENT OF DESIGN AND CONSTRUCTION

8/14/18
DATE

DATE _____

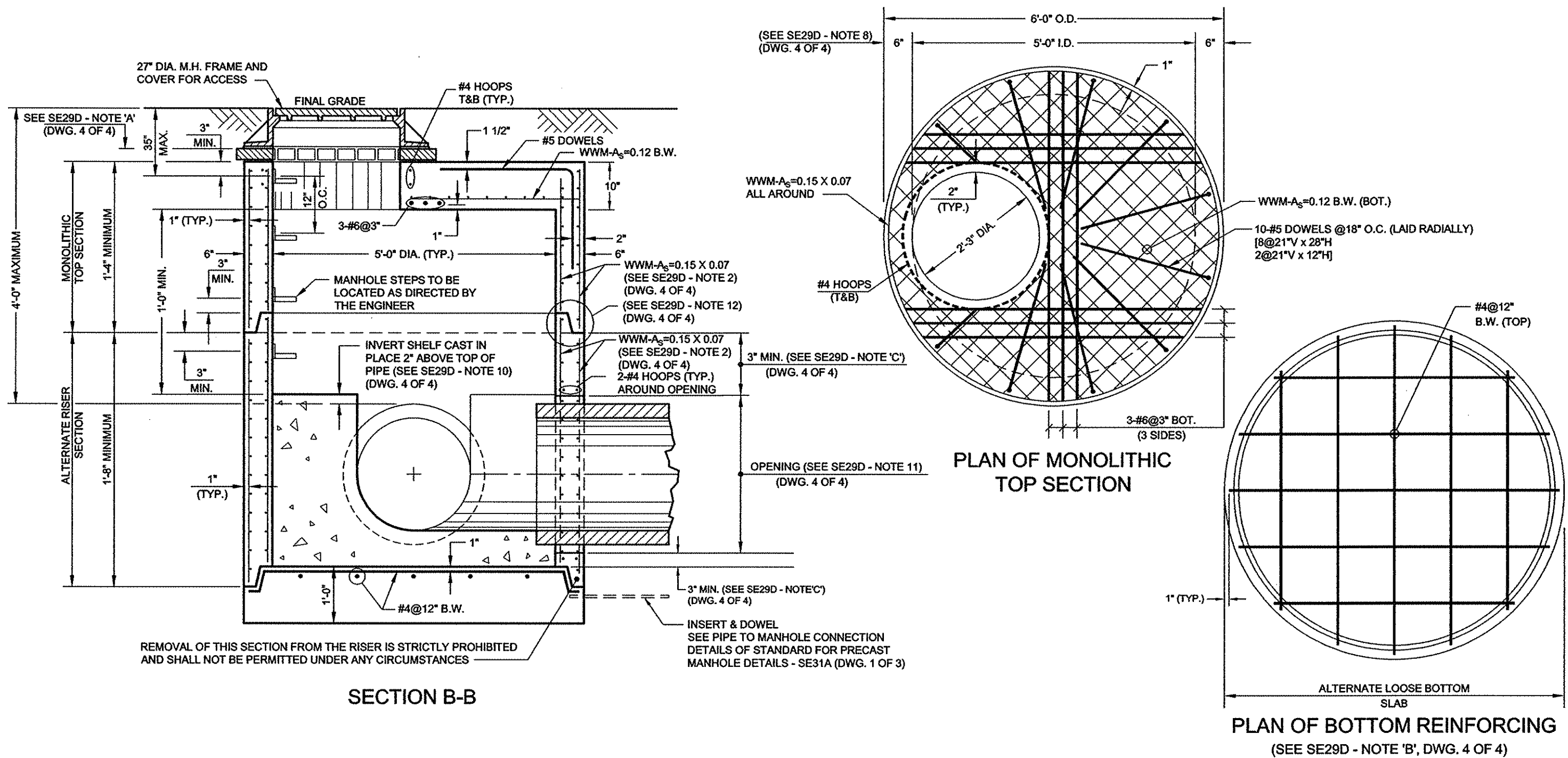
Thomas Wynne
EXECUTIVE DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION

8/14/18
DATE

DATE _____

STANDARD FOR 5'-0" DIAMETER PRECAST MANHOLE (DWG. 3 OF 4)

(MONOLITHIC TOP SECTION AND ALTERNATE LOOSE BOTTOM SLAB)



Sandeep S. Samra

P.E.

ASSOCIATE COMMISSIONER, DESIGN
DEPARTMENT OF DESIGN AND CONSTRUCTION

8/14/18

DATE

Thomas Wayne

P.E.

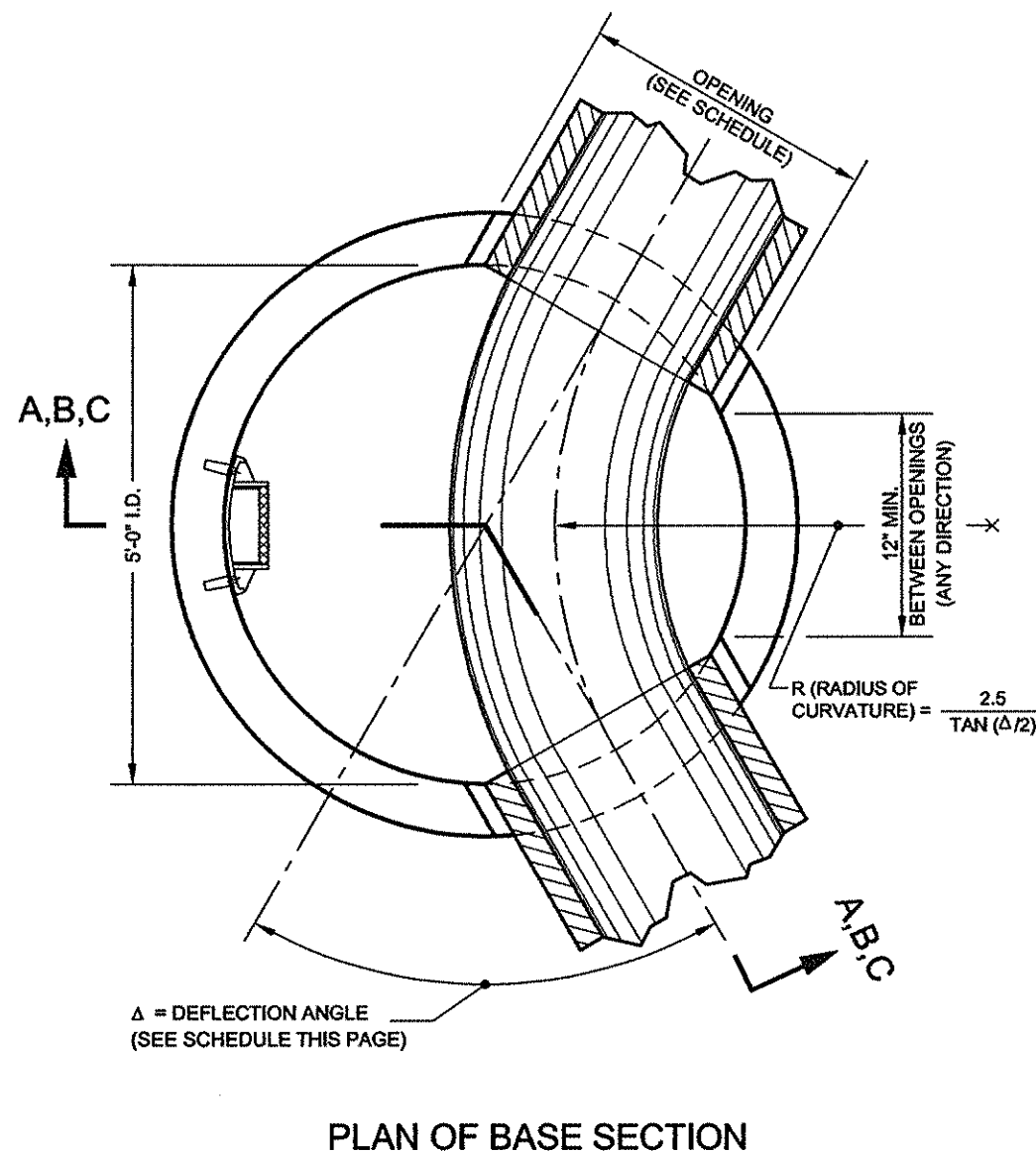
EXECUTIVE DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION

8/14/18

DATE

STANDARD FOR 5'-0" DIAMETER PRECAST MANHOLE (DWG. 4 OF 4)

(MISCELLANEOUS DETAIL, NOTES AND SCHEDULE)

**NOTE 'A':**

9" MIN. TO 20" MAX.; 9" BRICK MIN. LAID RADIALLY, USE 1 OR 2 PRECAST COLLARS OR BRICK AS REQUIRED. (4" BRICK MIN. ONLY FOR SHALLOW MANHOLE CONSTRUCTION.)

NOTE 'B':

ALTERNATE LOOSE BOTTOM SLAB TO BE USED ONLY IN SHALLOW MANHOLE CONSTRUCTION.
MANHOLE RISER MAY NOT BE REQUIRED IN SHALLOW MANHOLE CONSTRUCTION.
A SHALLOW MANHOLE IS A MANHOLE ON A SEWER WHICH HAS A COVER FROM FINAL GRADE TO THE OUTER TOP OF THE PIPE OF LESS THAN 4'-0". USE OF LOOSE BOTTOM SLAB IN CONJUNCTION WITH LOOSE TOP SLAB WILL NOT BE PERMITTED.

NOTE 'C':

PIPE OPENINGS WILL NOT BE PERMITTED THROUGH JOINTS. DISTANCE FROM TOP OR BOTTOM OF ANY SECTION SHALL BE A MINIMUM OF 3" PLUS THE JOINT DEPTH FOR CAST PIPE OPENINGS AND A MINIMUM OF 12" PLUS THE JOINT DEPTH FOR CORED OPENINGS FOR BASIN CONNECTIONS.

NOTE 'D':

THE MANUFACTURER SHALL ENSURE THAT ALL PRECAST MANHOLE SECTIONS ARE ADDITIONALLY REINFORCED WHERE REQUIRED TO RESIST DAMAGE FROM HANDLING, SHIPPING AND INSTALLATION STRESSES.

SCHEDULE

| PIPE DIA. | OPENING* | Δ MAX. |
|-----------|----------|--------|
| 12" | 19" | 118° |
| 15" | 22" | 106° |
| 18" | 26" | 96° |
| 24" | 34" | 79° |
| 30" | 42" | 67° |
| 36" | 49" | 47° |

* SEE NOTE 11

GENERAL NOTES:

- (1) THIS 5'-0" DIA. PRECAST MANHOLE MAY BE SUBSTITUTED FOR STANDARD MANHOLE TYPES A-1, A-2, B-1, B-2, C-1 AND C-2 ON SEWERS 36" IN DIAMETER AND LESS ONLY.
- (2) MANHOLE RISER REINFORCING COMPLIES WITH AREA REQUIREMENTS OF ASTM C478, EXCEPT THAT ALL WALL SECTIONS SHALL BE REINFORCED WITH WWM, $A_s=0.15$ CIR. X 0.07 LONG. - E.F. WITH 2-#4 HOOPS AROUND ALL CAST PIPE OPENINGS (1-E.F.). (THE 2-#4 HOOPS WILL NOT BE REQUIRED AT CORED OPENINGS FOR BASIN CONNECTIONS.) (ALL VALUES OF AREA OF STEEL (A_s) ARE IN SQUARE INCHES AND ARE A MINIMUM.)
- (3) CORED OPENINGS WILL BE PERMITTED FOR 12" DIA. BASIN CONNECTIONS ONLY. THE MAXIMUM CORED OPENING SHALL BE 16" FOR THESE BASIN CONNECTIONS. CORED OPENING WILL NOT BE PERMITTED FOR SHALLOW MANHOLES.
- (4) FOR DETAILS OF STEPS, JOINTS, GASKETS, PRECAST COLLARS, PIPE TO MANHOLE CONNECTIONS, PILE CAP AND POURED IN PLACE ALTERNATE MONOLITHIC BASE SECTION SEE STANDARD FOR PRECAST MANHOLE DETAILS, STANDARD FOR MANHOLE STEPS AND STANDARD FOR ALTERNATE MONOLITHIC BASE SECTIONS FOR PRECAST MANHOLES (POURED IN PLACE).
- (5) THE MAXIMUM DEPTH OF COVER OF THE 5'-0" DIA. PRECAST MANHOLE, FROM FINAL GRADE TO THE OUTER TOP OF THE PIPE, SHALL BE TWENTY-FIVE (25) FEET.
- (6) ALL COVER DISTANCES SHOWN FOR REINFORCEMENT ARE CLEAR DISTANCES.
- (7) LIFTING HOLES SHALL BE LOCATED IN THE SECTIONS AS PER MANUFACTURER'S RECOMMENDATIONS AND GROUTED PRIOR TO BACKFILLING.
- (8) THE VALUES OF THE WALL AND SLAB THICKNESSES ARE A MINIMUM.
- (9) CONCRETE DESIGN MIX = 5,000 PSI (MIN. 28 DAY STRENGTH = 4,000 PSI; MAX. W/C = 0.47). REBARS - $F_s = 60,000$ PSI. WWM - $F_s = 65,000$ PSI.
- (10) INVERT SHELVES SHALL HAVE A 1/2" PER LINEAR FOOT PITCH TOWARDS THE SEWER.
- (11) THE OPENING DIAMETERS SHOWN IN THE SCHEDULE ARE MAXIMUM VALUES. THE MINIMUM OPENING DIAMETERS SHALL BE AS FOLLOWS: 8" TO 24" DIA. PIPES = O.D.+3"; 30" TO 36" DIA. PIPES = O.D.+4".
- (12) BELL-UP TYPE JOINTS SHALL BE ALLOWED FOR 5'-0" DIA. PRECAST MANHOLE, WITH THE FOLLOWING MODIFICATION TO THE LOOSE TOP SLAB: (A) THE MINIMUM SLAB THICKNESS SHALL BE $X+6"$ (WHERE 'X' IS JOINT DEPTH), BUT IN NO CASE SHALL IT BE LESS THAN 10" THICK AND (B) THE EMBEDMENT LENGTH SHALL BE $t-1"$ (WHERE 't' IS THE THICKNESS OF RISER WALL); SEE DETAIL "A" ON DWG. 1 OF 4.

Gurdeep S. Saini

ASSOCIATE COMMISSIONER, DESIGN
DEPARTMENT OF DESIGN AND CONSTRUCTION

P.E.

8/14/18

DATE

Thomas Wynne

EXECUTIVE DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION

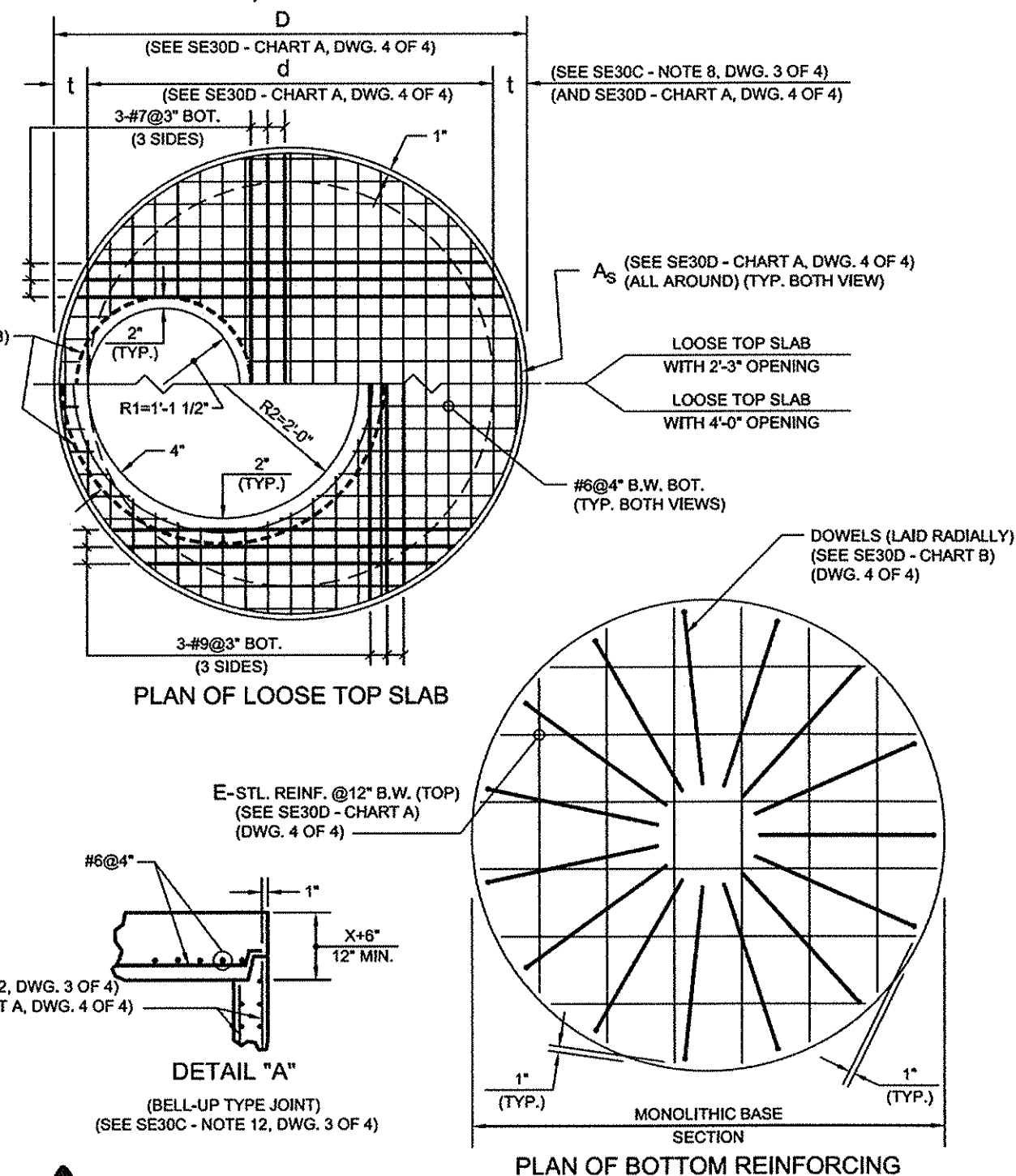
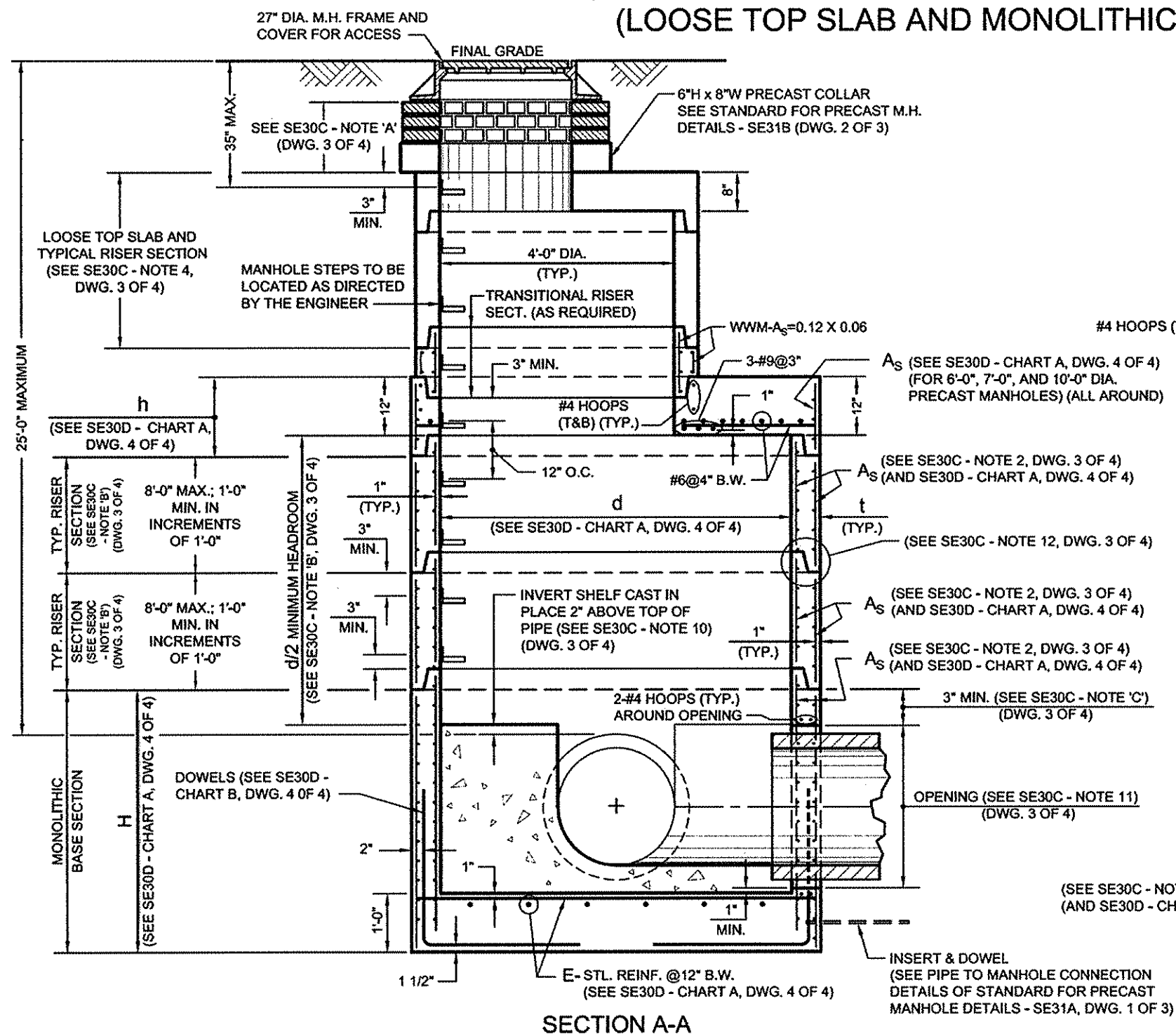
P.E.

8/14/18

DATE

STANDARD FOR PRECAST MANHOLE (DWG. 1 OF 4)

(FOR 6'-0", 7'-0", 8'-0" AND 10'-0" DIA. PRECAST MANHOLE)
(LOOSE TOP SLAB AND MONOLITHIC BASE SECTION)



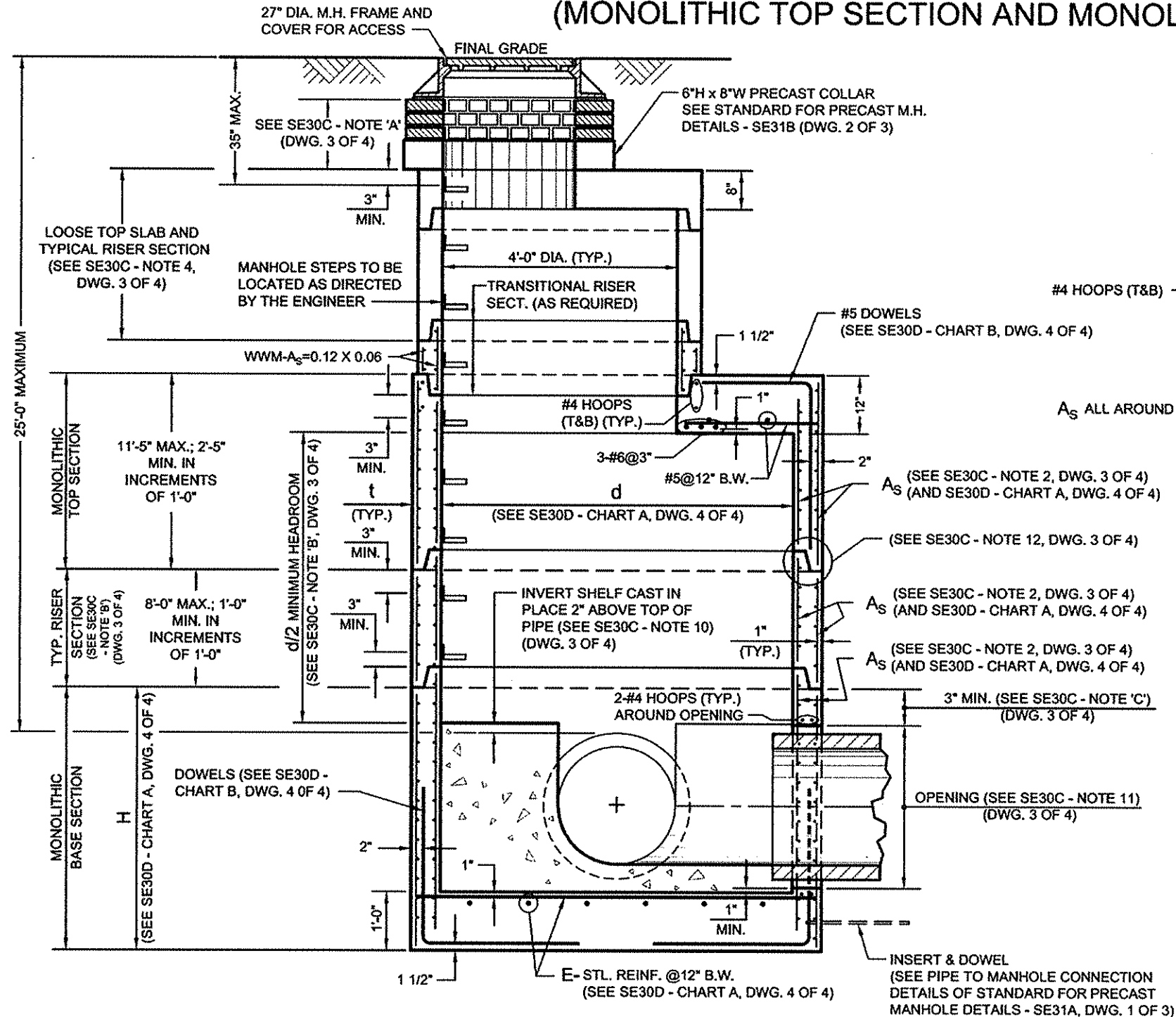
Gurdeep S. Saini
ASSOCIATE COMMISSIONER, DESIGN
DEPARTMENT OF DESIGN AND CONSTRUCTION

8/14/18
DATE

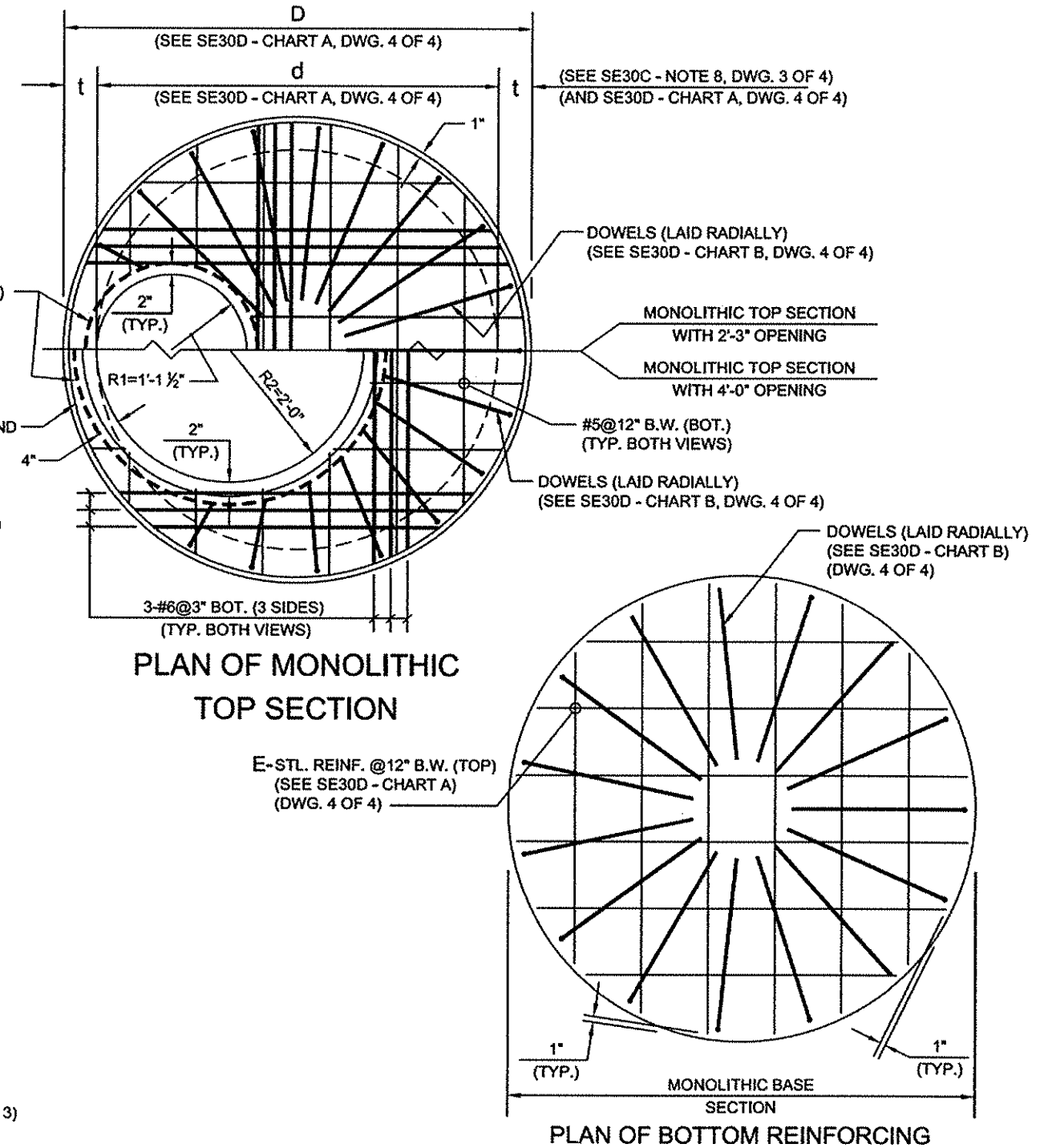
Thomas Wayne
EXECUTIVE DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION

8/14/18
DATE

STANDARD FOR PRECAST MANHOLE (DWG. 2 OF 4)

(FOR 6'-0", 7'-0", 8'-0" AND 10'-0" DIA. PRECAST MANHOLE)
(MONOLITHIC TOP SECTION AND MONOLITHIC BASE SECTION)

SECTION B-B



Gurdeep S. Saini
ASSOCIATE COMMISSIONER, DESIGN
DEPARTMENT OF DESIGN AND CONSTRUCTION

P.E.

8/14/18

DATE

Thomas Wynne
EXECUTIVE DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION

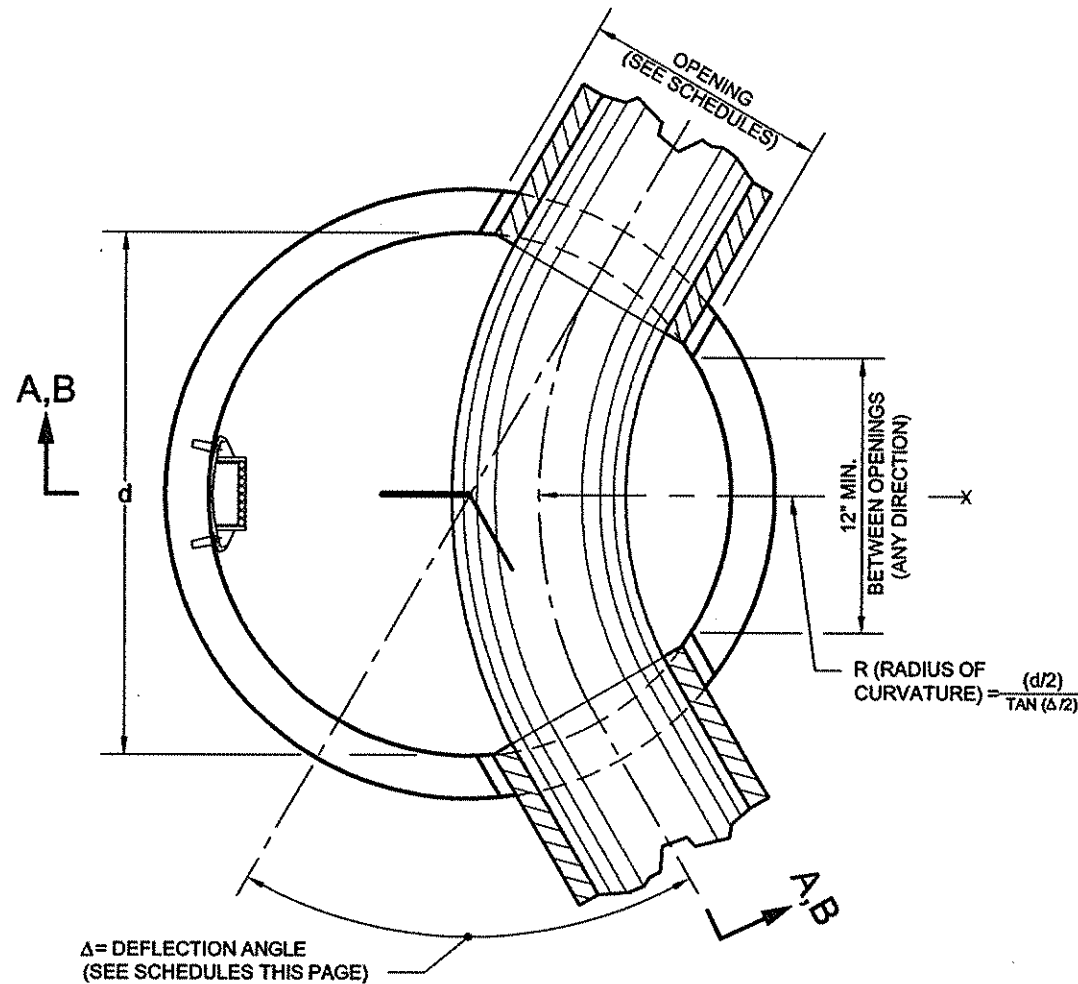
P.E.

8/14/18

DATE

CITY OF NEW YORK
DEPARTMENT OF ENVIRONMENTAL PROTECTION

STANDARD FOR PRECAST MANHOLE (DWG. 3 OF 4)

(FOR 6'-0", 7'-0", 8'-0" AND 10'-0" DIA. PRECAST MANHOLE)
(PRECAST MANHOLE MISCELLANEOUS DETAIL, NOTES AND SCHEDULES)

PLAN OF BASE SECTION

| SCHEDULE (6'-0" DIA. PRECAST MANHOLE) | | |
|--|----------|--------|
| PIPE DIA. | OPENING* | Δ MAX. |
| 18" | 26" | 106° |
| 24" | 34" | 90° |
| 30" | 42" | 77° |
| 36" | 49" | 67° |
| 42" | 56" | 58° |
| 48" | 63" | 38° |

* SEE NOTE 11

| SCHEDULE (7'-0" DIA. PRECAST MANHOLE) | | |
|--|----------|--------|
| PIPE DIA. | OPENING* | Δ MAX. |
| 18" | 26" | 114° |
| 24" | 34" | 98° |
| 30" | 42" | 86° |
| 36" | 49" | 75° |
| 42" | 56" | 67° |
| 48" | 63" | 60° |
| 54" | 71" | 48° |

* SEE NOTE 11

| SCHEDULE (8'-0" DIA. PRECAST MANHOLE) | | |
|--|----------|--------|
| PIPE DIA. | OPENING* | Δ MAX. |
| 24" | 34" | 106° |
| 30" | 42" | 93° |
| 36" | 49" | 83° |
| 42" | 56" | 74° |
| 48" | 63" | 67° |
| 54" | 71" | 61° |
| 60" | 78" | 56° |
| 66" | 85" | 41° |

* SEE NOTE 11

| SCHEDULE (10'-0" DIA. PRECAST MANHOLE) | | |
|---|----------|--------|
| PIPE DIA. | OPENING* | Δ MAX. |
| 36" | 49" | 96° |
| 42" | 56" | 87° |
| 48" | 63" | 79° |
| 54" | 71" | 73° |
| 60" | 78" | 67° |
| 66" | 85" | 62° |
| 72" | 92" | 58° |
| 78" | 99" | 54° |
| 84" | 106" | 44° |

* SEE NOTE 11

GENERAL NOTES:

- (1) THESE PRECAST MANHOLE MAY BE SUBSTITUTED FOR STANDARD MANHOLE TYPES A-1, A-2, B-1, B-2, C-1, C-2, D-1 AND D-2 ON SEWERS 84" IN DIAMETER AND LESS ONLY (AS SHOWN IN SCHEDULES).
- (2) MANHOLE RISER REINFORCING COMPLIES WITH AREA REQUIREMENTS OF ASTM C478, EXCEPT THAT ALL WALL SECTIONS SHALL BE REINFORCED WITH WWM, A_s =(SEE CHART A - DWG. 4 OF 4) E.F. WITH 2-#4 HOOPS AROUND ALL CAST PIPE OPENINGS (1-E.F.). (THE 2-#4 HOOPS WILL NOT BE REQUIRED AT CORED OPENINGS FOR BASIN CONNECTIONS.) (ALL VALUES OF AREA OF STEEL (A_s) ARE IN SQUARE INCHES AND ARE A MINIMUM.)
- (3) CORED OPENINGS WILL BE PERMITTED FOR 12" DIA. BASIN CONNECTIONS ONLY. THE MAXIMUM CORED OPENING SHALL BE 16" FOR THESE BASIN CONNECTIONS. CORED OPENING WILL NOT BE PERMITTED FOR SHALLOW MANHOLES.
- (4) FOR DETAILS OF STEPS, JOINTS, GASKETS, PRECAST COLLARS, PIPE TO MANHOLE CONNECTIONS, PILE CAP, POURED IN PLACE ALTERNATE MONOLITHIC BASE SECTIONS AND 4'-0" DIA. PRECAST MANHOLE UNITS SEE STANDARD FOR PRECAST MANHOLE DETAILS, STD. FOR M.H. STEPS, STD. FOR ALTERNATE MONOLITHIC BASE SECTIONS FOR PRECAST MANHOLES (POURED IN PLACE) AND STD. FOR 4'-0" DIA. PRECAST MANHOLE. TYPICAL 4'-0" DIA. PRECAST RISER SECTION WILL NOT BE REQUIRED FOR SHALLOW MANHOLE CONSTRUCTION.
- (5) THE MAXIMUM DEPTH OF COVER OF THE 6'-0", 7'-0", 8'-0" AND 10'-0" DIA. PRECAST MANHOLES, FROM FINAL GRADE TO THE OUTER TOP OF THE PIPE, SHALL BE TWENTY-FIVE (25) FEET.
- (6) ALL COVER DISTANCES SHOWN FOR REINFORCEMENT ARE CLEAR DISTANCES.
- (7) LIFTING HOLES SHALL BE LOCATED IN THE SECTIONS AS PER MANUFACTURER'S RECOMMENDATIONS AND GROUTED PRIOR TO BACKFILLING.
- (8) THE VALUES OF THE WALL AND SLAB THICKNESSES ARE A MINIMUM.
- (9) CONCRETE DESIGN MIX = 5,000 PSI (MIN. 28 DAY STRENGTH = 4,000 PSI; MAX. W/C = 0.47). REBARS - F_s = 60,000 PSI. WWM - F_s = 65,000 PSI.
- (10) INVERT SHELVES SHALL HAVE A 1/2" PER LINEAR FOOT PITCH TOWARDS THE SEWER.
- (11) THE OPENING DIAMETERS SHOWN IN THE SCHEDULE ARE MAXIMUM VALUES. THE MINIMUM OPENING DIAMETERS SHALL BE AS FOLLOWS: 8" TO 24" DIA. PIPES = O.D.+3"; 30" TO 48" DIA. PIPES = O.D.+4" AND 54" TO 84" DIA. PIPES = O.D.+5".
- (12) BELL-UP TYPE JOINTS SHALL BE ALLOWED FOR 6'-0", 7'-0", 8'-0" AND 10'-0" DIA. PRECAST MANHOLE, WITH THE FOLLOWING MODIFICATION TO THE LOOSE TOP SLAB: (A) THE MINIMUM SLAB THICKNESS SHALL BE X+6" (WHERE 'X' IS JOINT DEPTH), BUT IN NO CASE SHALL IT BE LESS THAN 12" THICK AND (B) THE EMBEDMENT LENGTH SHALL BE t-1" (WHERE 't' IS THE THICKNESS OF RISER WALL); SEE DETAIL "A" ON DWG. 1 OF 4.

Sandeep S. Saini
ASSOCIATE COMMISSIONER, DESIGN
DEPARTMENT OF DESIGN AND CONSTRUCTION

P.E.

8/14/18
DATE

Thomas Wynne
EXECUTIVE DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION

P.E.

8/14/18
DATE

CITY OF NEW YORK
DEPARTMENT OF ENVIRONMENTAL PROTECTION

STANDARD FOR PRECAST MANHOLE (DWG. 4 OF 4)
(FOR 6'-0", 7'-0", 8'-0" AND 10'-0" DIA. PRECAST MANHOLES)

CHART A

| d | D | t | H | As | E | h |
|--------|---------|-----|-------------------------|-------------|----|------------|
| | | | MONOLITHIC BASE SECTION | | | |
| 6'-0" | 7'-2" | 7" | 11'-6" MAX.; 3'-5" MIN. | 0.18 X 0.09 | #4 | 15" TO 18" |
| 7'-0" | 8'-4" | 8" | 11'-6" MAX.; 3'-5" MIN. | 0.21 X 0.10 | #4 | 15" TO 18" |
| 8'-0" | 9'-6" | 9" | 11'-6" MAX.; 4'-1" MIN. | 0.24 X 0.12 | #5 | 15" TO 20" |
| 10'-0" | 11'-10" | 11" | 11'-6" MAX.; 5'-4" MIN. | 0.30 X 0.15 | #6 | 15" TO 20" |

CHART B

| d | DOWELS IN MONOLITHIC TOP SECTION | | DOWELS IN MONOLITHIC BASE SECTION |
|--------|---|---|---|
| | 2'-3" OPENING | 4'-0" OPENING | |
| 6'-0" | 19-#5 DOWELS @12" O.C. (17@23"V x 32"H) (2@23"V x 10"H) | 15-#5 DOWELS @12" O.C. (3@23"V x 25"H); (4@23"V x 23"H) (2@23"V x 20"H); (2@23"V x 17"H) (2@23"V x 13"H); (2@23"V x 9"H) | 15-#5 DOWELS @17" O.C. (32"V x 32"H) |
| 7'-0" | 23-#5 DOWELS @12" O.C. (21@23"V x 38"H) (2@23"V x 10"H) | 19-#5 DOWELS @12" O.C. (5@23"V x 38"H); (4@23"V x 35"H) (2@23"V x 31"H); (2@23"V x 28"H) (2@23"V x 23"H); (2@23"V x 17"H) (2@23"V x 12"H) | 20-#6 DOWELS @15" O.C. (38"V x 38"H) |
| 8'-0" | 27-#6 DOWELS @12" O.C. (25@23"V x 40"H) (2@23"V x 10"H) | 23-#6 DOWELS @12" O.C. (15@23"V x 40"H); (2@23"V x 35"H) (2@23"V x 28"H); (2@23"V x 20"H) (2@23"V x 14"H) | 25-#6 DOWELS @13 3/4" O.C. (40"V x 40"H) |
| 10'-0" | 33-#7 DOWELS @12" O.C. (33@23"V x 46"H) | 31-#7 DOWELS @12" O.C. (25@23"V x 46"H); (2@23"V x 40"H) (2@23"V x 25"H); (2@23"V x 16"H) | 34-#7 DOWELS @12 3/4" O.C. (46"V x 46"H) |

Gurdeep S. Saini

P.E.

8/14/18

DATE

Thomas Wynne

P.E.

8/14/18

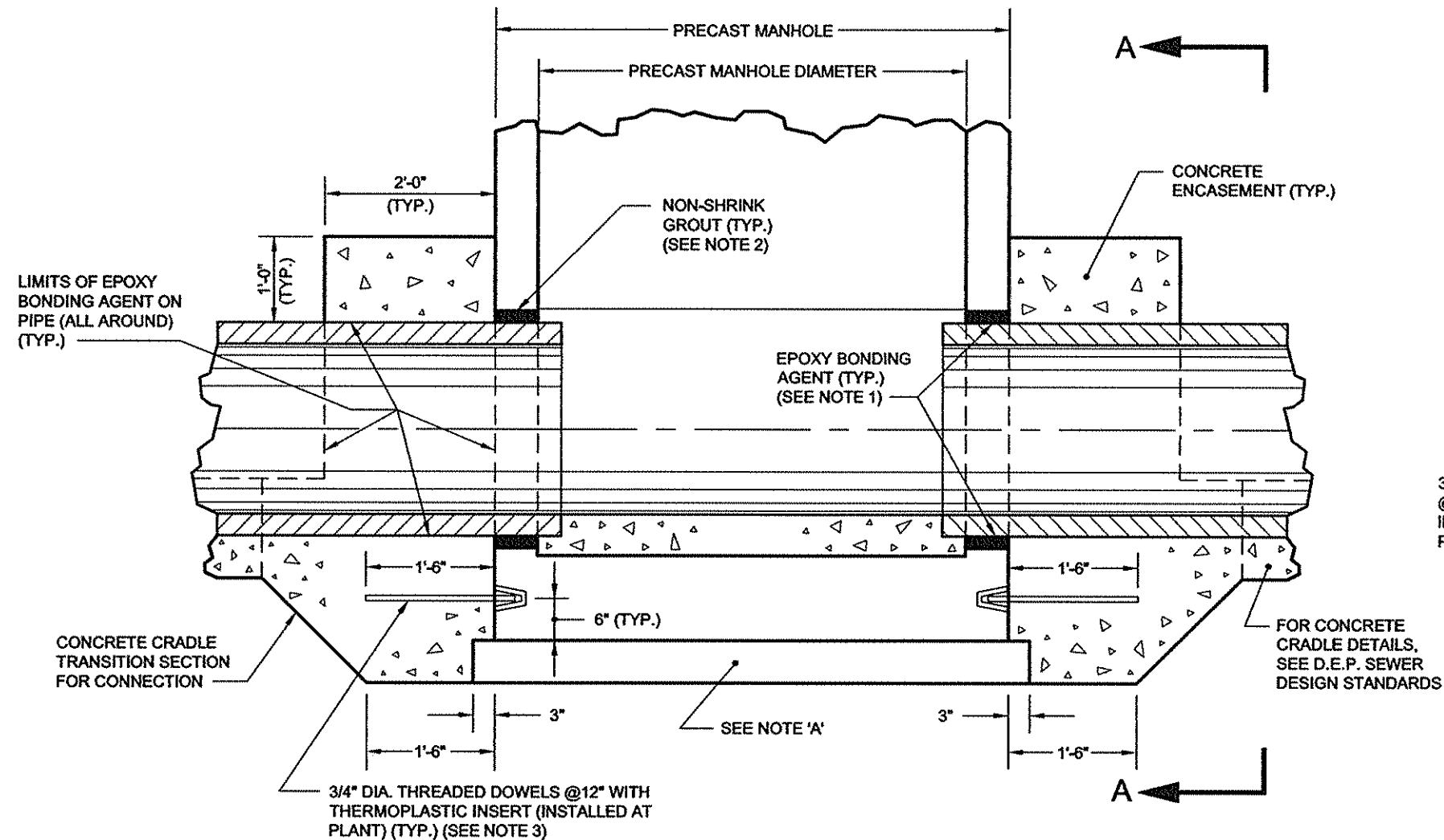
DATE

ASSOCIATE COMMISSIONER, DESIGN
DEPARTMENT OF DESIGN AND CONSTRUCTION

EXECUTIVE DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION

STANDARD FOR PRECAST MANHOLE DETAILS (DWG. 1 OF 3)

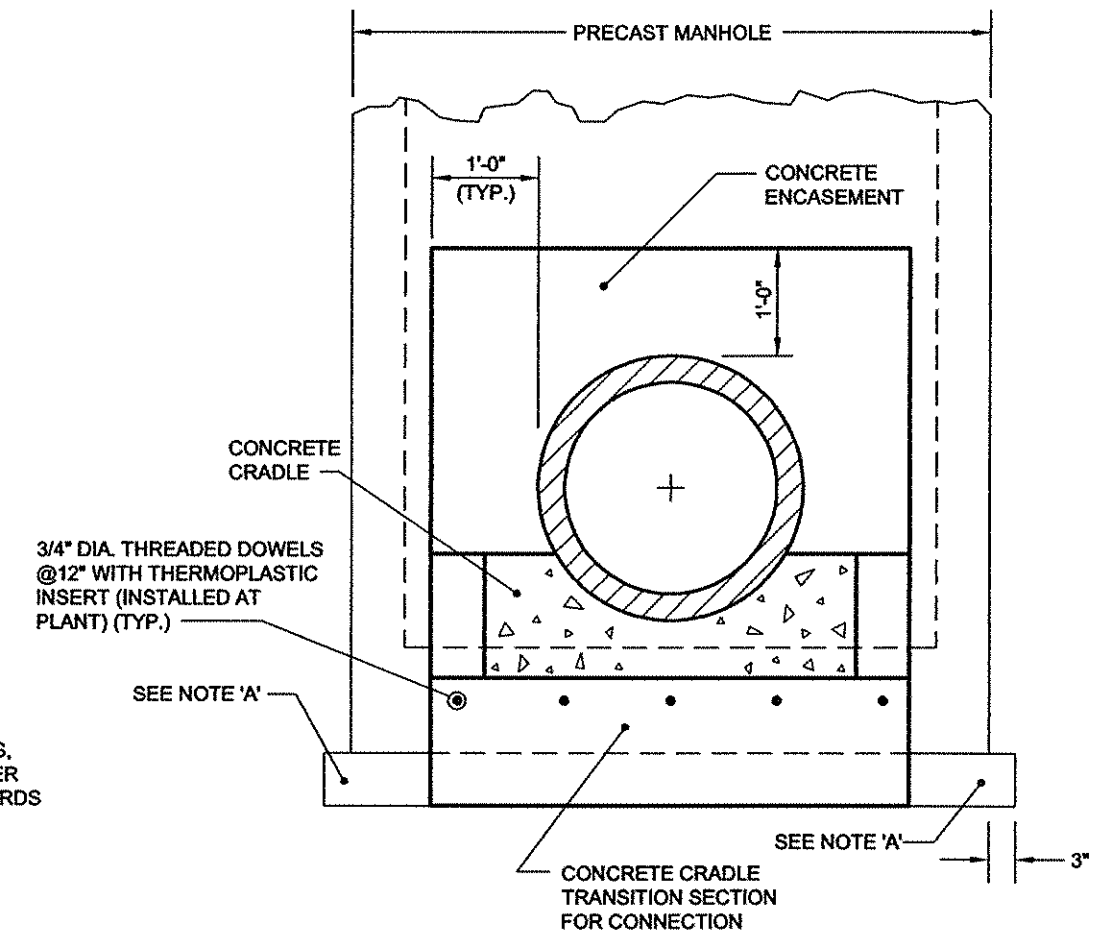
(PIPE TO MANHOLE CONNECTION DETAILS)



SECTIONAL PROFILE

NOTE 'A':

LEVELING PAD AND/OR PILE CAP - FOR MH'S ON GRADE, USE 6" WELL COMPACTED STONE BALLAST. FOR MH'S ON PILES, USE A CLASS 40 REINFORCED CONCRETE PILE CAP AS SHOWN ON THE STANDARD FOR PRECAST MANHOLE DETAILS DWG. 3 OF 3. IN EACH CASE, THE SHAPE SHALL BE SQUARE AND 3" LARGER THAN THE O.D. OF THE STRUCTURE, UNLESS OTHERWISE SPECIFIED.



SECTION A-A

GENERAL NOTES:

- (1) EPOXY BONDING AGENT TO BE ROCKWELL 'C' AS MANUFACTURED BY PRECO CHEMICAL CO. OR EQUAL.
- (2) NON-SHRINK GROUT TO BE SIKA-SET MORTAR AS MANUFACTURED BY SIKA CO. OR EQUAL.
- (3) THERMOPLASTIC INSERT AS MANUFACTURED BY PENNSYLVANIA INSERT CORP. OR EQUAL.

Sandeep S. Saini
P.E.

ASSOCIATE COMMISSIONER, DESIGN
DEPARTMENT OF DESIGN AND CONSTRUCTION

8/14/18

DATE

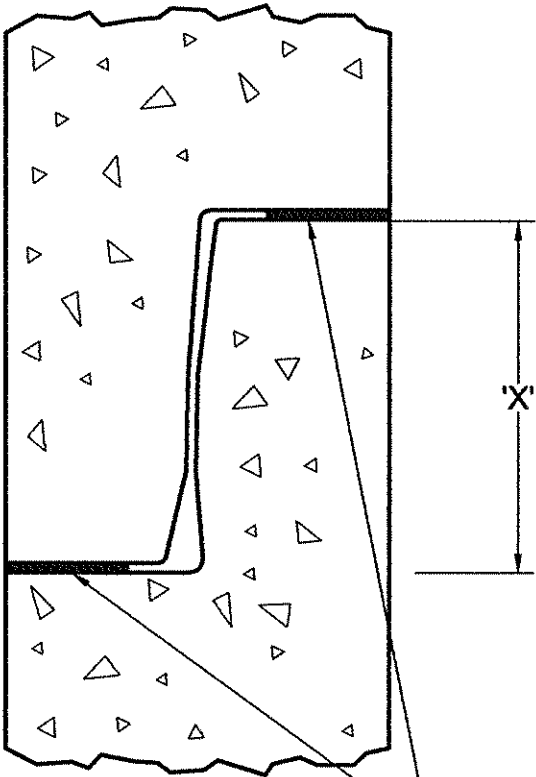
Thomas Wynne
P.E.

EXECUTIVE DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION

8/14/18

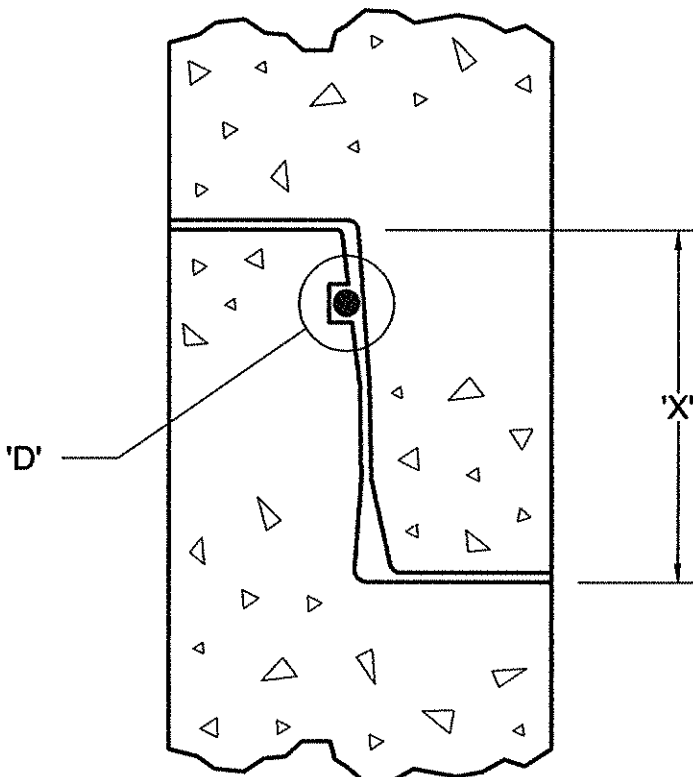
DATE

STANDARD FOR PRECAST MANHOLE DETAILS (DWG. 2 OF 3)
(JOINTS, GASKETS AND PRECAST COLLAR DETAILS)

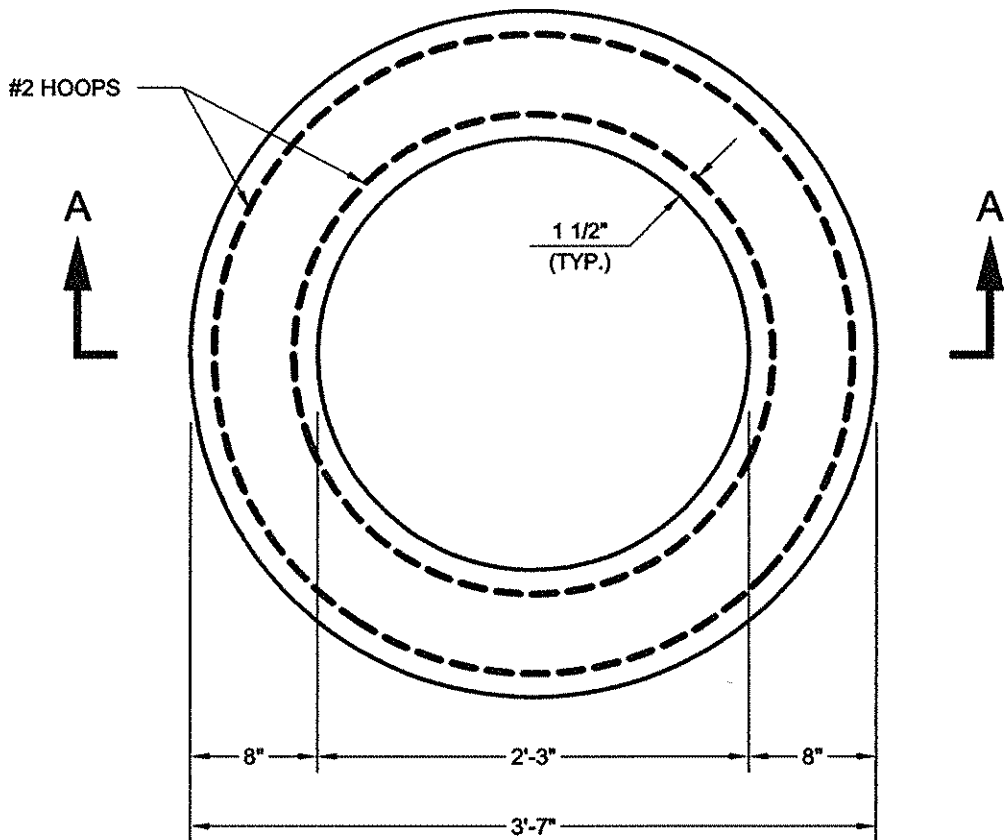


BUTYL JOINT

7/8" X 7/8" OR 1" DIA. SELF SEALING BUTYL GASKET.
QUALITY EQUAL TO FEDERAL SPEC. #SS-S-00210.

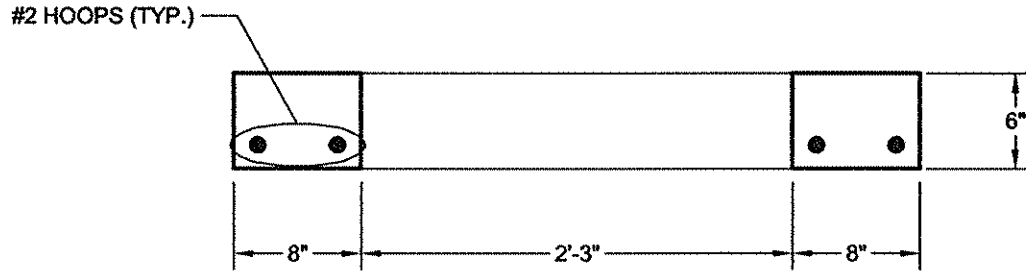


'O' RING JOINT



PLAN OF 6"H X 8"W PRECAST COLLAR

| JOINT DETAILS | | |
|---------------------|----------|-----------|
| M.H. I.D. | 'X' | 'D' |
| 4'-0" | 3" TO 5" | 5/8" DIA. |
| 5'-0" | 3" TO 5" | 3/4" DIA. |
| 6'-0" AND 7'-0" | 3" TO 6" | 3/4" DIA. |
| 8'-0" AND 10'-0" | 3" TO 8" | 3/4" DIA. |



SECTION A-A

Sandeep S. Saini
P.E.

ASSOCIATE COMMISSIONER, DESIGN
DEPARTMENT OF DESIGN AND CONSTRUCTION

8/14/18

DATE

Thomas Wayne
P.E.

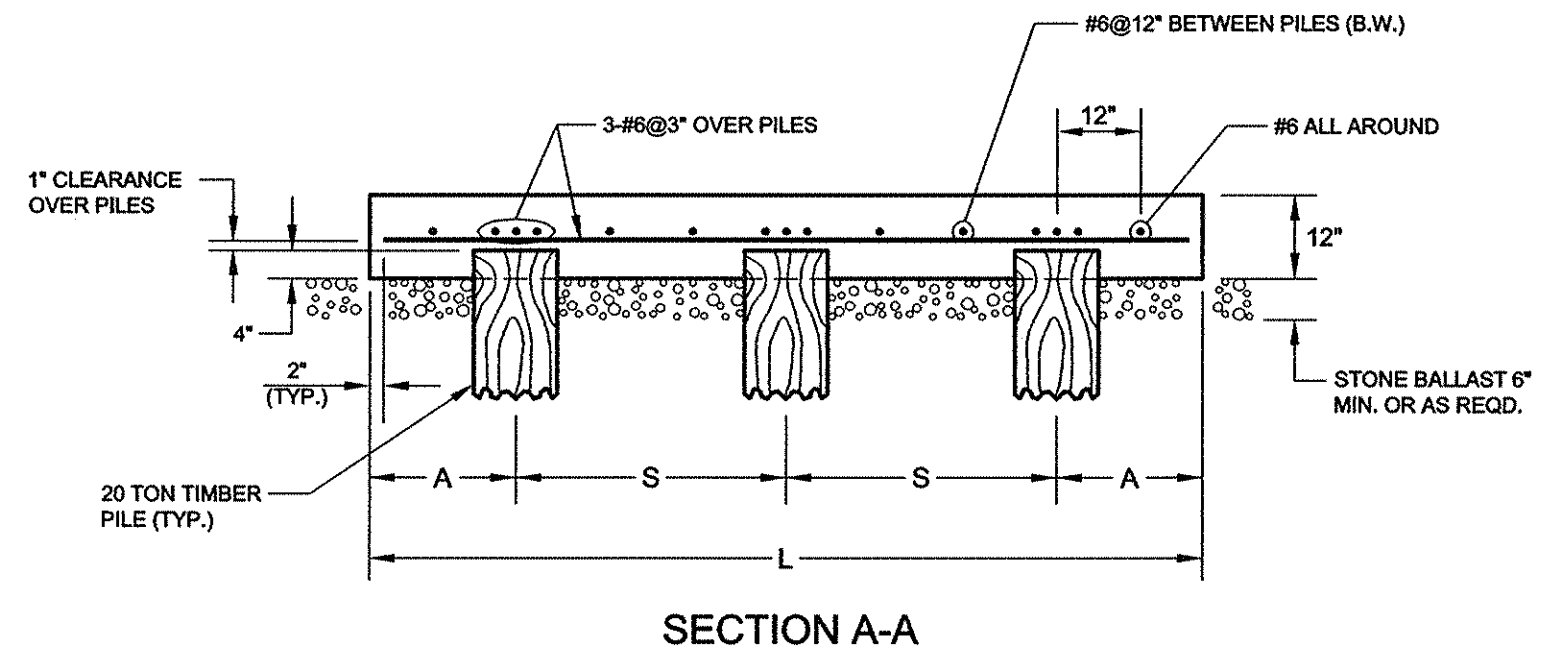
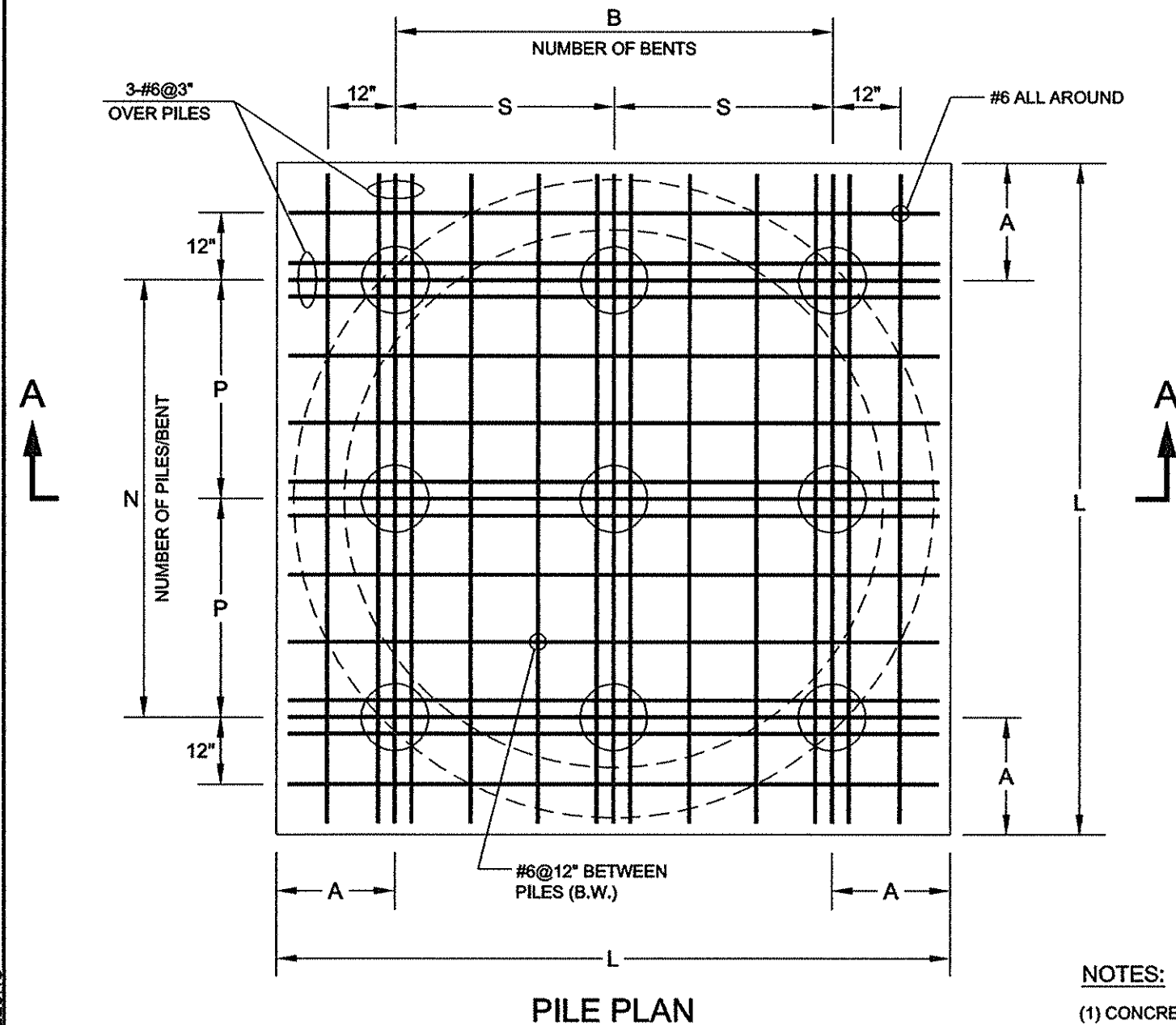
EXECUTIVE DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION

8/14/18

DATE

STANDARD FOR PRECAST MANHOLE DETAILS (DWG. 3 OF 3)

(PRECAST MANHOLE PILE CAP DETAILS)



| M.H. DIA. | L | A | N/B | P/S |
|-----------|--------|-----|-----|--------|
| 4'-0" | 5'-4" | 15" | 2 | 2'-10" |
| 5'-0" | 6'-6" | 16" | 2 | 3'-10" |
| 6'-0" | 7'-8" | 17" | 3 | 2'-5" |
| 7'-0" | 8'-10" | 20" | 3 | 2'-9" |
| 8'-0" | 10'-0" | 21" | 3 | 3'-3" |
| 10'-0" | 12'-4" | 23" | 4 | 2'-10" |

NOTES:

- (1) CONCRETE SHALL BE CLASS 40. STEEL REINFORCEMENT BARS SHALL BE GRADE 60.
- (2) COST FOR ALL LABOR, MATERIAL, ETC. REQUIRED FOR THE PLACEMENT OF PILE CAP(S) SHALL BE MADE UNDER THE FOLLOWING CONTRACT ITEMS:
 - (A) ADDITIONAL EARTH EXCAVATION INCLUDING TEST PITS
 - (B) ADDITIONAL CONCRETE
 - (C) ADDITIONAL STEEL REINFORCING BARS
 - (D) STONE BALLAST

Sandeep S. Saini
ASSOCIATE COMMISSIONER, DESIGN
DEPARTMENT OF DESIGN AND CONSTRUCTION

P.E.

8/14/18
DATE

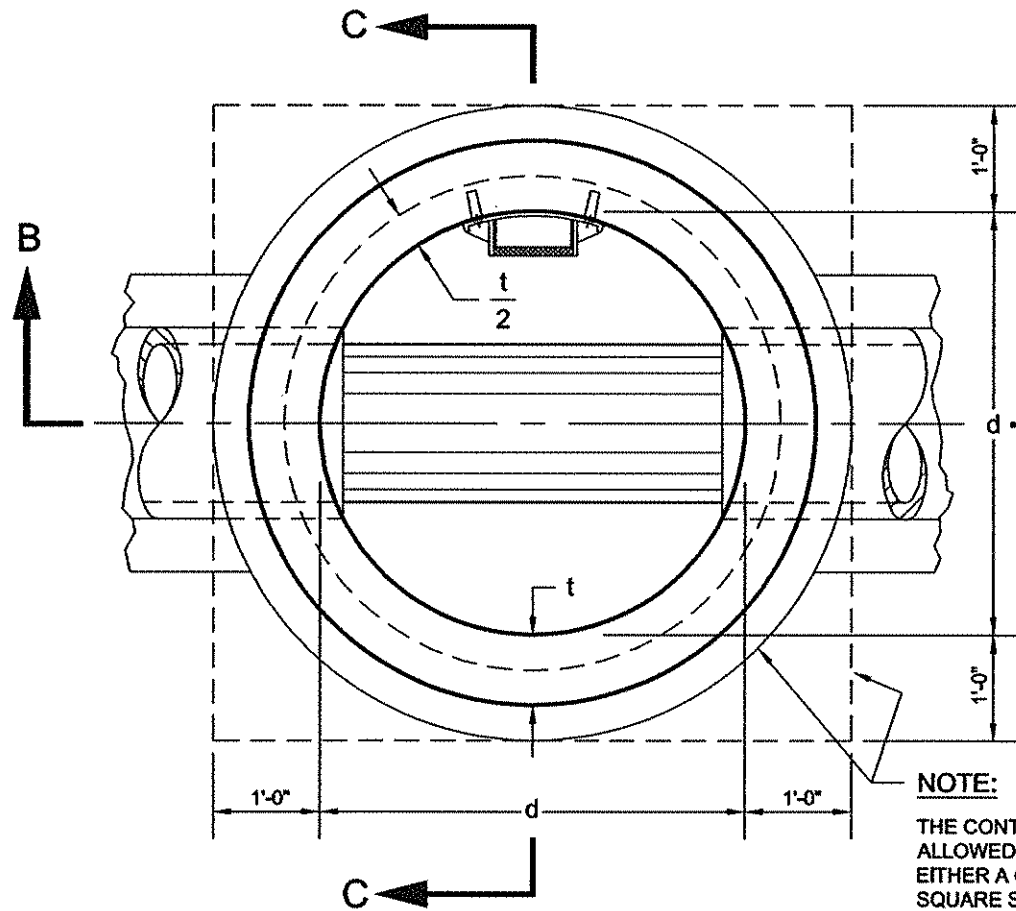
Thomas Wynne
EXECUTIVE DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION

P.E.

8/14/18
DATE

STANDARD FOR ALTERNATE MONOLITHIC BASE SECTION FOR PRECAST MANHOLES (POURED IN PLACE)

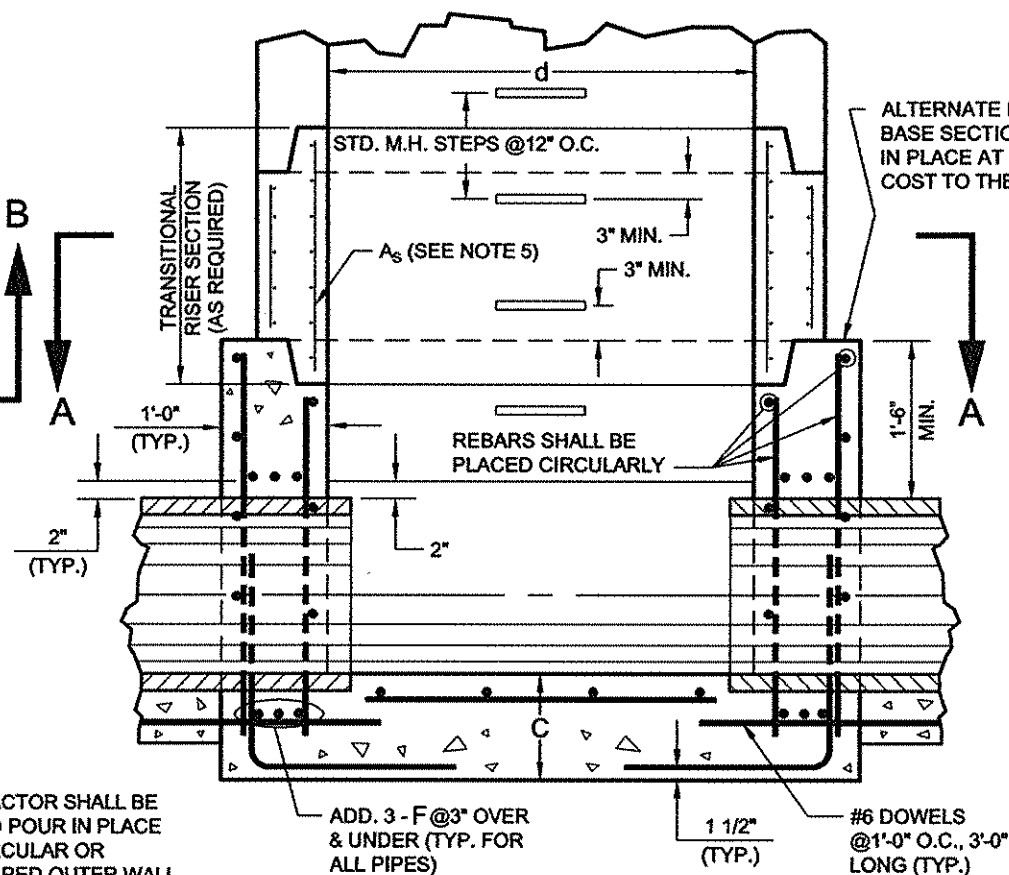
(FOR 4'-0", 5'-0", 6'-0", 7'-0", 8'-0" AND 10'-0" DIA. PRECAST MANHOLES)



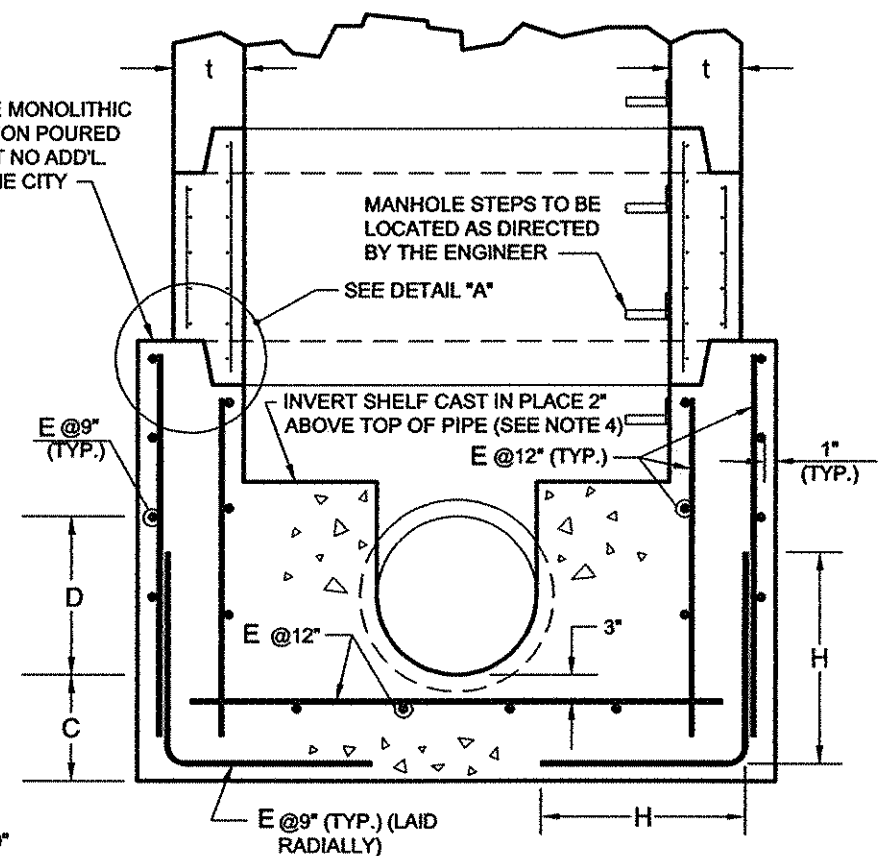
SECTION A-A

NOTE:

THE CONTRACTOR SHALL BE ALLOWED TO POUR IN PLACE EITHER A CIRCULAR OR SQUARE SHAPED OUTER WALL FOR THE ALTERNATE MONOLITHIC BASE SECTION.



SECTION B-B



SECTION C-C

NOTES:

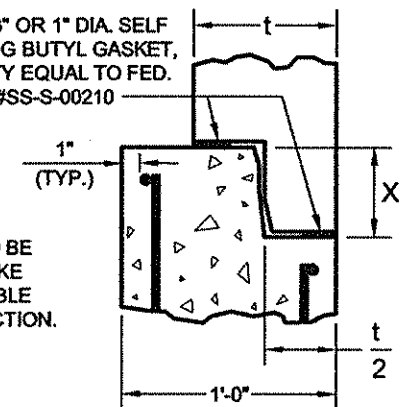
- (1) ALL STEEL REINFORCEMENT SHALL BE AS SHOWN. COVER DISTANCES SHOWN ARE CLEAR DISTANCES.
- (2) FOR ALTERNATE MONOLITHIC BASE SECTION ON PILES SEE PRECAST MANHOLE PILE CAP DETAILS OF STANDARD FOR PRECAST MANHOLE DETAILS DWG. 3 OF 3. ALL PILE CAP DIMENSIONS SHALL REMAIN THE SAME, WITH THE EXCEPTIONS OF DIMENSION "L" WHICH SHALL BE EQUAL TO THE DIMENSION OF THE ALTERNATE MONOLITHIC BASE SECTION AND DIMENSION "A" WHICH SHALL BE ADJUSTED ACCORDINGLY.
- (3) CONCRETE SHALL BE CLASS 40. STEEL REINFORCEMENT BARS SHALL BE GRADE 60.
- (4) INVERT SHELVES SHALL HAVE A 1/2" PER LINEAR FOOT PITCH TOWARDS THE SEWER.
- (5) TRANSITIONAL RISER SECTION SHALL CONFORM TO ALL REQUIREMENTS OF THE STANDARDS FOR PRECAST MANHOLES.

| d | t | X | C | E | F | H | A _s |
|--------|-----|----------|---------|----|----|-------|----------------|
| 4'-0" | 5" | 3" TO 5" | 12" | #4 | #6 | 2'-0" | 0.12 X 0.06 |
| 5'-0" | 6" | 3" TO 5" | 12" | #4 | #6 | 2'-3" | 0.15 X 0.07 |
| 6'-0" | 7" | 3" TO 6" | 14" | #4 | #6 | 2'-6" | 0.18 X 0.09 |
| 7'-0" | 8" | 3" TO 6" | 15 1/2" | #5 | #6 | 2'-9" | 0.21 X 0.10 |
| 8'-0" | 9" | 3" TO 8" | 18 1/2" | #5 | #8 | 3'-0" | 0.24 X 0.12 |
| 10'-0" | 11" | 3" TO 8" | 23" | #5 | #8 | 3'-6" | 0.30 X 0.15 |

7/8"x7/8" OR 1" DIA. SELF SEALING BUTYL GASKET, QUALITY EQUAL TO FED. SPEC. #SS-S-00210

NOTE:

STEEL FORM TO BE UTILIZED TO MAKE JOINT COMPATIBLE WITH RISER SECTION.



DETAIL "A"

Gurdeep S. Saini
ASSOCIATE COMMISSIONER, DESIGN
DEPARTMENT OF DESIGN AND CONSTRUCTION

P.E.

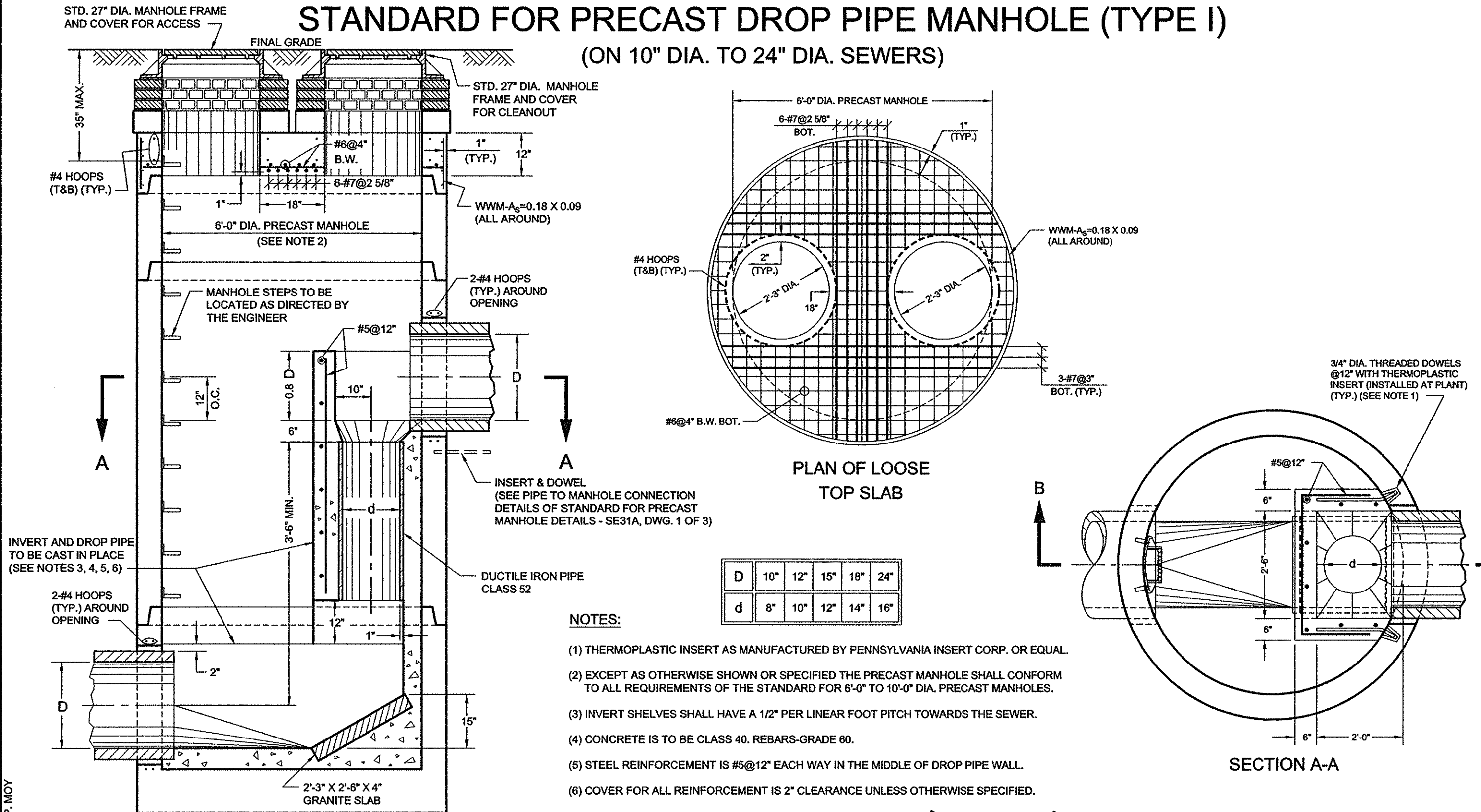
8/14/18
DATE

Thomas Wynne
EXECUTIVE DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION

P.E.

8/14/18
DATE

STANDARD FOR PRECAST DROP PIPE MANHOLE (TYPE I) (ON 10" DIA. TO 24" DIA. SEWERS)



SECTION B-B

Gurdeep S. Saini
ASSOCIATE COMMISSIONER, DESIGN
DEPARTMENT OF DESIGN AND CONSTRUCTION

P.E.

8/14/18

DATE

Thomas Wynne
EXECUTIVE DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION

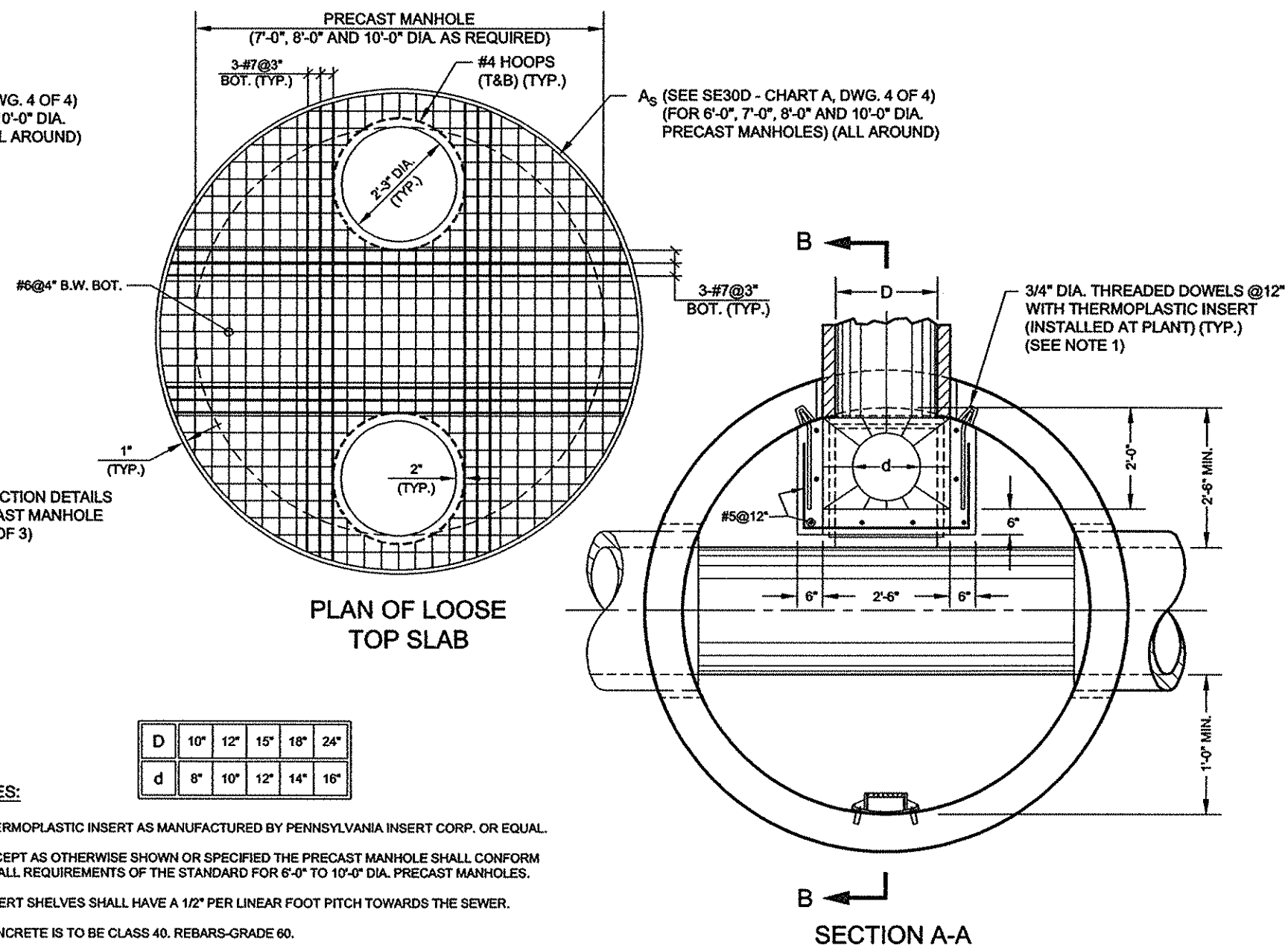
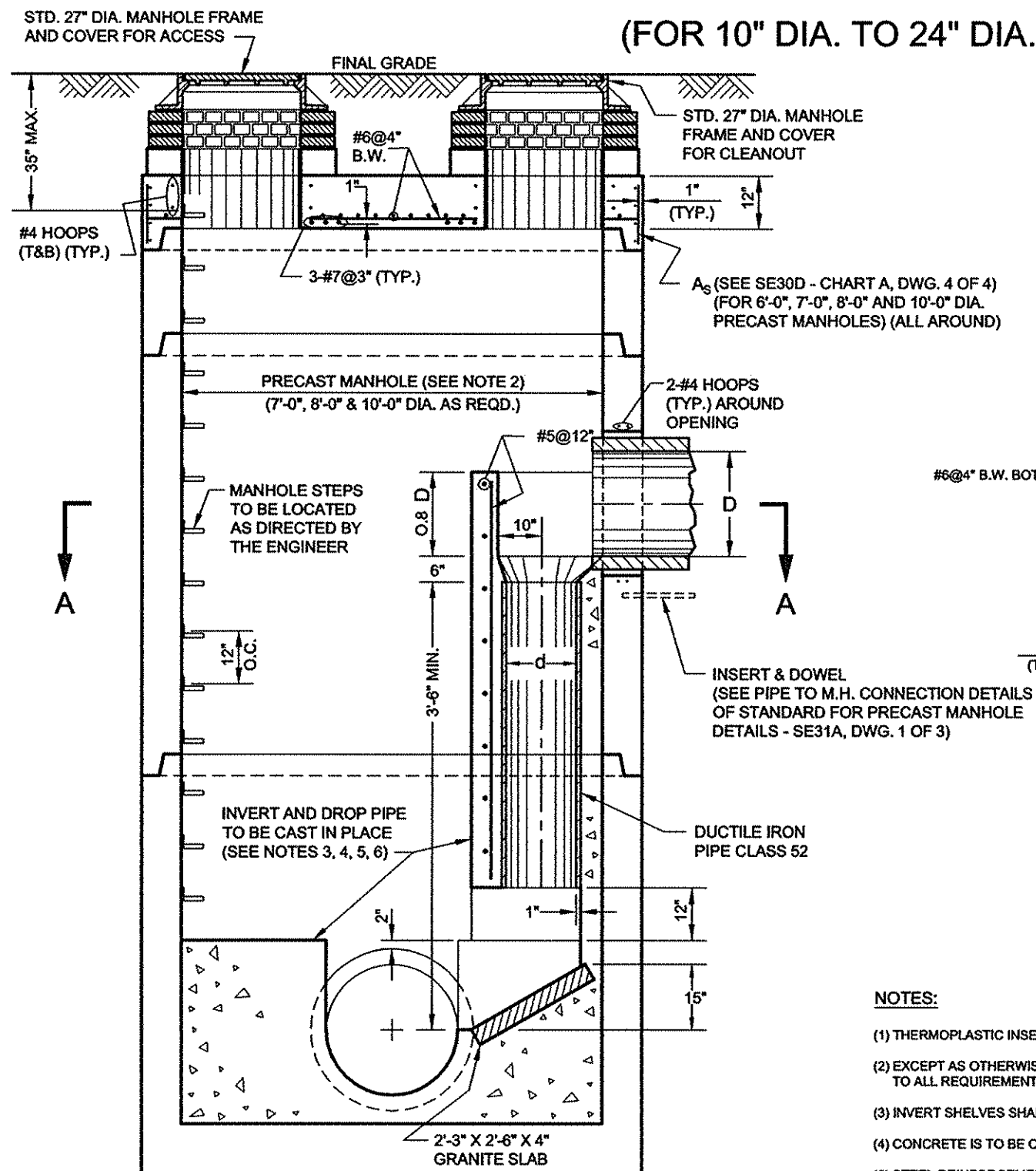
P.E.

8/14/18

DATE

STANDARD FOR PRECAST DROP PIPE MANHOLE (TYPE II)

(FOR 10" DIA. TO 24" DIA. INCOMING DROP PIPE SEWERS)



| | | | | | |
|---|-----|-----|-----|-----|-----|
| D | 10" | 12" | 15" | 18" | 24" |
| d | 8" | 10" | 12" | 14" | 16" |

NOTES:

- (1) THERMOPLASTIC INSERT AS MANUFACTURED BY PENNSYLVANIA INSERT CORP. OR EQUAL.
- (2) EXCEPT AS OTHERWISE SHOWN OR SPECIFIED THE PRECAST MANHOLE SHALL CONFORM TO ALL REQUIREMENTS OF THE STANDARD FOR 6'-0" TO 10'-0" DIA. PRECAST MANHOLES.
- (3) INVERT SHELVES SHALL HAVE A 1/2" PER LINEAR FOOT PITCH TOWARDS THE SEWER.
- (4) CONCRETE IS TO BE CLASS 40. REBARS- GRADE 60.
- (5) STEEL REINFORCEMENT IS #5@12" EACH WAY IN THE MIDDLE OF DROP PIPE WALL.
- (6) COVER FOR ALL REINFORCEMENT IS 2" CLEARANCE UNLESS OTHERWISE SPECIFIED.

SECTION B-B

Sandeep S. Saini
ASSOCIATE COMMISSIONER, DESIGN
DEPARTMENT OF DESIGN AND CONSTRUCTION

P. 2.

8/14/18
DATE

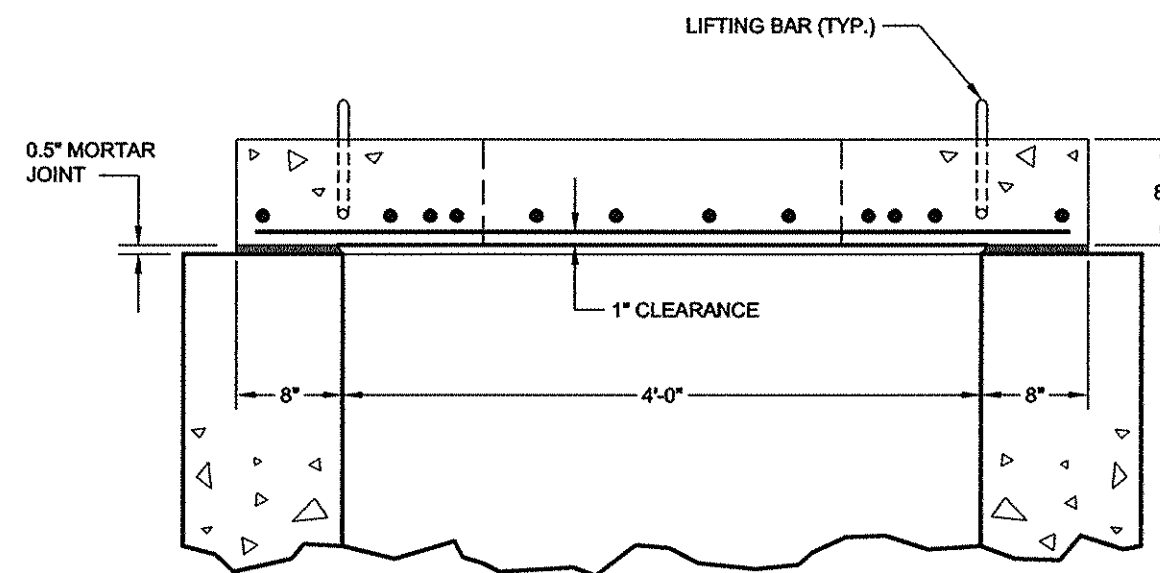
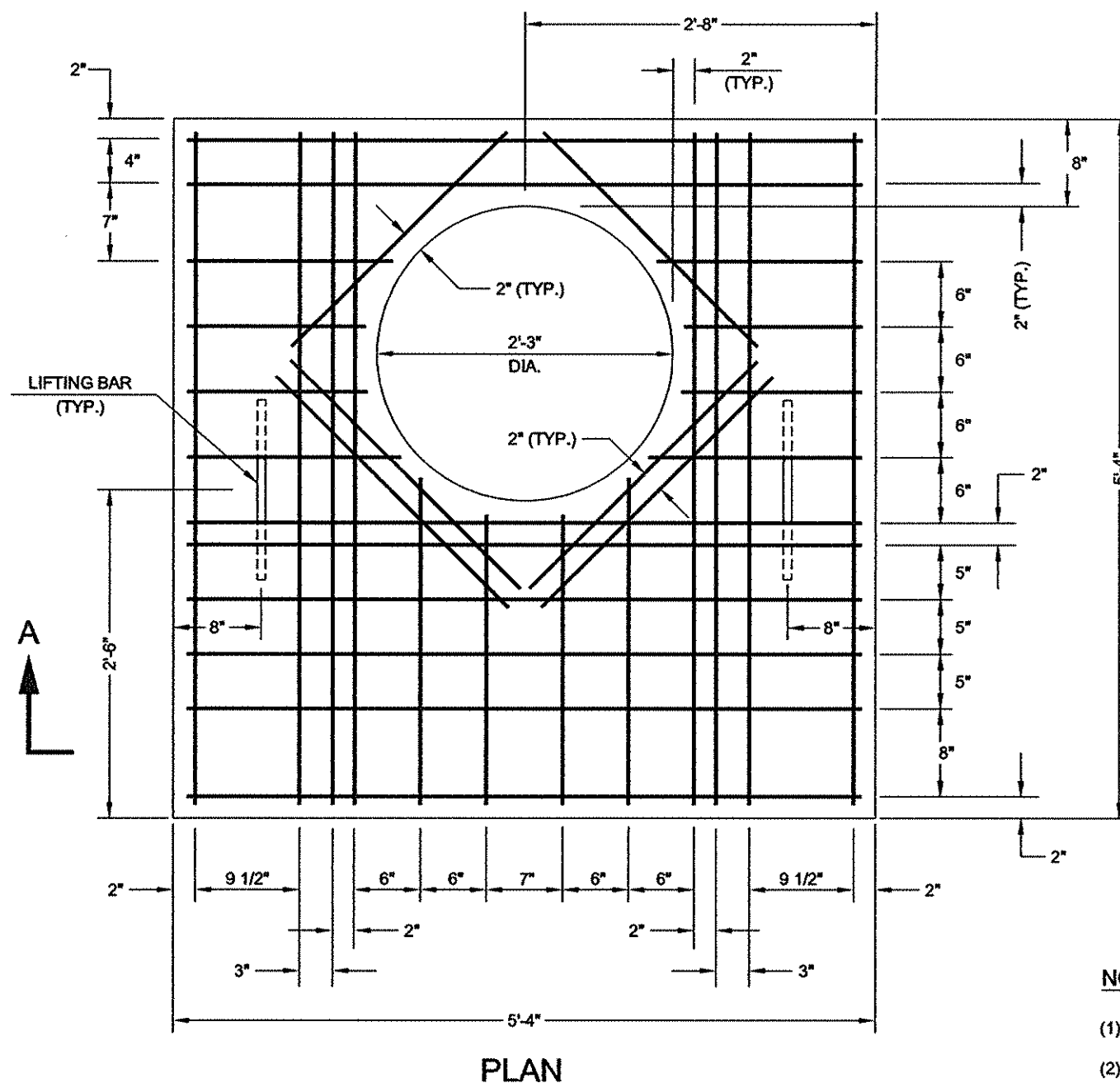
Thomas Wynne
EXECUTIVE DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION

P.E

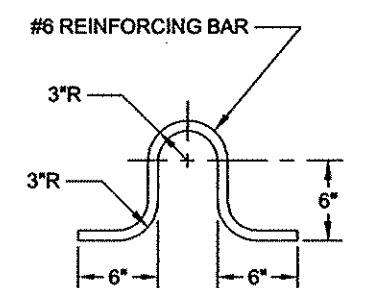
8/14/18
DATE

DATE _____

STANDARD FOR REMOVABLE PRECAST REINFORCED CONCRETE SLAB



SECTION A-A



LIFTING BAR DETAIL

NOTES:

- (1) ALL STEEL REINFORCEMENT ARE #6 BARS.
- (2) CONCRETE IS TO BE CLASS 40. REBARS-GRADE 60.

Sandeep S. Saini

P.E.

ASSOCIATE COMMISSIONER, DESIGN
DEPARTMENT OF DESIGN AND CONSTRUCTION

8/14/18

DATE _____

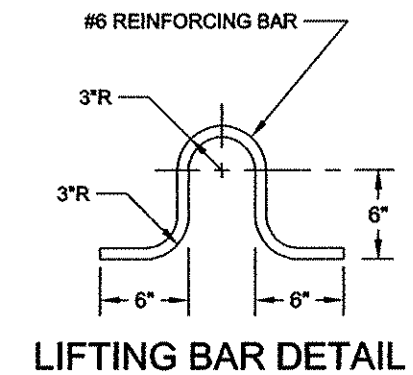
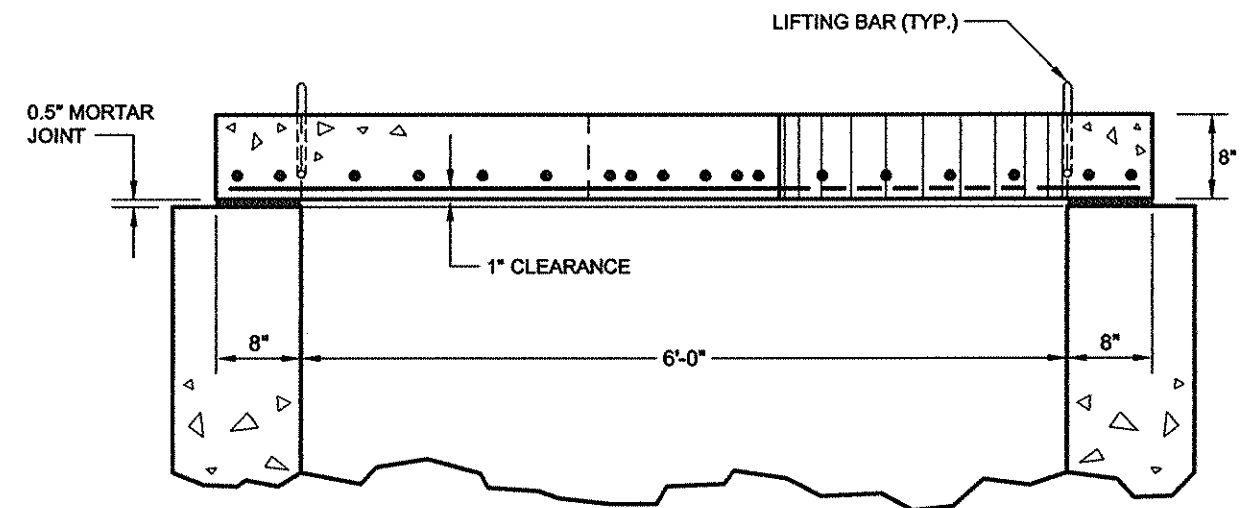
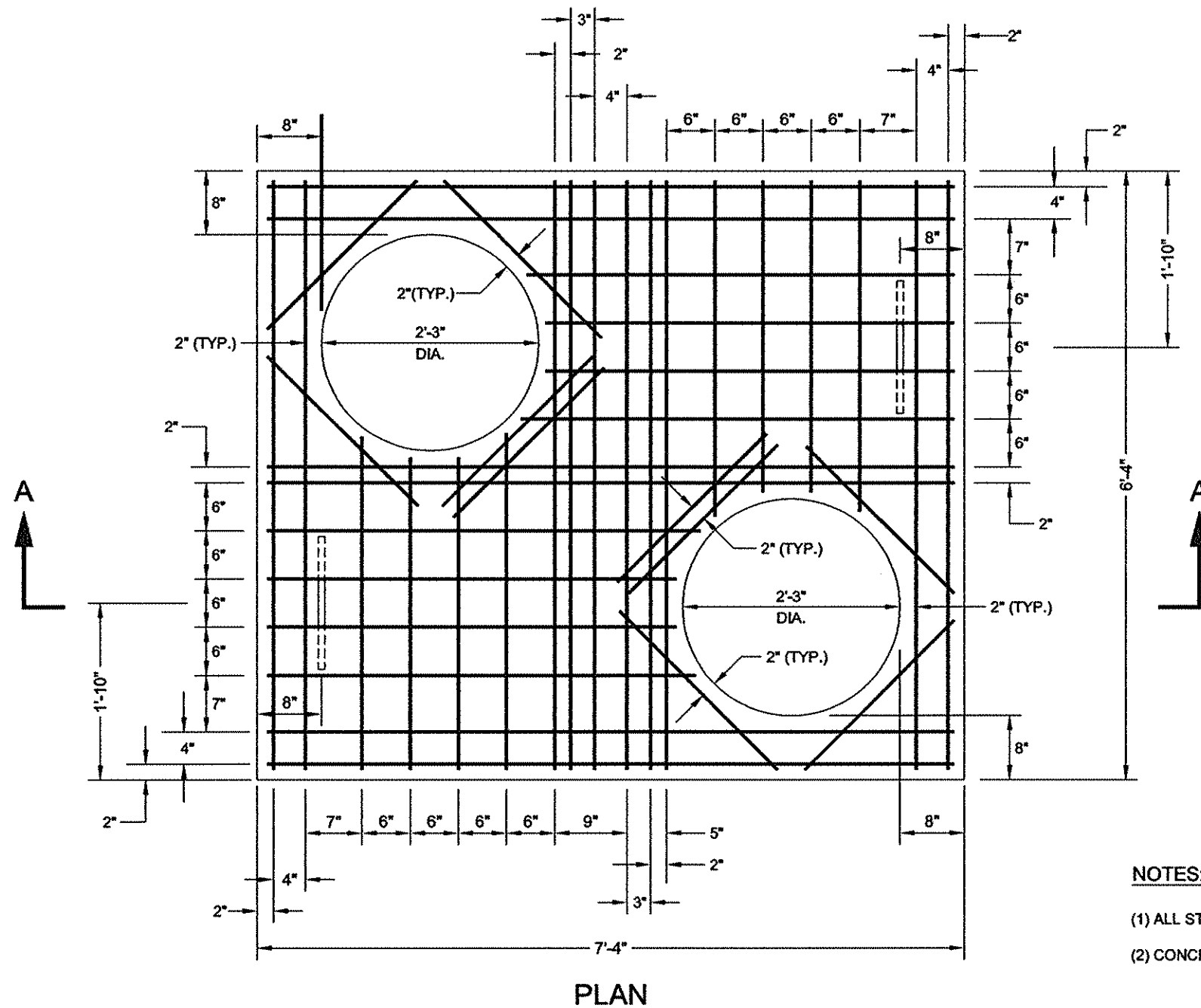
Thomas Wynne

P.E.

EXECUTIVE DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION

8/14/18

DATE _____

STANDARD FOR REMOVABLE PRECAST REINFORCED
CONCRETE SLAB FOR DROP PIPE MANHOLE (TYPE I)

NOTES:

- (1) ALL STEEL REINFORCEMENT ARE #6 BARS.
- (2) CONCRETE IS TO BE CLASS 40. REBARS-GRADE 60.

Gurdeep S. Sarin

P.E.

ASSOCIATE COMMISSIONER, DESIGN
DEPARTMENT OF DESIGN AND CONSTRUCTION

8/14/18

DATE

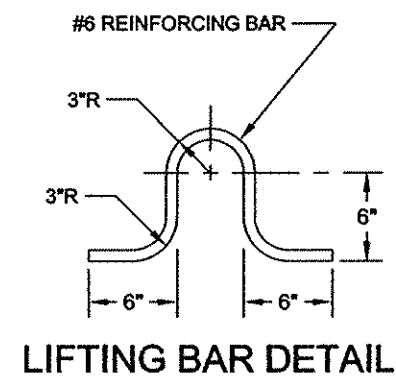
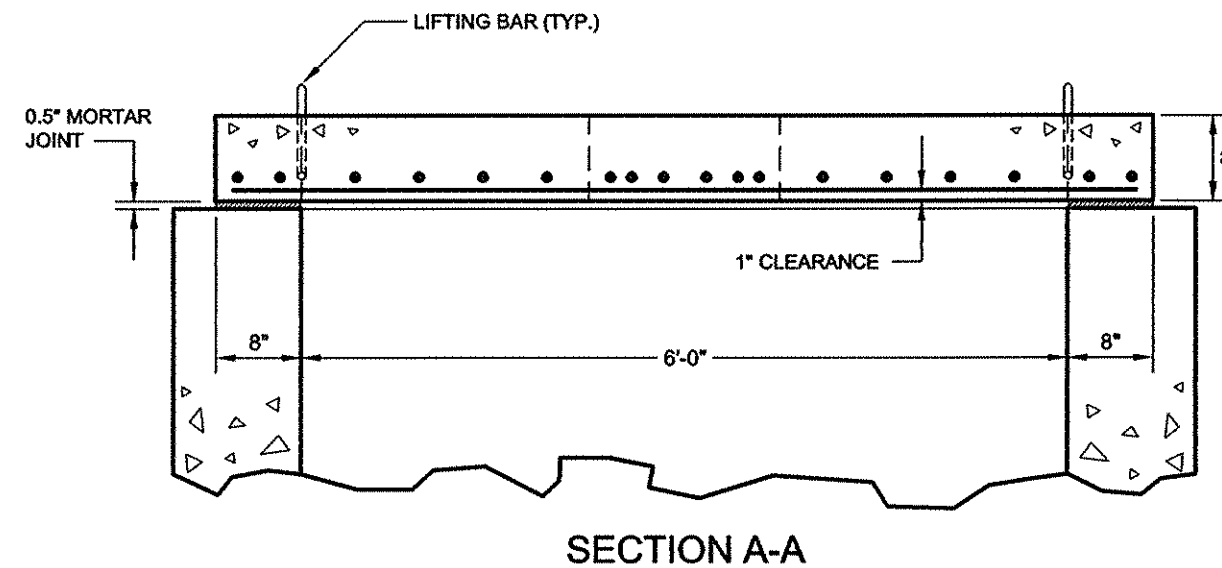
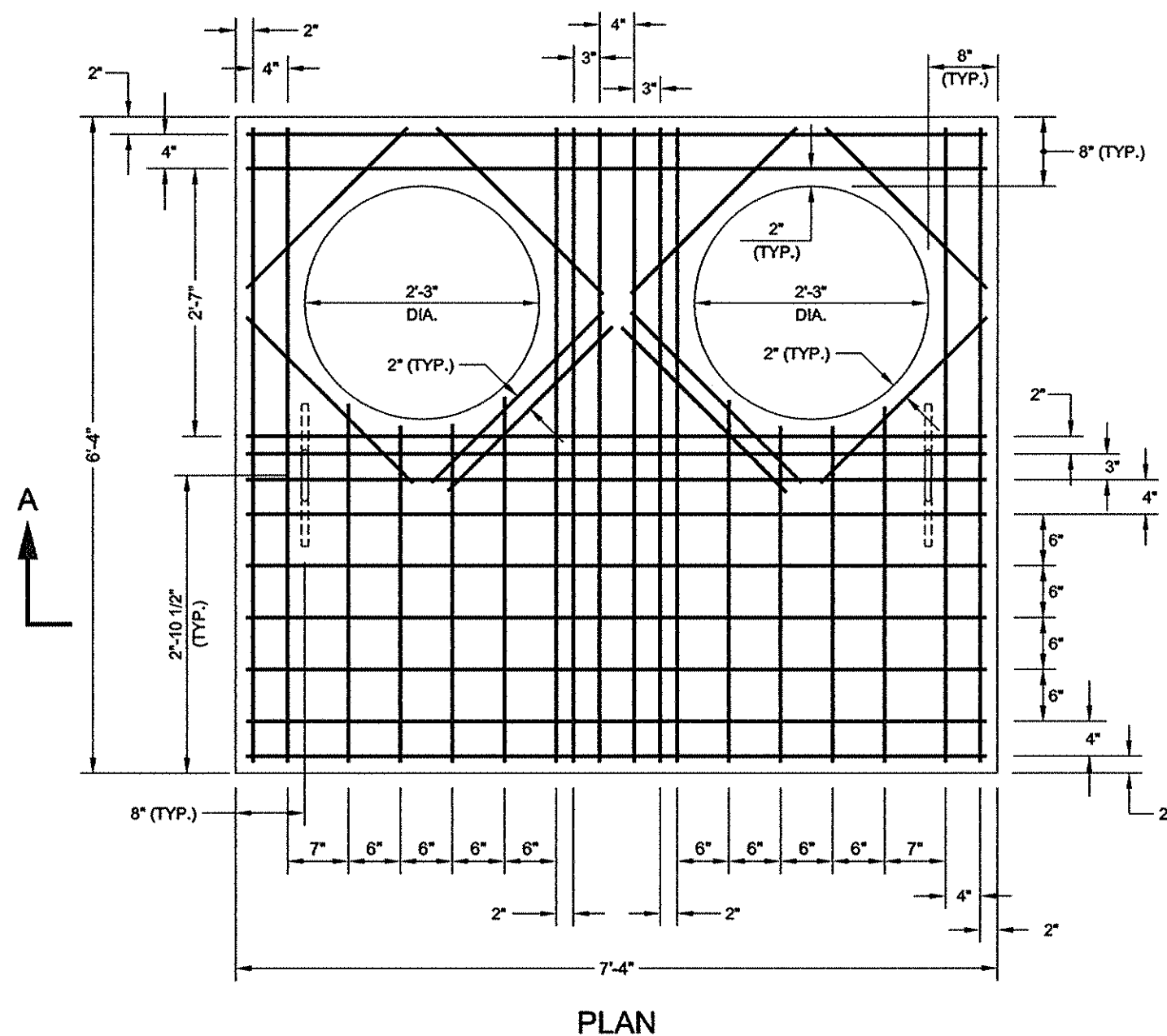
Thomas Wynne

P.E.

EXECUTIVE DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION

8/14/18

DATE

STANDARD FOR REMOVABLE PRECAST REINFORCED
CONCRETE SLAB FOR DROP PIPE MANHOLE (TYPE II)

NOTES:

- (1) ALL STEEL REINFORCEMENT ARE #6 BARS.
- (2) CONCRETE IS TO BE CLASS 40. REBARS-GRADE 60.

Gurdeep S. Saini
P.E.
ASSOCIATE COMMISSIONER, DESIGN
DEPARTMENT OF DESIGN AND CONSTRUCTION

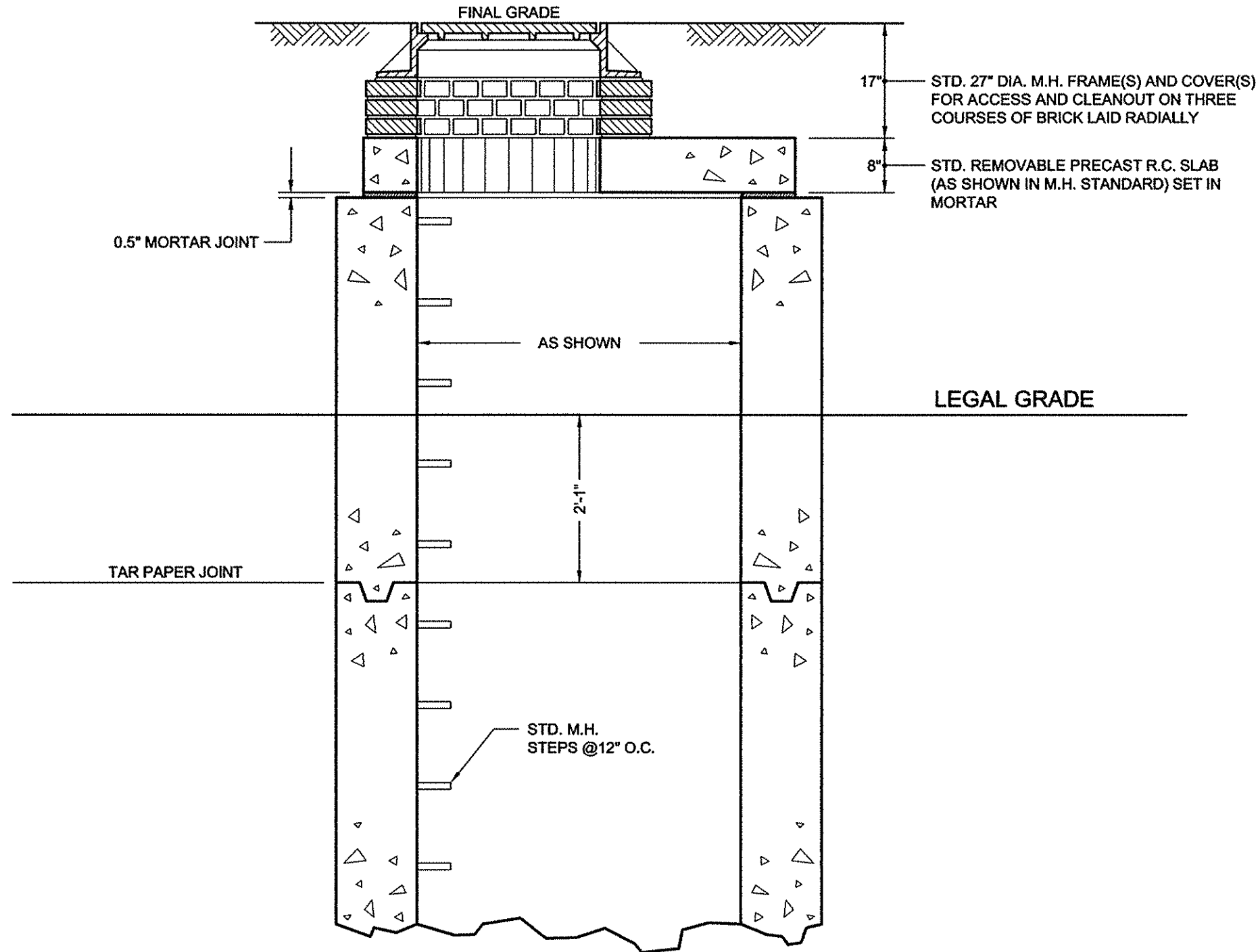
8/14/18
DATE

Thomas Wynne
P.E.
EXECUTIVE DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION

8/14/18
DATE

CITY OF NEW YORK
DEPARTMENT OF ENVIRONMENTAL PROTECTION

STANDARD FOR MANHOLE CHIMNEY DETAIL
(WHEN LEGAL GRADE IS BELOW FINAL GRADE)



STANDARD SQUARE MANHOLE CHIMNEY

Sundip S. Saini

P.E.

ASSOCIATE COMMISSIONER, DESIGN
DEPARTMENT OF DESIGN AND CONSTRUCTION

8/14/18

DATE

Thomas Wayne

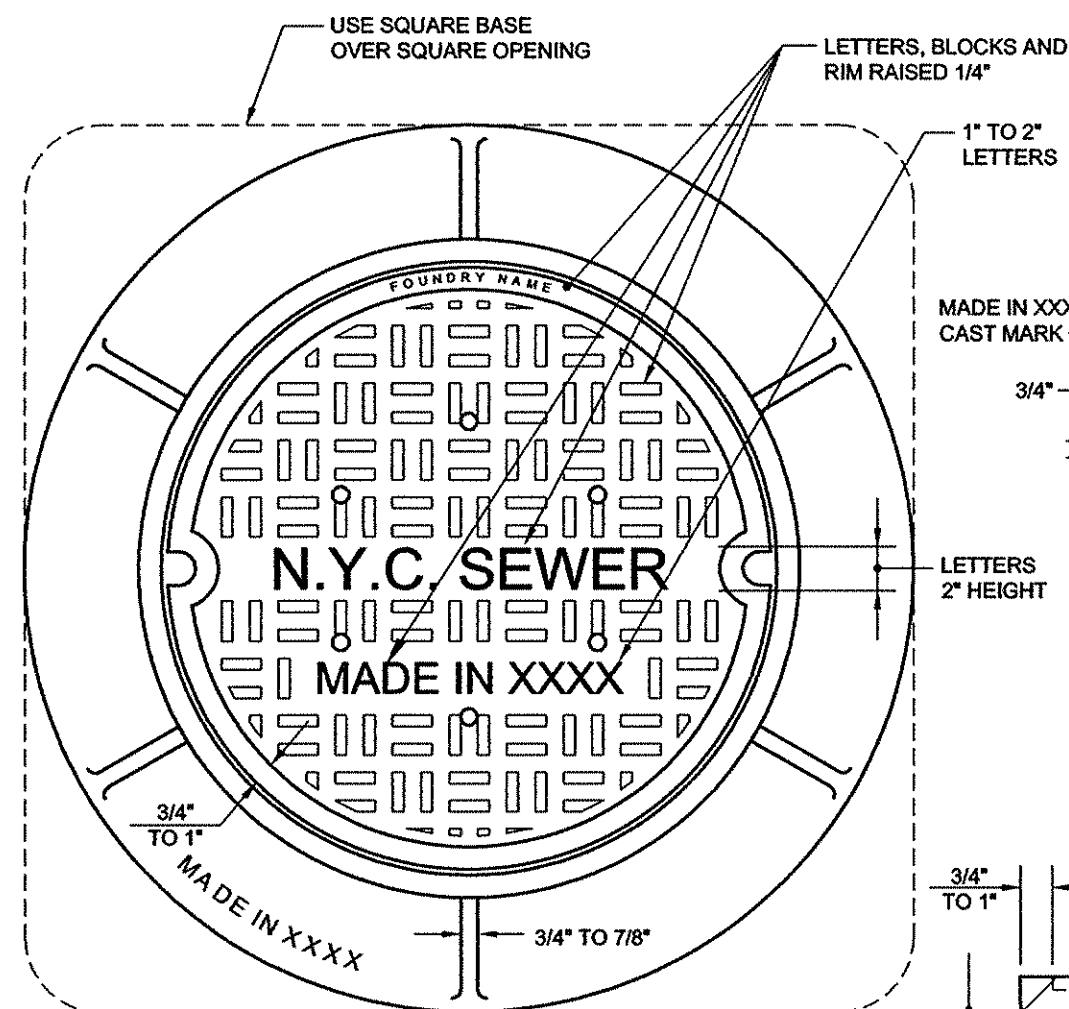
P.E.

EXECUTIVE DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION

8/14/18

DATE

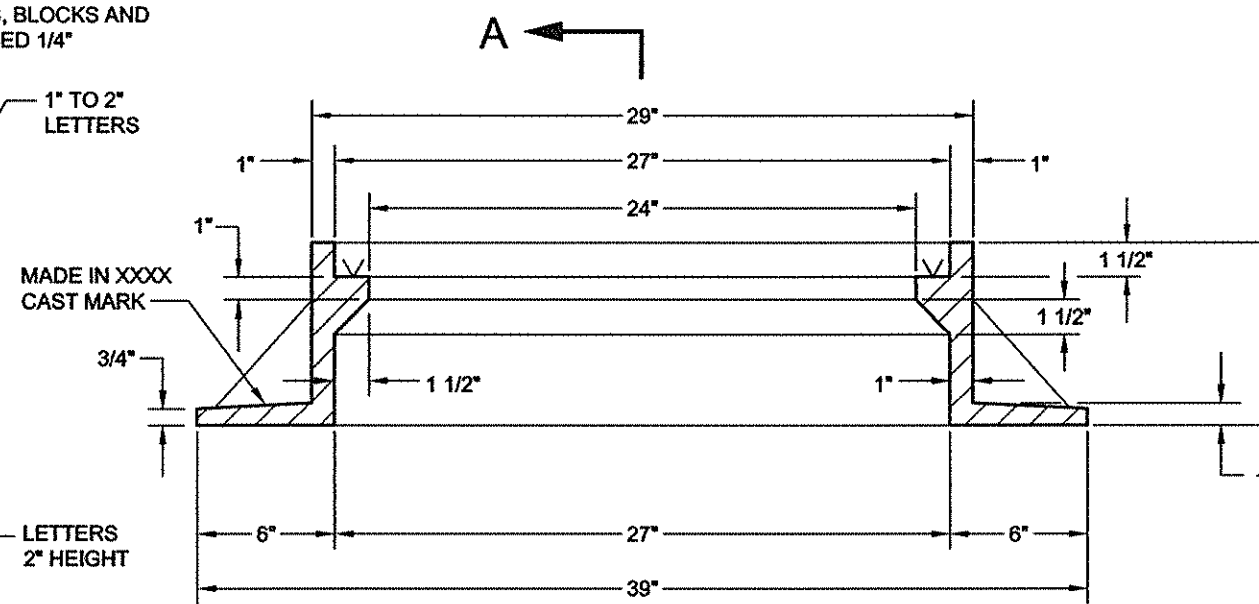
STANDARD FOR 27" DIAMETER CAST IRON MANHOLE FRAME AND COVER (FOR ACCESS OR CLEANOUT)



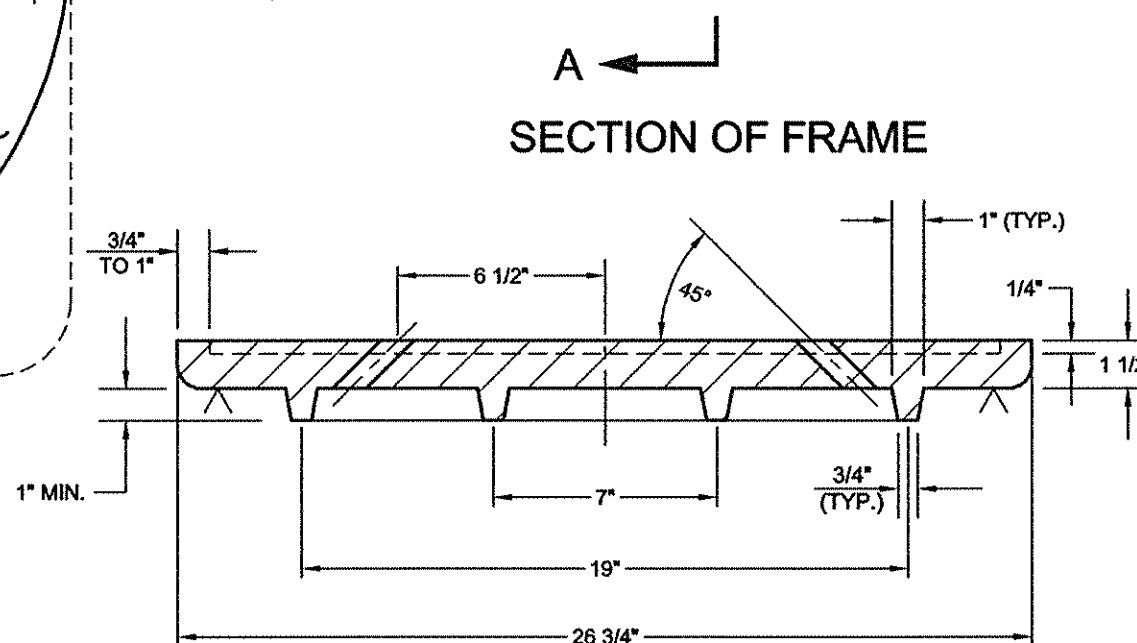
PLAN VIEW OF FRAME AND COVER

NOTES:

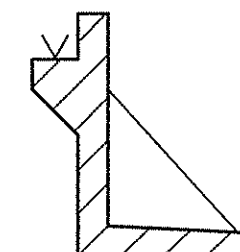
- (1) FRAME MATERIAL: GRAY CAST IRON ASTM A-48 CLASS 35B.
MINIMUM WEIGHT OF FRAME IS 345 LBS.
- (2) COVER MATERIAL: GRAY CAST IRON ASTM A-48 CLASS 35B.
MINIMUM WEIGHT OF COVER IS 195 LBS.
- (3) DESIGN LOADING: HS20-44 HIGHWAY LOADING.
- (4) ALL MANHOLE FRAMES & COVERS SHALL HAVE THE MANUFACTURER'S IDENTIFICATION, CAST DATE OR HEAT NUMBER AND COUNTRY OF ORIGIN INTEGRALLY CAST ON INDIVIDUAL PIECES AT THE TIME OF MANUFACTURE IN ACCORDANCE WITH THE DEP SPECIFICATION.



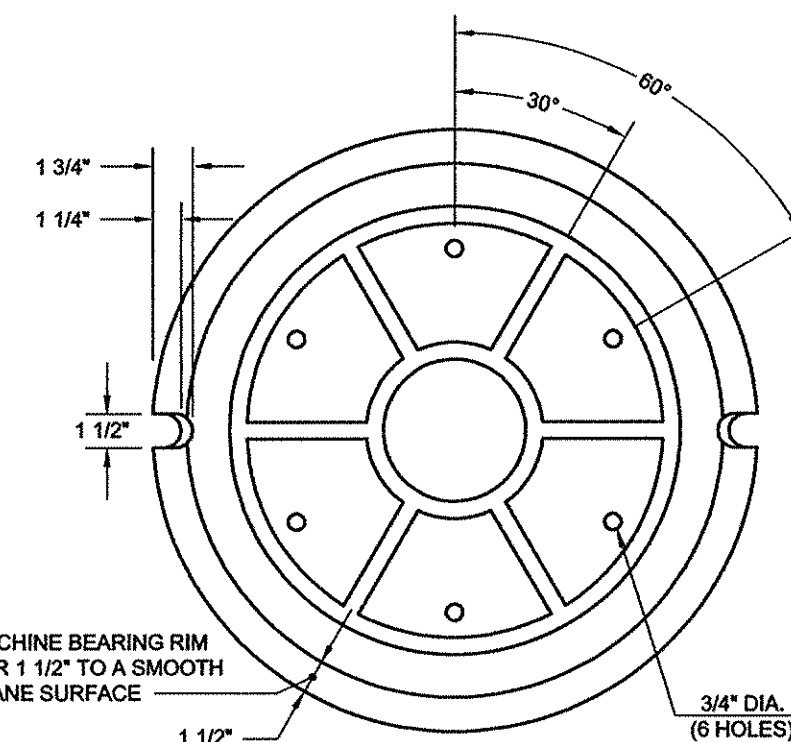
SECTION OF FRAME



SECTION OF COVER



SECTION A-A



BOTTOM VIEW OF COVER

Gurdeep S. Saini
ASSOCIATE COMMISSIONER, DESIGN
DEPARTMENT OF DESIGN AND CONSTRUCTION

P.E.

8/14/18
DATE

DATE _____

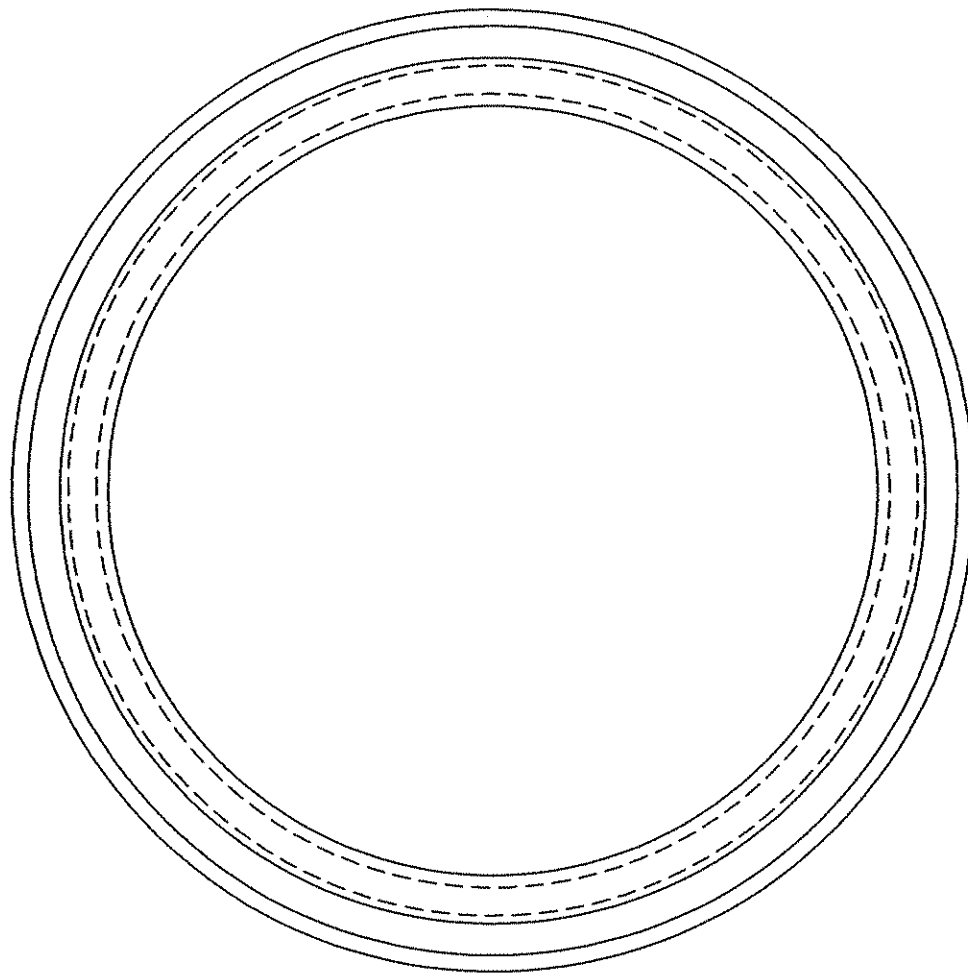
Thomas Wynne
EXECUTIVE DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION

P.E.

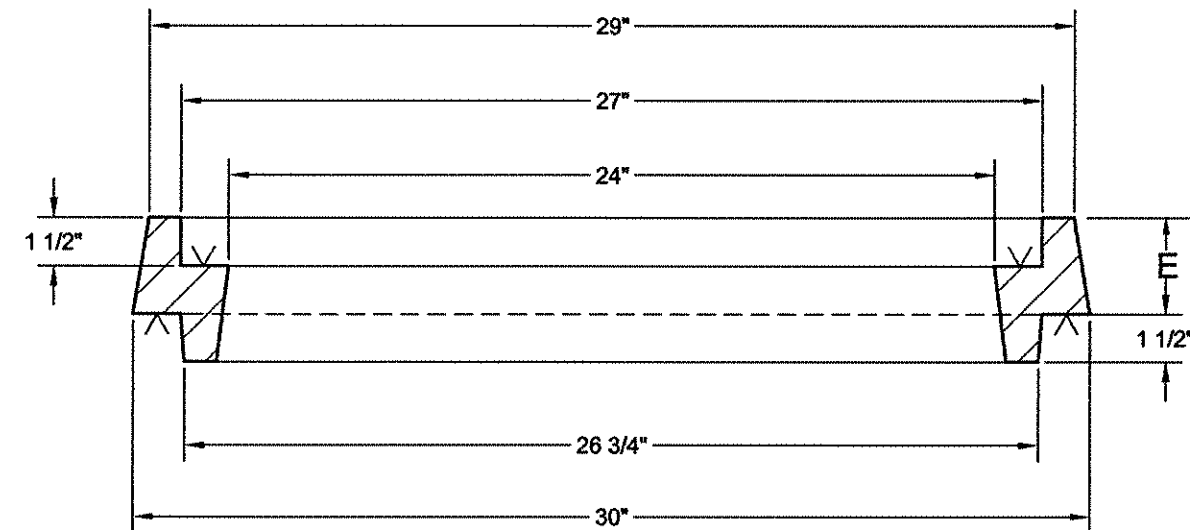
8/14/18
DATE

DATE _____

STANDARD FOR 27" DIAMETER CAST IRON EXTENSION RING FOR 27" DIAMETER MANHOLE FRAME AND COVER



PLAN



SECTION

E = 2" for 2" raise
E = 3" for 3" raise
E = 4" for 4" raise
Minimum Raise: 2"
Maximum Raise: 4"

NOTES:

- (1) MATERIAL: GRAY CAST IRON ASTM A-48, CLASS 35B. MINIMUM WEIGHT OF EXTENSION RINGS:
2" = 120 LBS.; 3" = 150 LBS.; 4" = 170 LBS.
- (2) DESIGN LOADING: HS20-44 HIGHWAY LOADING.
- (3) ALL MANHOLE FRAMES & COVERS SHALL HAVE THE MANUFACTURER'S IDENTIFICATION, CAST DATE OR HEAT NUMBER AND COUNTRY OF ORIGIN INTEGRALLY CAST ON INDIVIDUAL PIECES AT THE TIME OF MANUFACTURE IN ACCORDANCE WITH THE DEP SPECIFICATION.

Gurdeep S. Saini

P.E.

ASSOCIATE COMMISSIONER, DESIGN
DEPARTMENT OF DESIGN AND CONSTRUCTION

8/14/18

DATE

Thomas Wynne

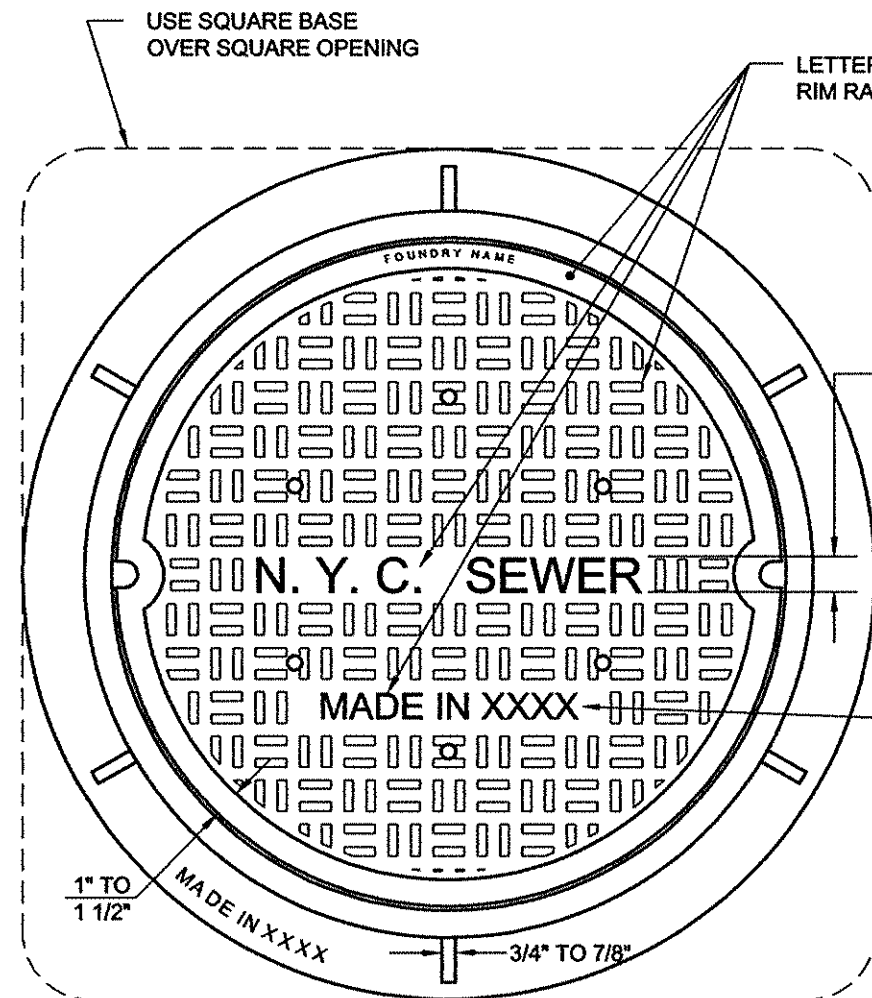
P.E.

EXECUTIVE DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION

8/14/18

DATE

CITY OF NEW YORK
DEPARTMENT OF ENVIRONMENTAL PROTECTION
**STANDARD FOR 36" DIAMETER CAST IRON
MANHOLE FRAME AND COVER FOR CLEANOUT**



PLAN VIEW OF FRAME AND COVER

NOTES:

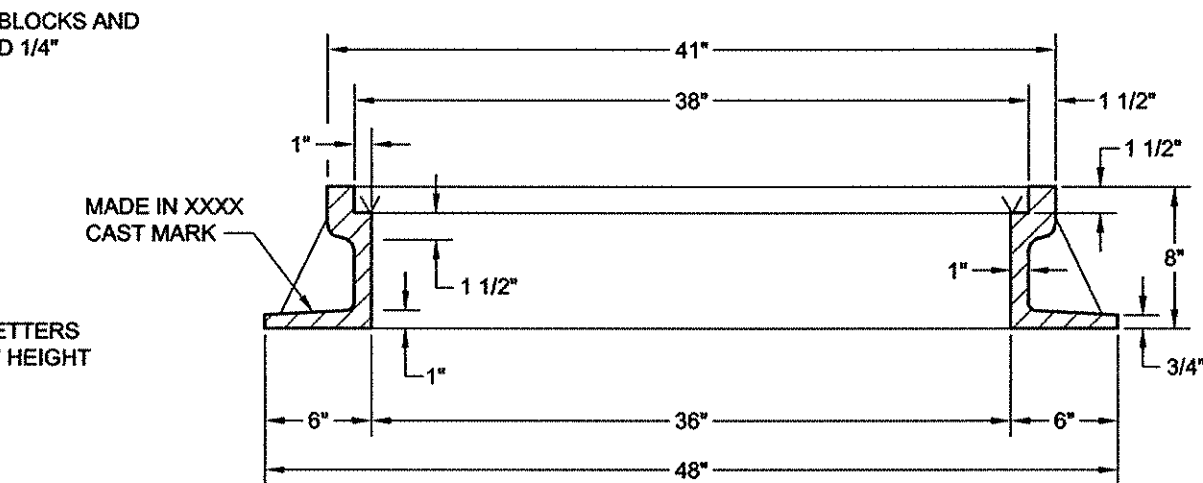
- (1) FRAME MATERIAL: GRAY CAST IRON ASTM A-48 CLASS 35B.
MINIMUM WEIGHT OF FRAME IS 480 LBS.
- (2) COVER MATERIAL: GRAY CAST IRON ASTM A-48 CLASS 35B.
MINIMUM WEIGHT OF COVER IS 400 LBS.
- (3) DESIGN LOADING: HS20-44 HIGHWAY LOADING.
- (4) ALL MANHOLE FRAMES & COVERS SHALL HAVE THE MANUFACTURER'S IDENTIFICATION, CAST DATE OR HEAT NUMBER AND COUNTRY OF ORIGIN INTEGRALLY CAST ON INDIVIDUAL PIECES AT THE TIME OF MANUFACTURE IN ACCORDANCE WITH THE DEP SPECIFICATION.

Gurdeep S. Saini
ASSOCIATE COMMISSIONER, DESIGN
DEPARTMENT OF DESIGN AND CONSTRUCTION

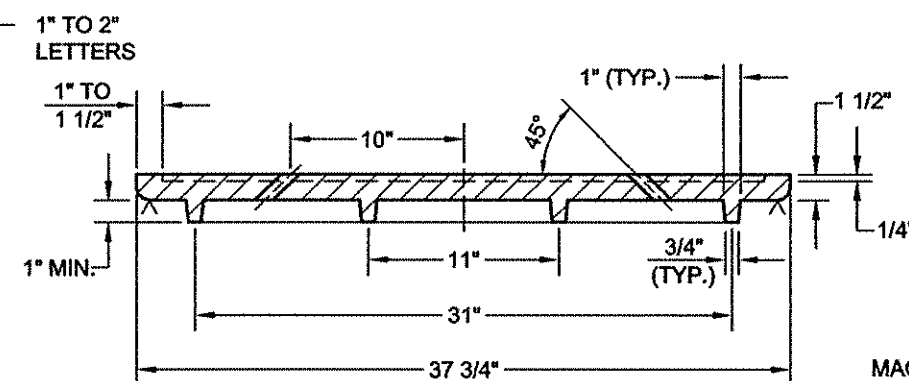
P.E.

8/14/18

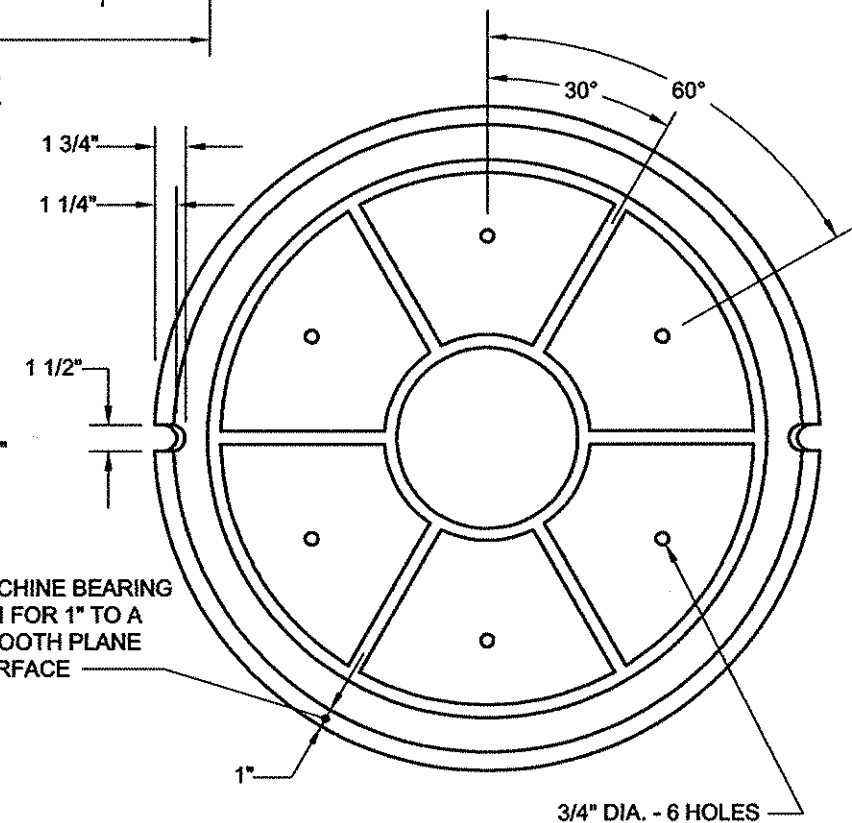
DATE _____



SECTION OF FRAME



SECTION OF COVER



BOTTOM VIEW OF COVER

Thomas Wynne
EXECUTIVE DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION

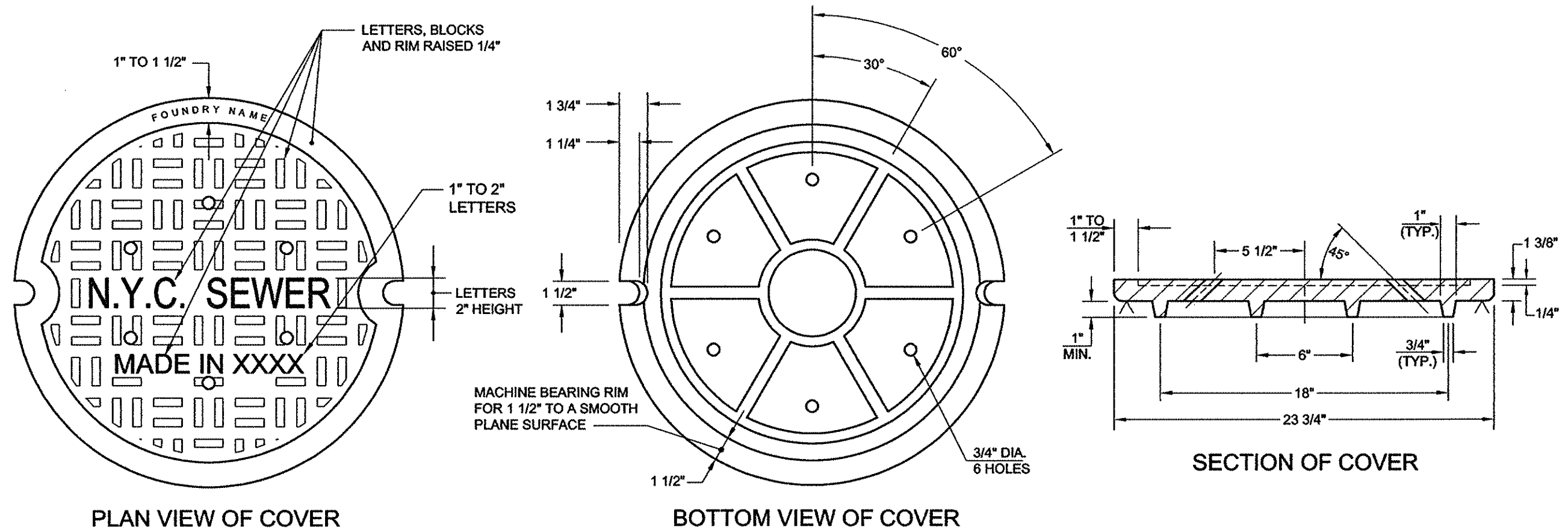
P.E.

8/14/18

DATE _____

CITY OF NEW YORK
DEPARTMENT OF ENVIRONMENTAL PROTECTION

STANDARD FOR 24" DIAMETER CAST IRON MANHOLE COVER



NOTES:

- (1) COVER MATERIAL: GRAY CAST IRON ASTM A-48 CLASS 35B.
MINIMUM WEIGHT OF COVER IS 130 LBS.
- (2) DESIGN LOADING: HS20-44 HIGHWAY LOADING.
- (3) ALL MANHOLE COVERS SHALL HAVE THE MANUFACTURER'S IDENTIFICATION, CAST DATE OR HEAT NUMBER AND COUNTRY OF ORIGIN INTEGRALLY CAST ON INDIVIDUAL PIECES AT THE TIME OF MANUFACTURE IN ACCORDANCE WITH THE DEP SPECIFICATION.
- (4) TO BE USED ONLY TO REPLACE BROKEN OR DAMAGED EXISTING 24" DIAMETER SEWER MANHOLE COVER.

Gurdeep S. Saini

P.E.

ASSOCIATE COMMISSIONER, DESIGN
DEPARTMENT OF DESIGN AND CONSTRUCTION

8/14/18

DATE

Thomas Wynne

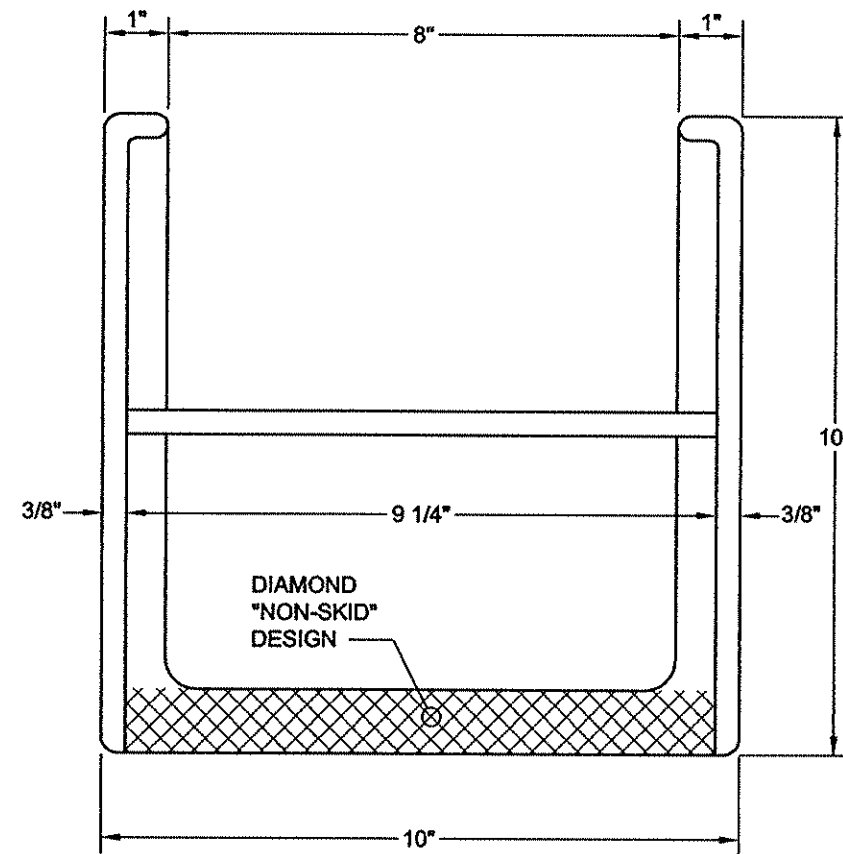
P.E.

EXECUTIVE DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION

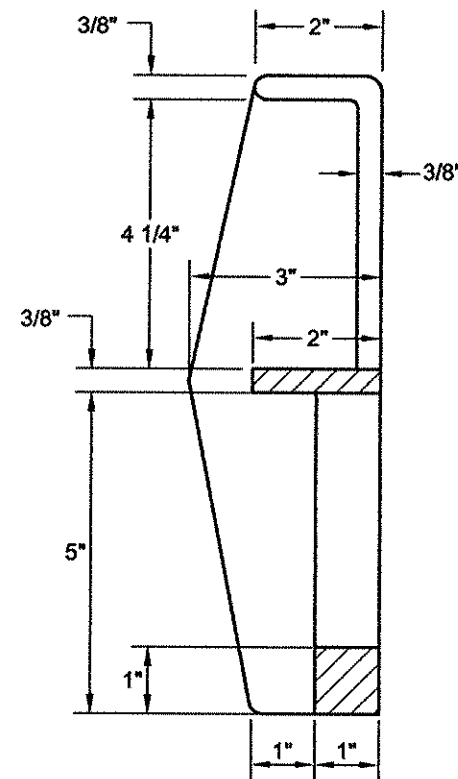
8/14/18

DATE

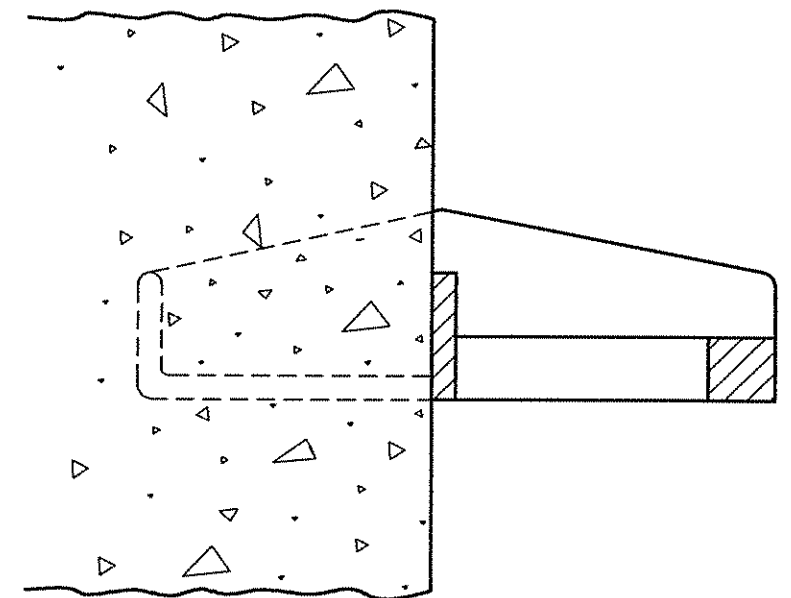
CITY OF NEW YORK
DEPARTMENT OF ENVIRONMENTAL PROTECTION
STANDARD FOR CAST IRON MANHOLE STEP



PLAN



SECTION



SECTION OF STEP IN PLACE

NOTES:

- (1) MATERIAL: GRAY CAST IRON ASTM A-48 CLASS 35B. MINIMUM WEIGHT OF STEP IS 11 LBS.
- (2) ALL MANHOLE STEPS SHALL HAVE THE MANUFACTURER'S IDENTIFICATION, CAST DATE OR HEAT NUMBER AND COUNTRY OF ORIGIN INTEGRALLY CAST ON INDIVIDUAL PIECES AT THE TIME OF MANUFACTURE IN ACCORDANCE WITH THE DEP SPECIFICATION.

Sandeep S. Saini

P.E.

ASSOCIATE COMMISSIONER, DESIGN
DEPARTMENT OF DESIGN AND CONSTRUCTION

8/14/18

DATE

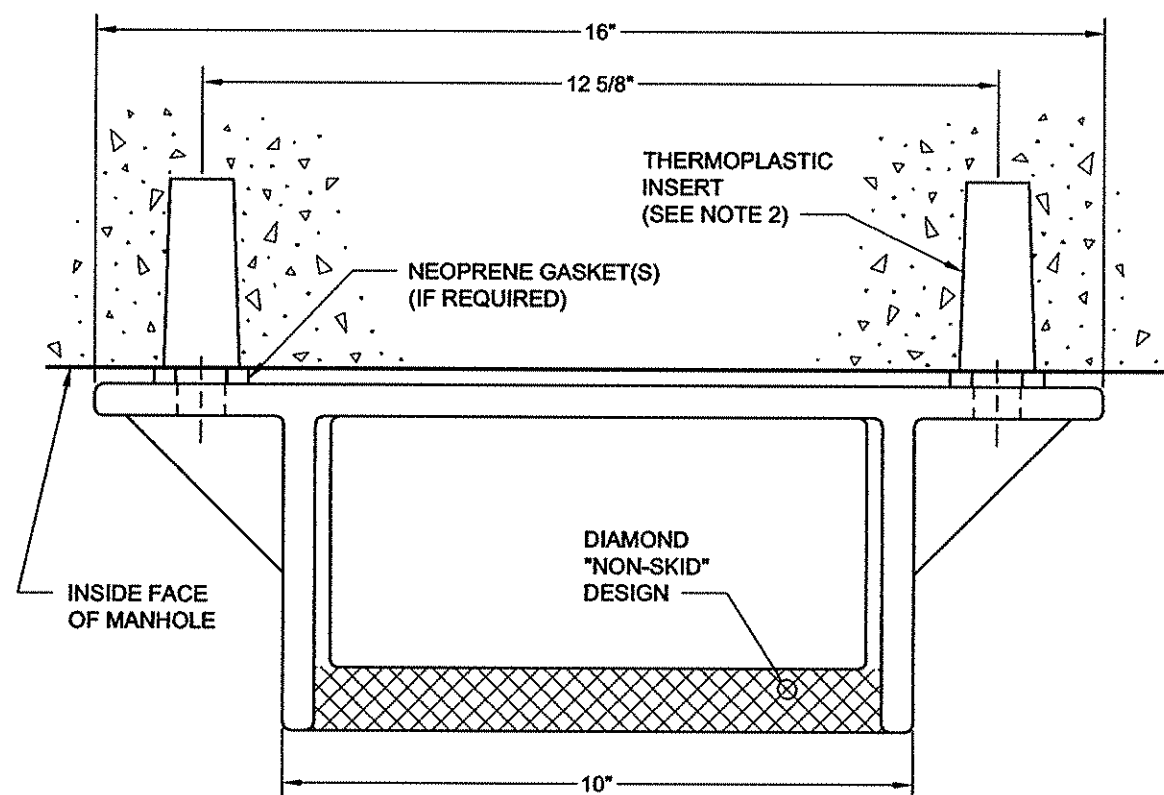
Thomas Wynne

P.E.

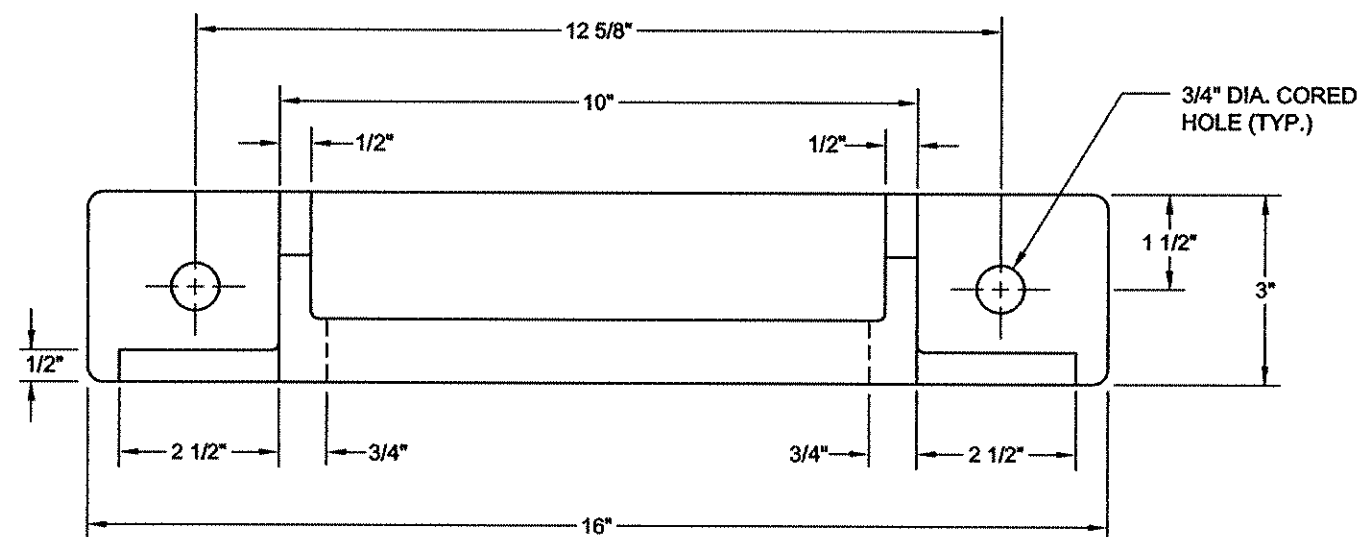
EXECUTIVE DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION

8/14/18

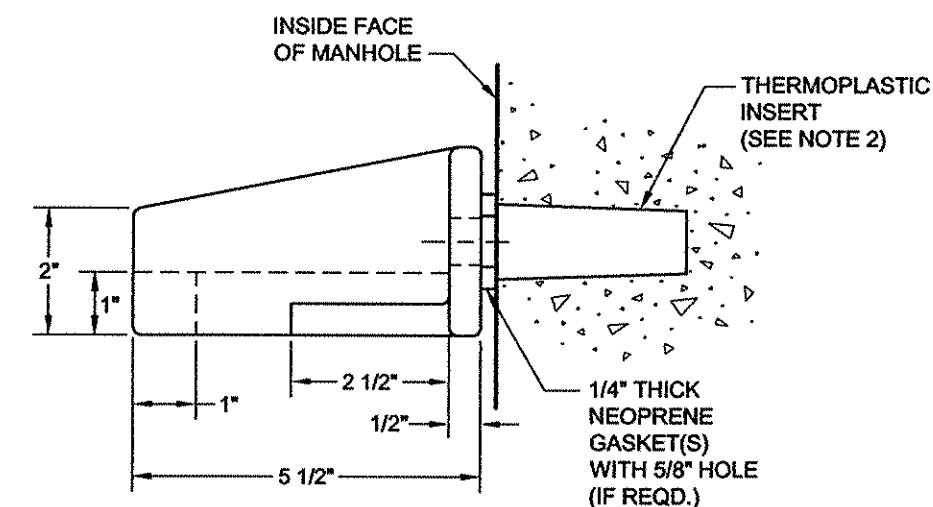
DATE

STANDARD FOR CAST IRON MANHOLE STEP
(BOLT-ON TYPE)

PLAN



FRONT ELEVATION



SIDE ELEVATION

NOTES:

- (1) MATERIAL: GRAY CAST IRON ASTM A-48 CLASS 35B. MINIMUM WEIGHT OF BOLT-ON STEP IS 13 LBS.
- (2) THERMOPLASTIC INSERT AS MANUFACTURED BY PENNSYLVANIA INSERT CORP., OR EQUAL, WITH 5/8"-11 X 2 1/2" STAINLESS STEEL BOLT AND WASHER.
OR
1 1/8" X 2" CORED HOLE FOR 5/8"-11 X 2 1/2" STAINLESS STEEL BOLT AND WASHER, WITH ACKERMAN - JOHNSON EXPANSIVE SCREW ANCHOR WITH NONCORROSIVE BRASS CONES, CATALOG NO. 701-62.
- (3) ALL MANHOLE STEPS SHALL HAVE THE MANUFACTURER'S IDENTIFICATION, CAST DATE OR HEAT NUMBER AND COUNTRY OF ORIGIN INTEGRALLY CAST ON INDIVIDUAL PIECES AT THE TIME OF MANUFACTURE IN ACCORDANCE WITH THE DEP SPECIFICATION.

Gurdeep S. Saini
ASSOCIATE COMMISSIONER, DESIGN
DEPARTMENT OF DESIGN AND CONSTRUCTION

P.E.

8/14/18
DATE

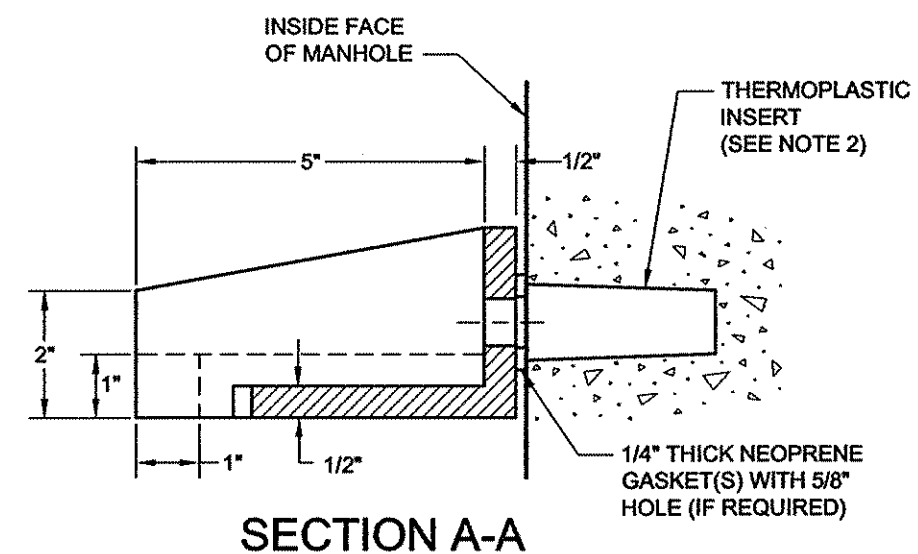
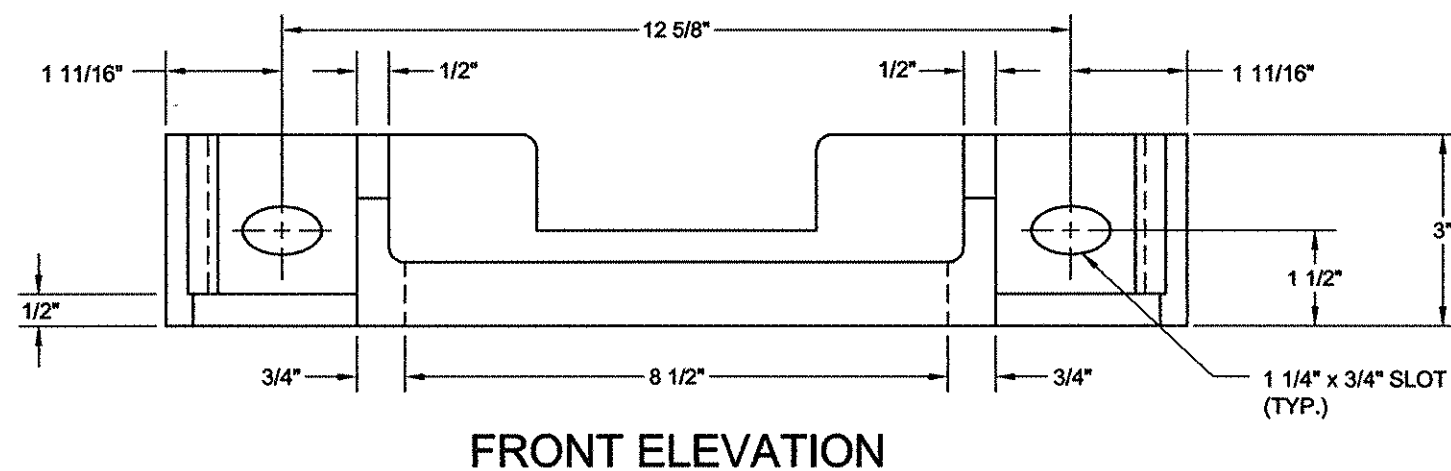
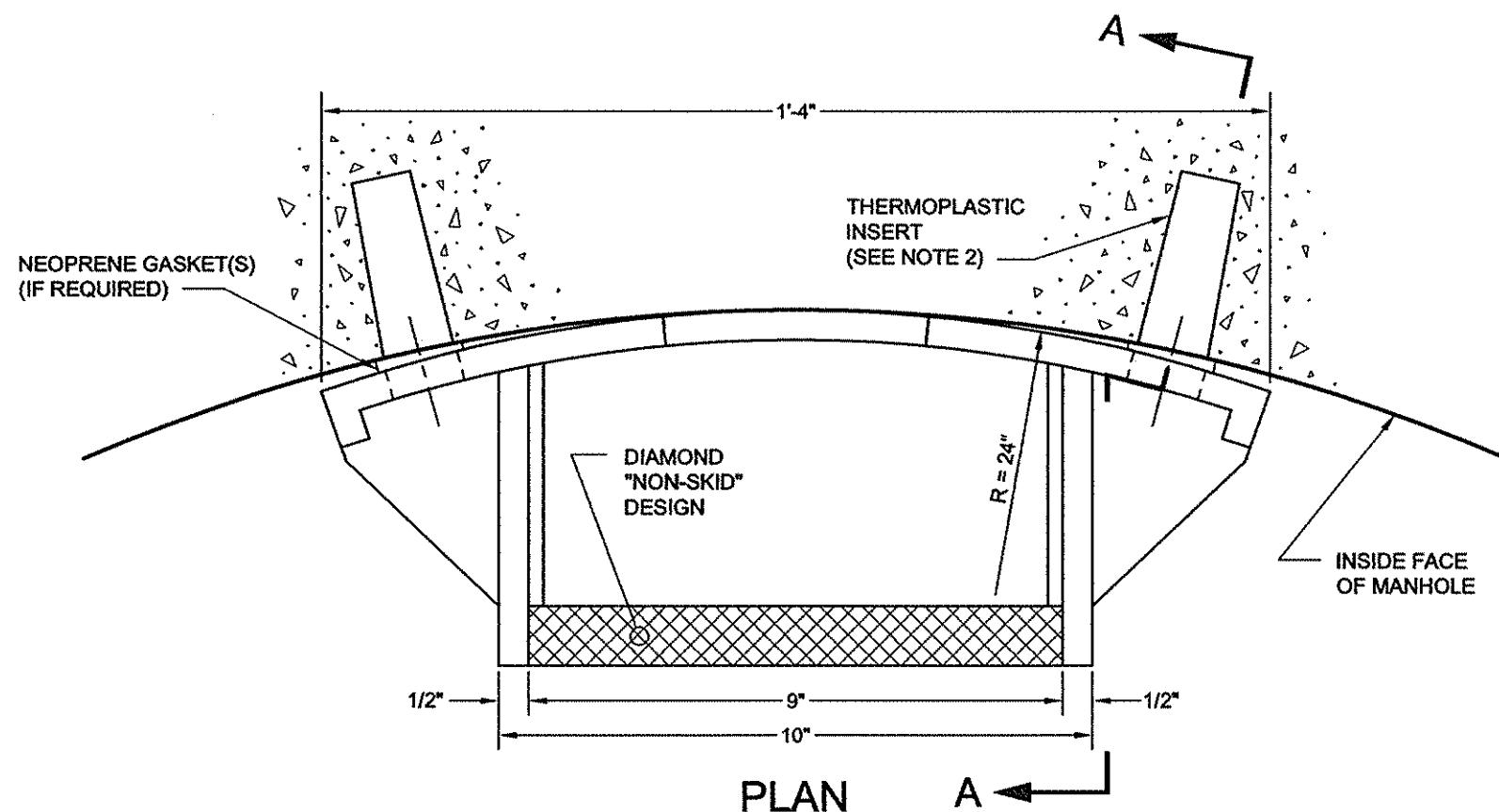
DATE

Thomas Wayne
EXECUTIVE DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION

P.E.

8/14/18
DATE

DATE

STANDARD FOR CIRCULAR CAST IRON MANHOLE STEP
(BOLT-ON TYPE)

NOTES:

- (1) MATERIAL: GRAY CAST IRON ASTM A-48 CLASS 35B.
MINIMUM WEIGHT OF CIRCULAR BOLT-ON STEP IS 13 LBS.
- (2) THERMOPLASTIC INSERT AS MANUFACTURED BY PENNSYLVANIA INSERT CORP., OR EQUAL, WITH 5/8"-11 X 2 1/2" STAINLESS STEEL BOLT AND WASHER.
OR
1 1/8" X 2" CORED HOLE FOR 5/8"-11 X 2 1/2" STAINLESS STEEL BOLT AND WASHER, WITH ACKERMAN - JOHNSON EXPANSIVE SCREW ANCHOR WITH NONCORROSIVE BRASS CONES, CATALOG NO. 701-62.
- (3) ALL MANHOLE STEPS SHALL HAVE THE MANUFACTURER'S IDENTIFICATION, CAST DATE OR HEAT NUMBER AND COUNTRY OF ORIGIN INTEGRALLY CAST ON INDIVIDUAL PIECES AT THE TIME OF MANUFACTURE IN ACCORDANCE WITH THE DEP SPECIFICATION.

Gurdeep S. Saini

P.E.

ASSOCIATE COMMISSIONER, DESIGN
DEPARTMENT OF DESIGN AND CONSTRUCTION

8/14/18

DATE

Thomas Wynne

P.E.

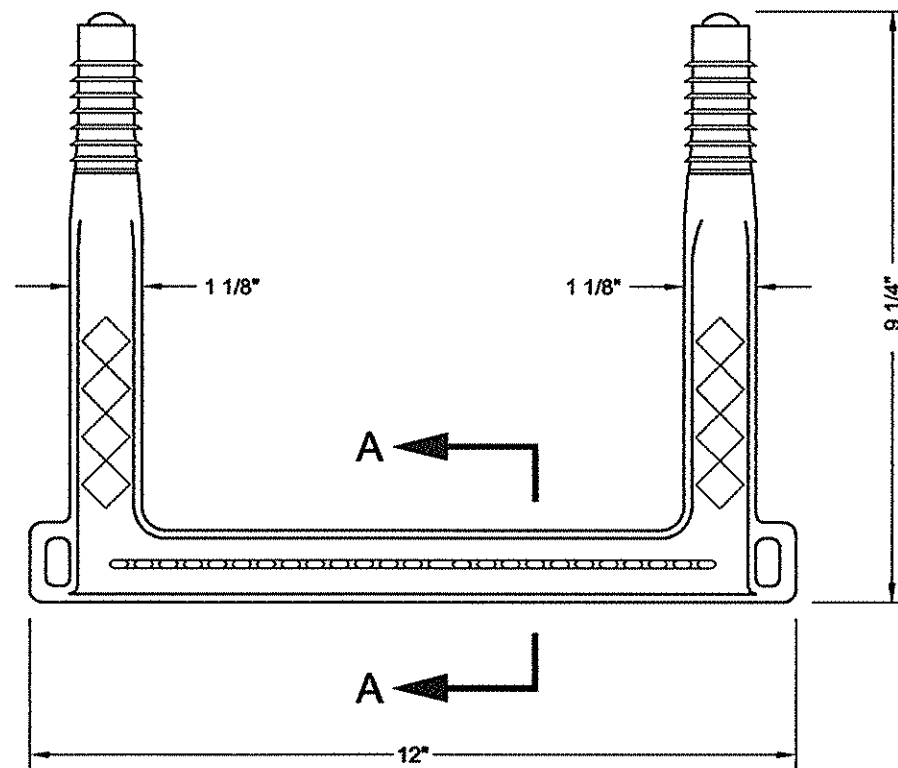
EXECUTIVE DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION

8/14/18

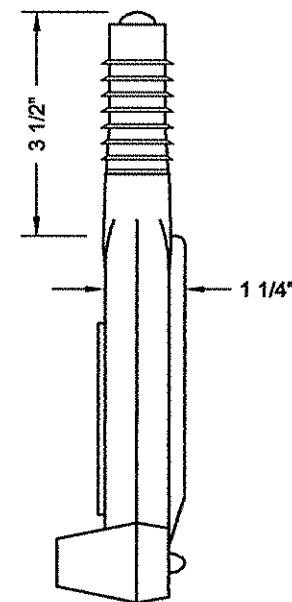
DATE

CITY OF NEW YORK
DEPARTMENT OF ENVIRONMENTAL PROTECTION

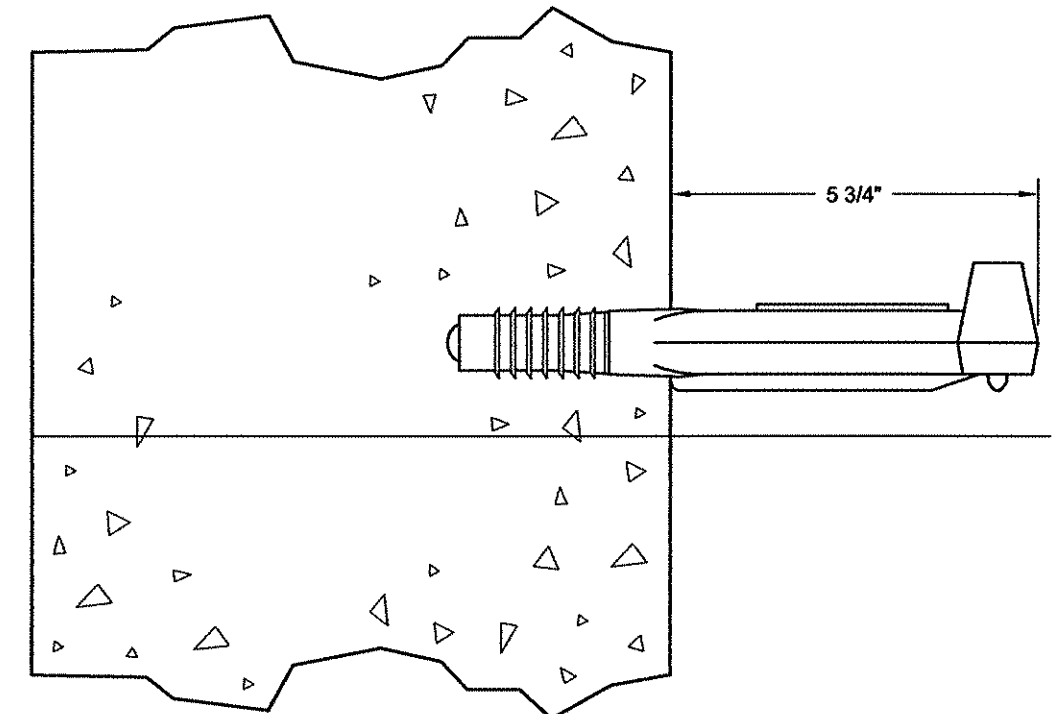
STANDARD FOR PLASTIC MANHOLE STEP
(COPOLYMER POLYPROPYLENE PLASTIC MANHOLE STEP)



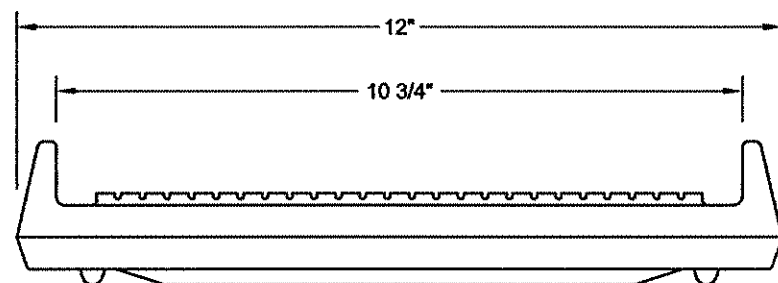
PLAN



SIDE ELEVATION



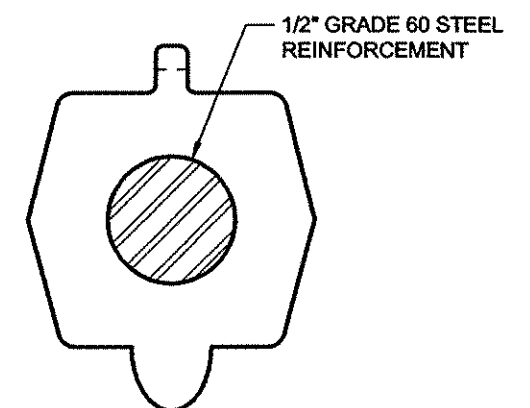
ANCHORAGE DETAIL



FRONT ELEVATION

NOTE:

PLASTIC MANHOLE STEP MAY BE SUBSTITUTED FOR CAST IRON MANHOLE STEP,
UNLESS OTHERWISE DIRECTED BY THE ENGINEER.



SECTION A-A

Gurdeep S. Saini

P.E.

ASSOCIATE COMMISSIONER, DESIGN
DEPARTMENT OF DESIGN AND CONSTRUCTION

8/14/18

DATE

Thomas Wyane

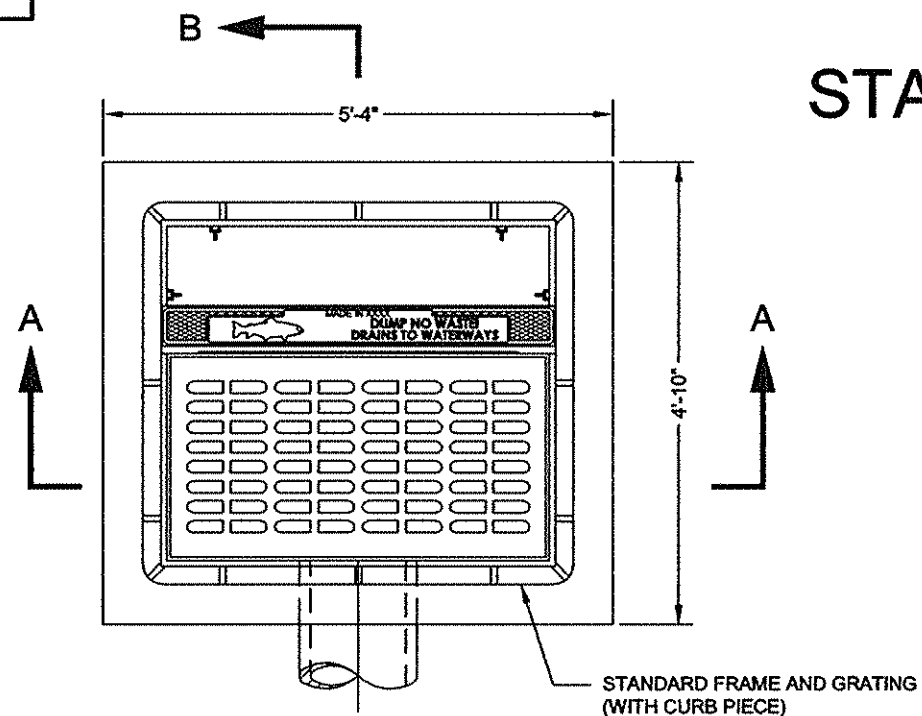
P.E.

EXECUTIVE DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION

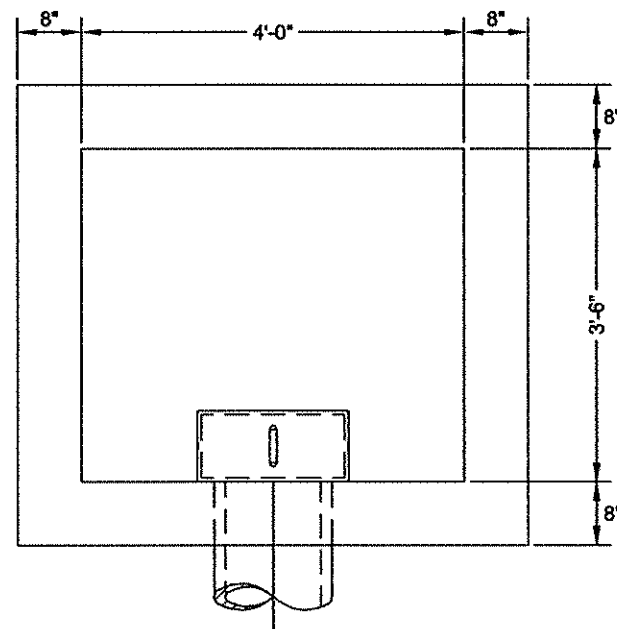
8/14/18

DATE

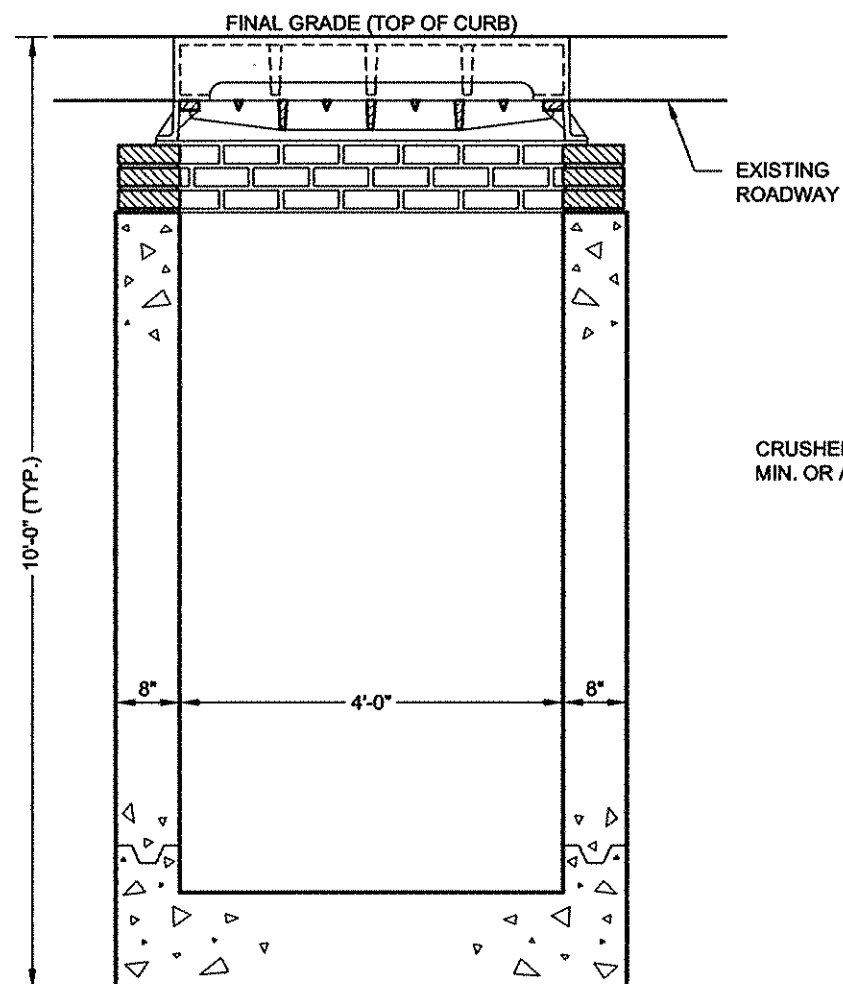
CITY OF NEW YORK
DEPARTMENT OF ENVIRONMENTAL PROTECTION
STANDARD FOR TYPE 1 CATCH BASIN
(WITH CURB PIECE)



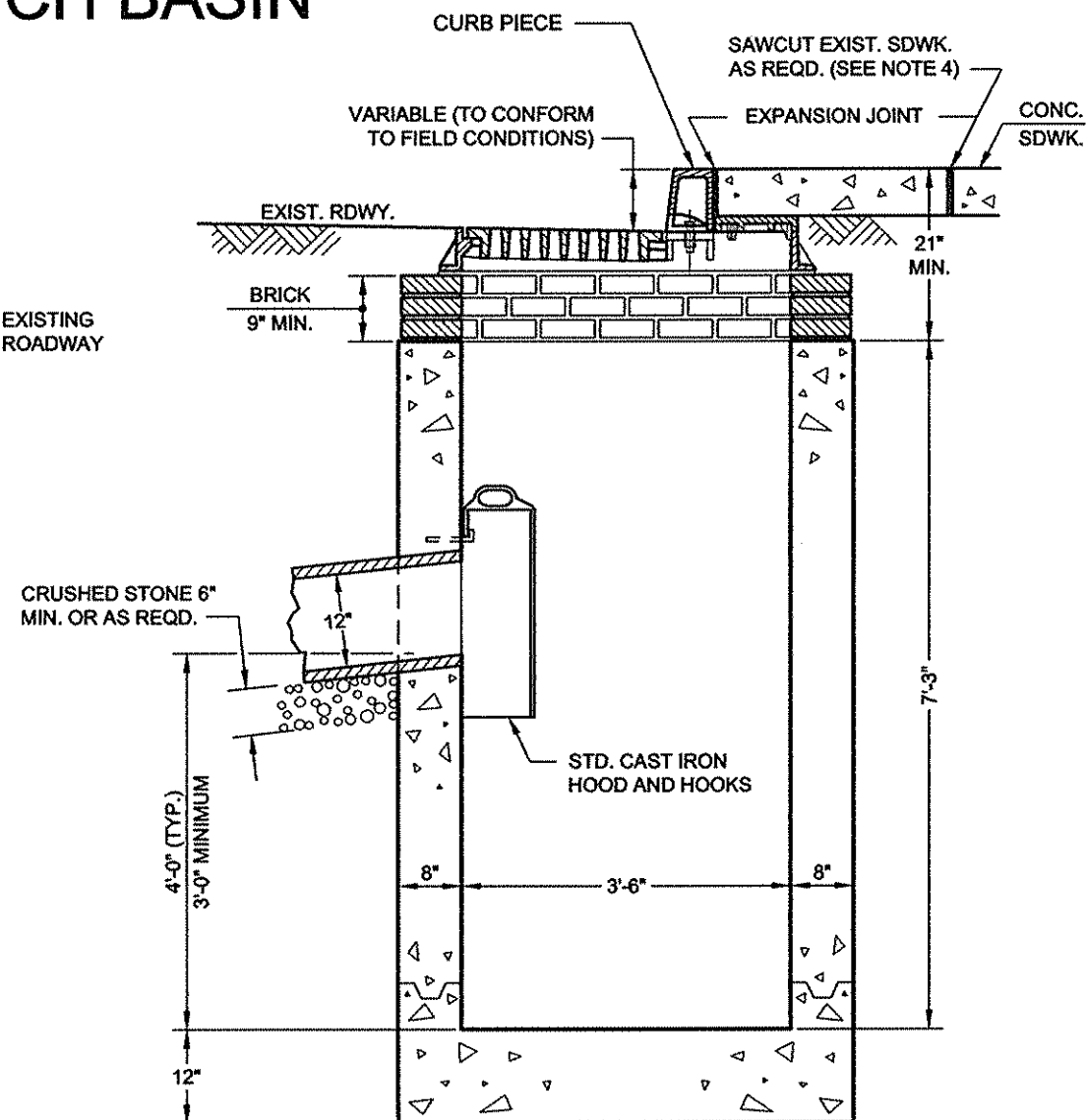
PLAN
(WITH CASTING)



PLAN
(WITHOUT CASTING)



SECTION A-A



SECTION B-B

NOTES:

- (1) LOCATION AND ANGLE OF BASIN CONNECTION MAY BE VARIED TO SUIT FIELD CONDITIONS.
- (2) KEYED CONSTRUCTION JOINTS ARE REQUIRED BETWEEN ANY SUCCESSIVE POURS.
- (3) THE MINIMUM DROP FROM BASIN TO SEWER SHALL BE 6".
- (4) EXPANSION JOINTS ARE REQUIRED IN THE CONCRETE SIDEWALK AREA AT A DISTANCE OF 1'-0" AROUND THE PERIMETER OF THE BASIN.
- (5) CONCRETE IS TO BE CLASS 40. REBARS-GRADE 60.

Gurdeep S. Saini

P.E.

ASSOCIATE COMMISSIONER, DESIGN
DEPARTMENT OF DESIGN AND CONSTRUCTION

8/14/18

DATE

Thomas Wayne

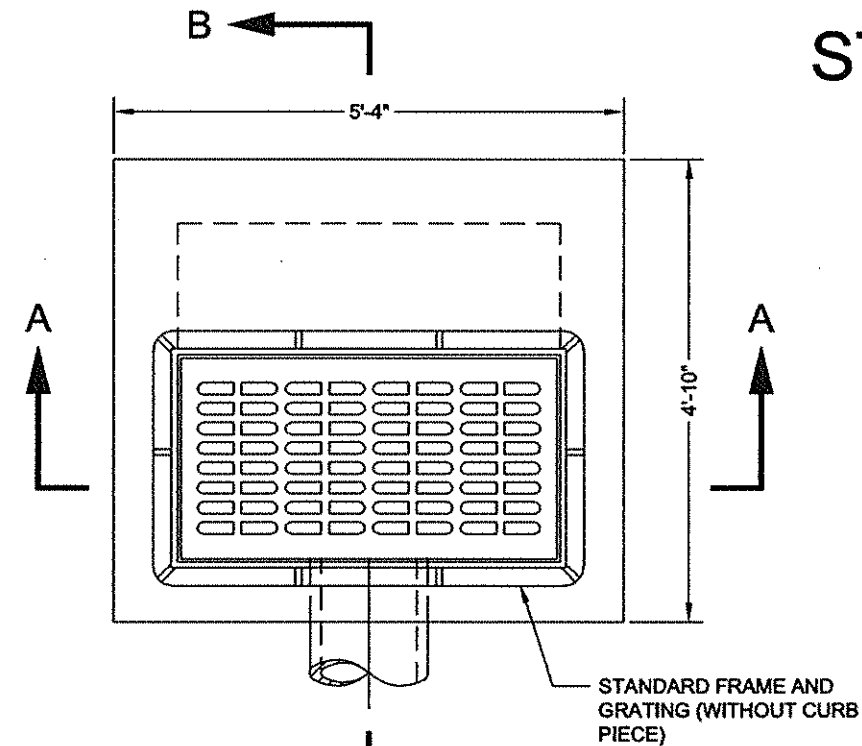
P.E.

EXECUTIVE DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION

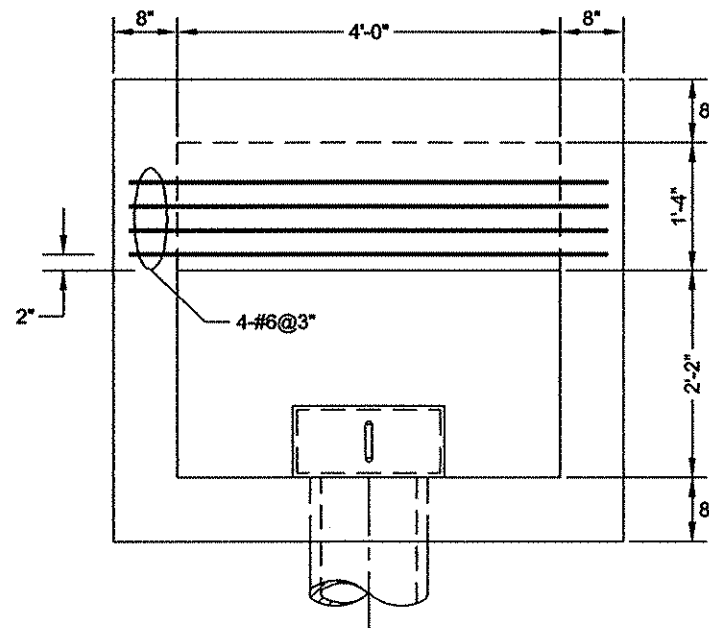
8/14/18

DATE

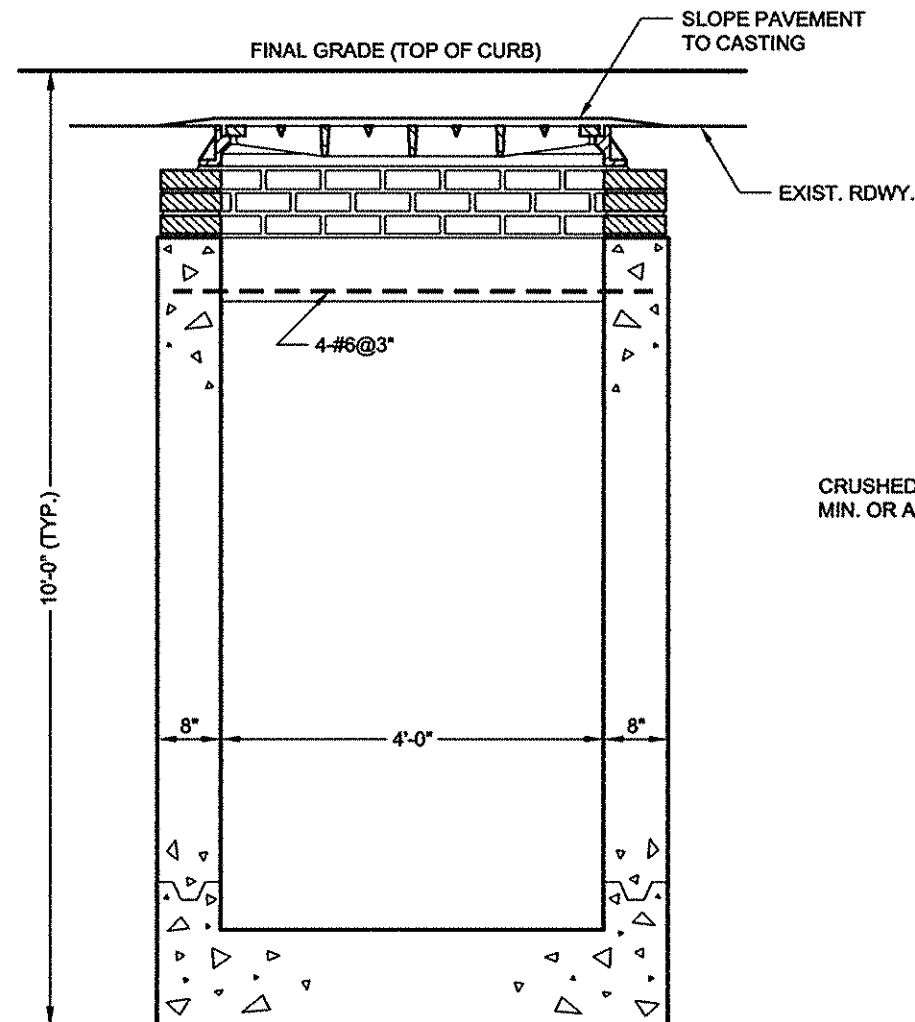
STANDARD FOR TYPE 2 CATCH BASIN (WITHOUT CURB PIECE)



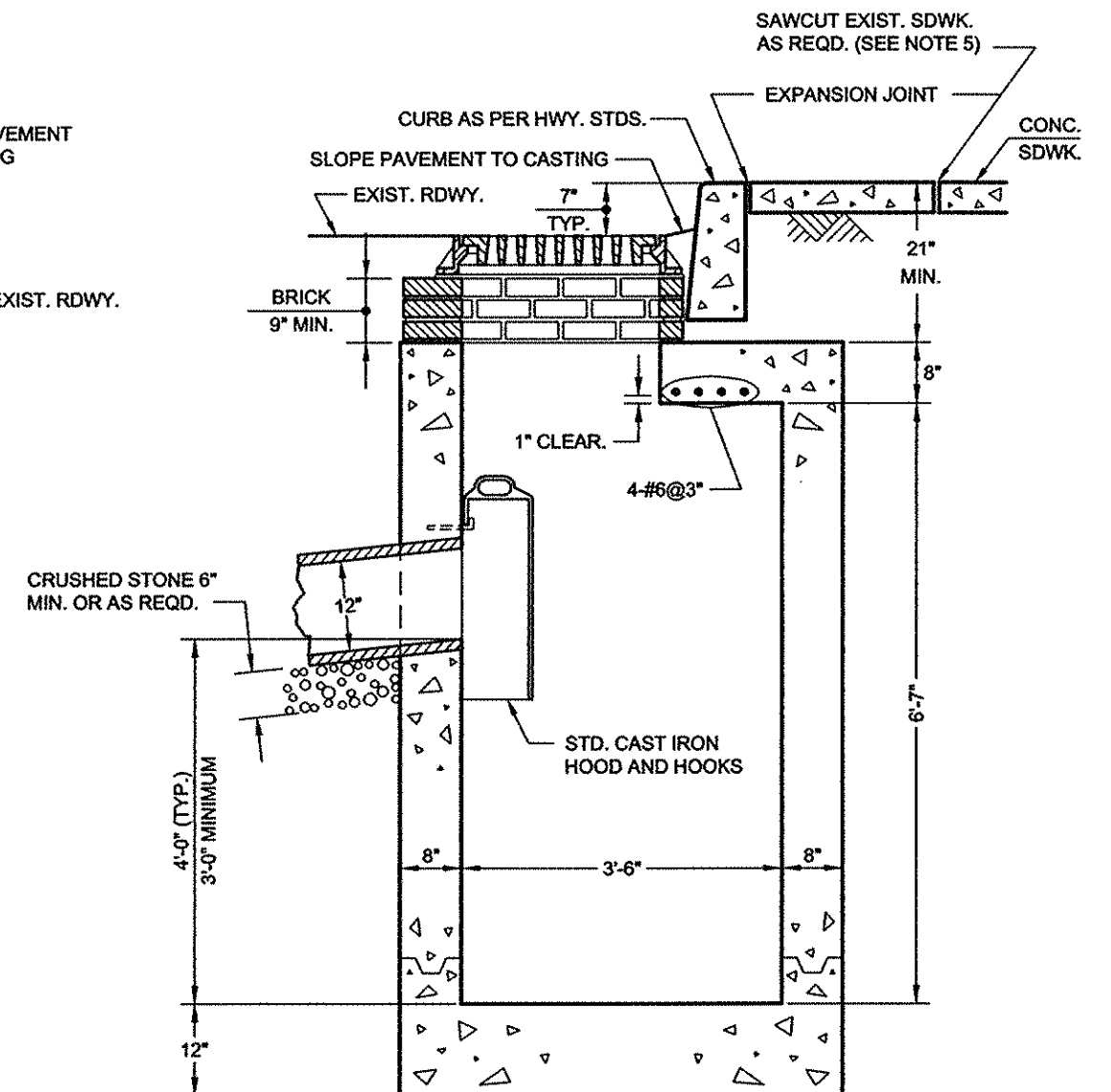
PLAN (WITH CASTING)



PLAN
(WITHOUT CASTING)



SECTION A-A



SECTION B-B

NOTES:

- (1) LOCATION OF CURB SHALL BE AS SHOWN UNLESS OTHERWISE DIRECTED BY THE ENGINEER.
- (2) LOCATION AND ANGLE OF BASIN CONNECTION MAY BE VARIED TO SUIT FIELD CONDITIONS.
- (3) KEYED CONSTRUCTION JOINTS ARE REQUIRED BETWEEN ANY SUCCESSIVE POURS.
- (4) THE MINIMUM DROP FROM BASIN TO SEWER SHALL BE 6".
- (5) EXPANSION JOINTS ARE REQUIRED IN THE CONCRETE SIDEWALK AREA AT A DISTANCE OF 1'-0" AROUND THE PERIMETER OF THE BASIN.
- (6) CONCRETE IS TO BE CLASS 40. REBARS- GRADE 60.
- (7) COVER FOR ALL REINFORCEMENT IS 2" CLEARANCE UNLESS OTHERWISE SPECIFIED.

Hardeep S. Savini
ASSOCIATE COMMISSIONER, DESIGN
DEPARTMENT OF DESIGN AND CONSTRUCTION

8/14/18
DATE

LESS OTHERWISE SPECIFIED.

Thomas Wynne

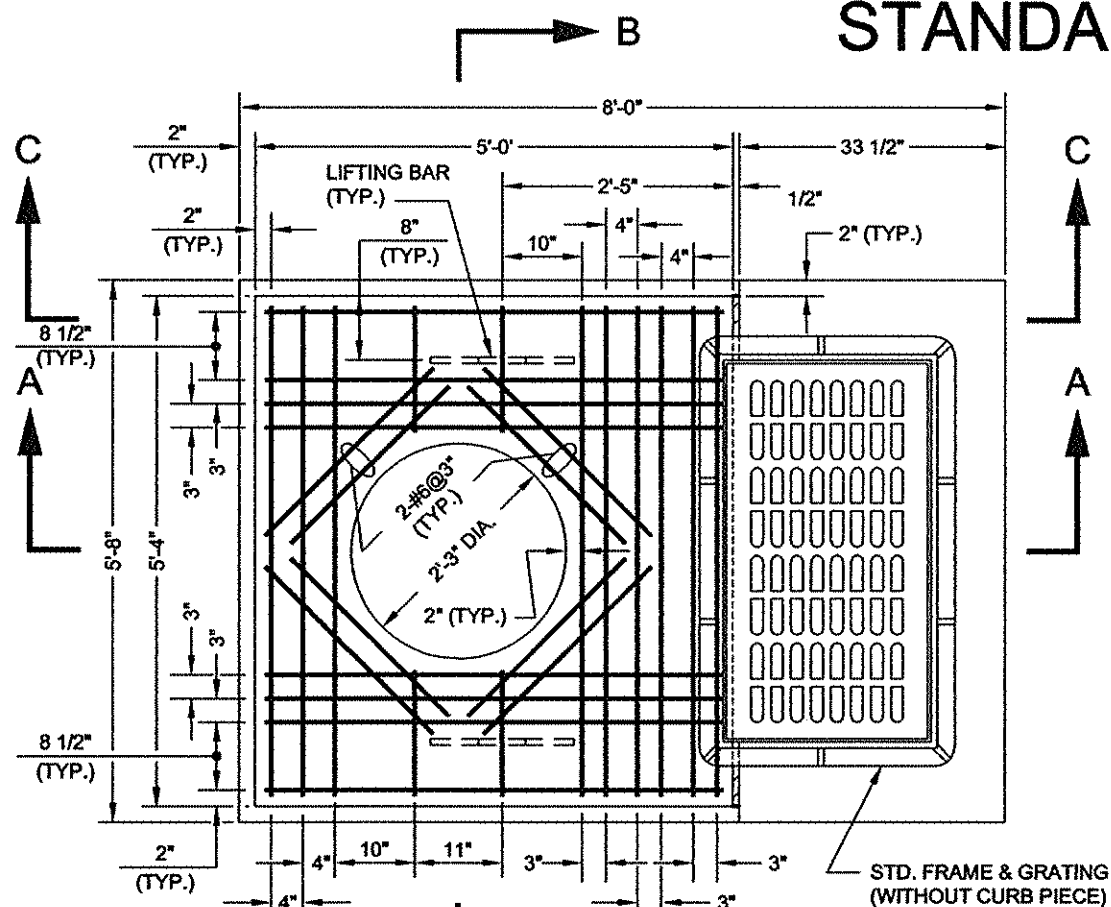
EXECUTIVE DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION

8/14/18
DATE

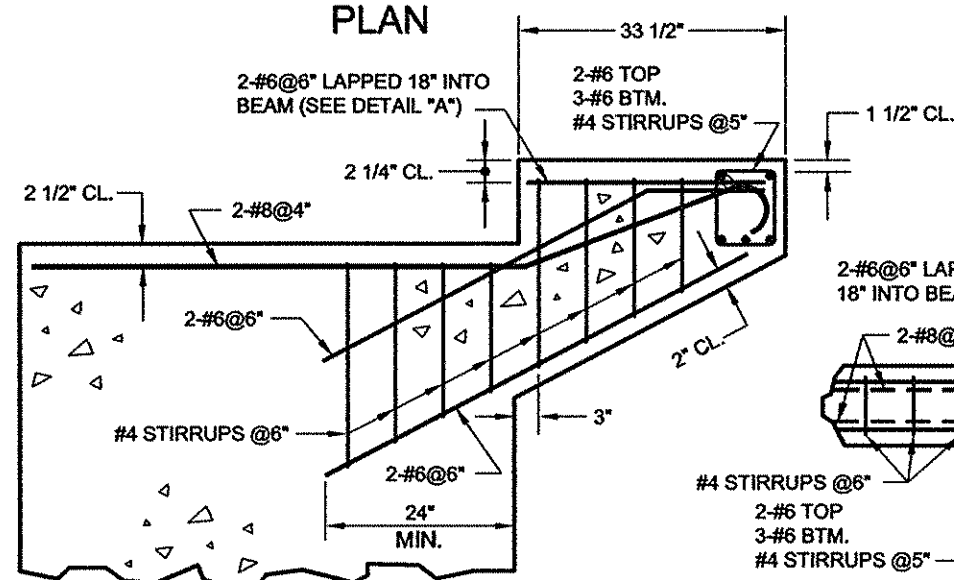
CITY OF NEW YORK
DEPARTMENT OF ENVIRONMENTAL PROTECTION

STANDARD FOR TYPE 3 CATCH BASIN

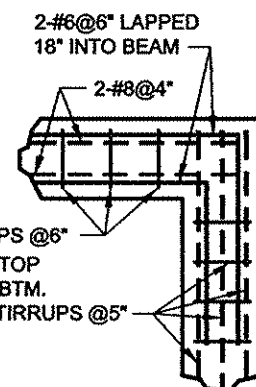
(WITHOUT CURB PIECE)



PLAN

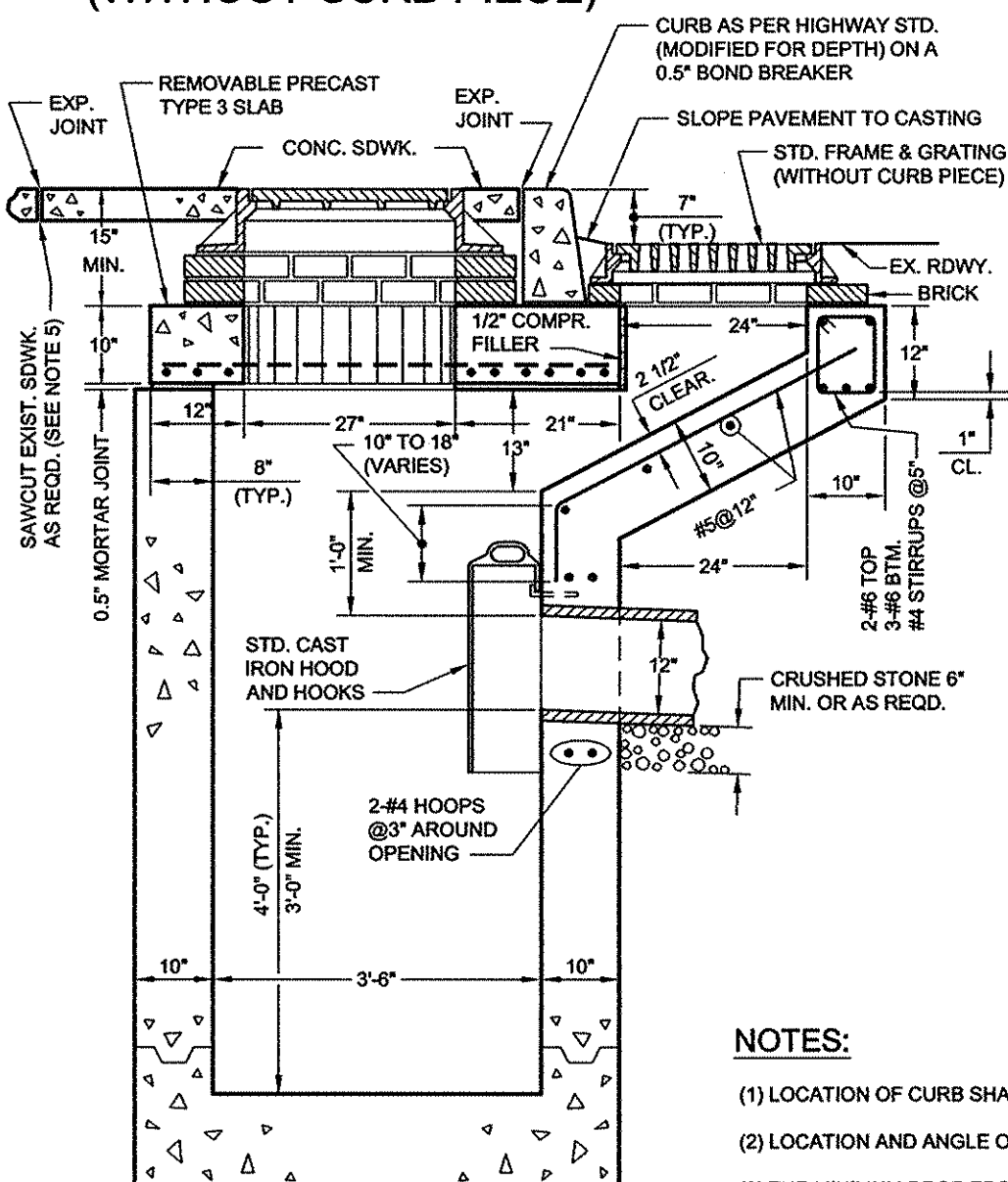


SECTION C-C

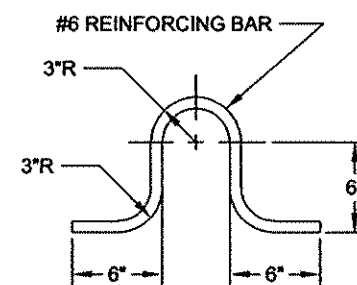


DETAIL "A"

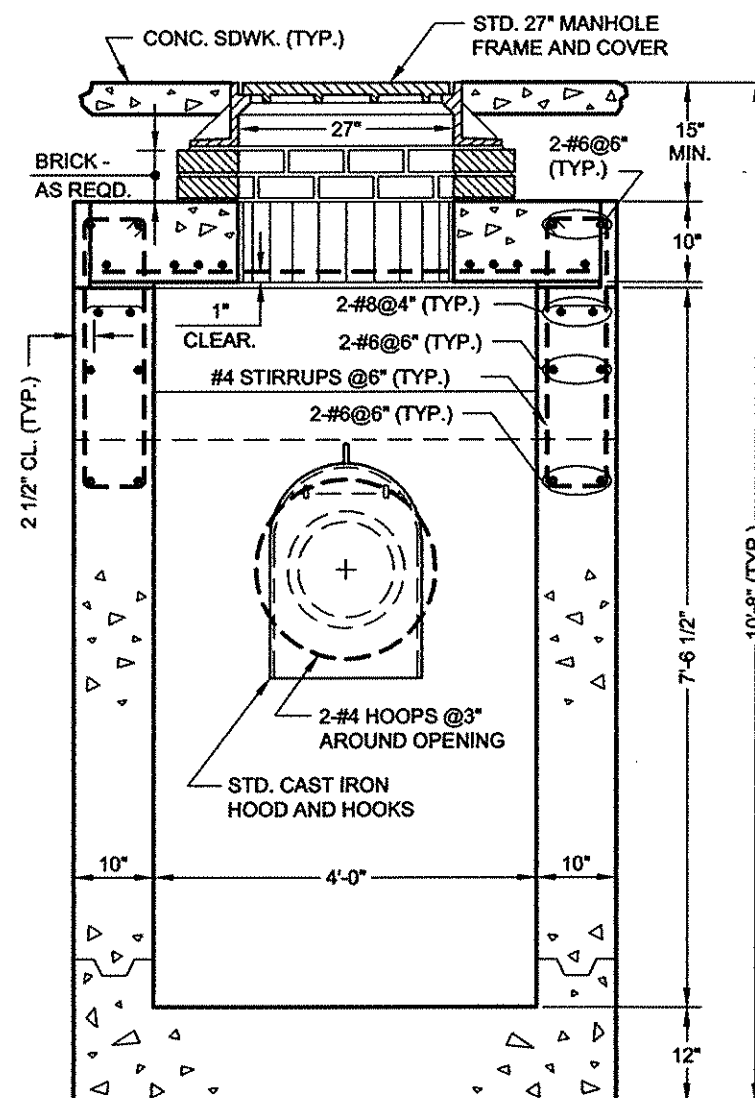
8/14/18
DATE



SECTION A-A



LIFTING BAR DETAIL



SECTION B-B

NOTES:

- (1) LOCATION OF CURB SHALL BE AS SHOWN UNLESS OTHERWISE DIRECTED BY THE ENGINEER.
- (2) LOCATION AND ANGLE OF BASIN CONNECTION MAY BE VARIED TO SUIT FIELD CONDITIONS.
- (3) THE MINIMUM DROP FROM BASIN TO SEWER SHALL BE 6".
- (4) KEYED CONSTRUCTION JOINTS ARE REQUIRED BETWEEN ANY SUCCESSIVE POURS.
- (5) EXPANSION JOINTS ARE REQUIRED IN THE CONC. SIDEWALK AREA AT A DISTANCE OF 1'-0" AROUND THE PERIMETER OF THE BASIN.
- (6) ALL REINFORCEMENT FOR ROOF SLAB IS #6 REINFORCING BARS UNLESS OTHERWISE SHOWN.
- (7) CONCRETE IS TO BE CLASS 40. REBARS-GRADE 60.
- (8) COVER FOR ALL REINFORCEMENT IS 2" CLEARANCE UNLESS OTHERWISE SPECIFIED.

Sundip S. Saini
P.E.

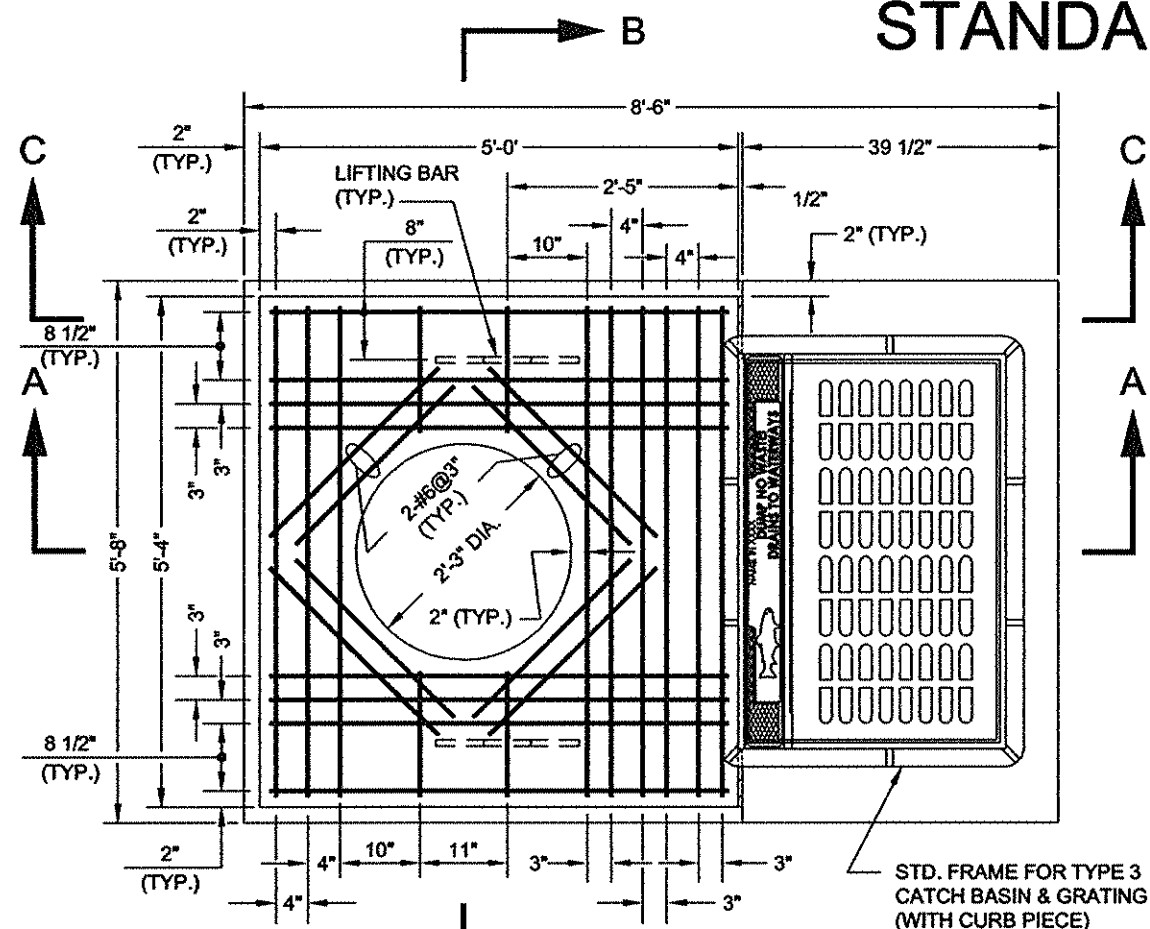
ASSOCIATE COMMISSIONER, DESIGN
DEPARTMENT OF DESIGN AND CONSTRUCTION

Thomas Wayne
EXECUTIVE DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION

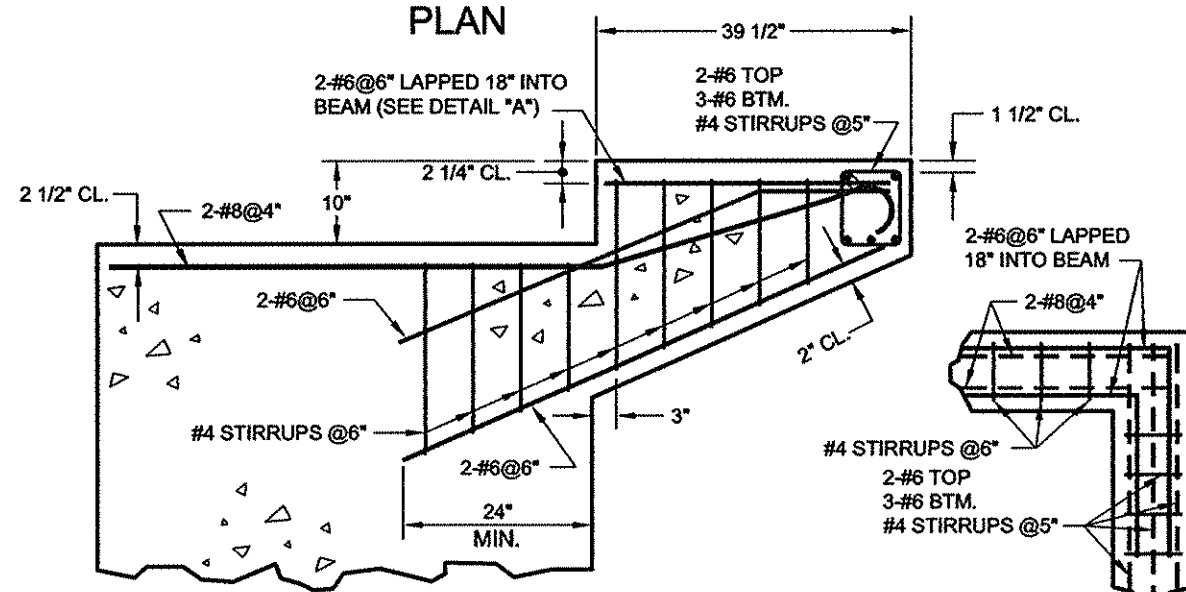
P.E.

8/14/18
DATE

STANDARD FOR TYPE 3 CATCH BASIN



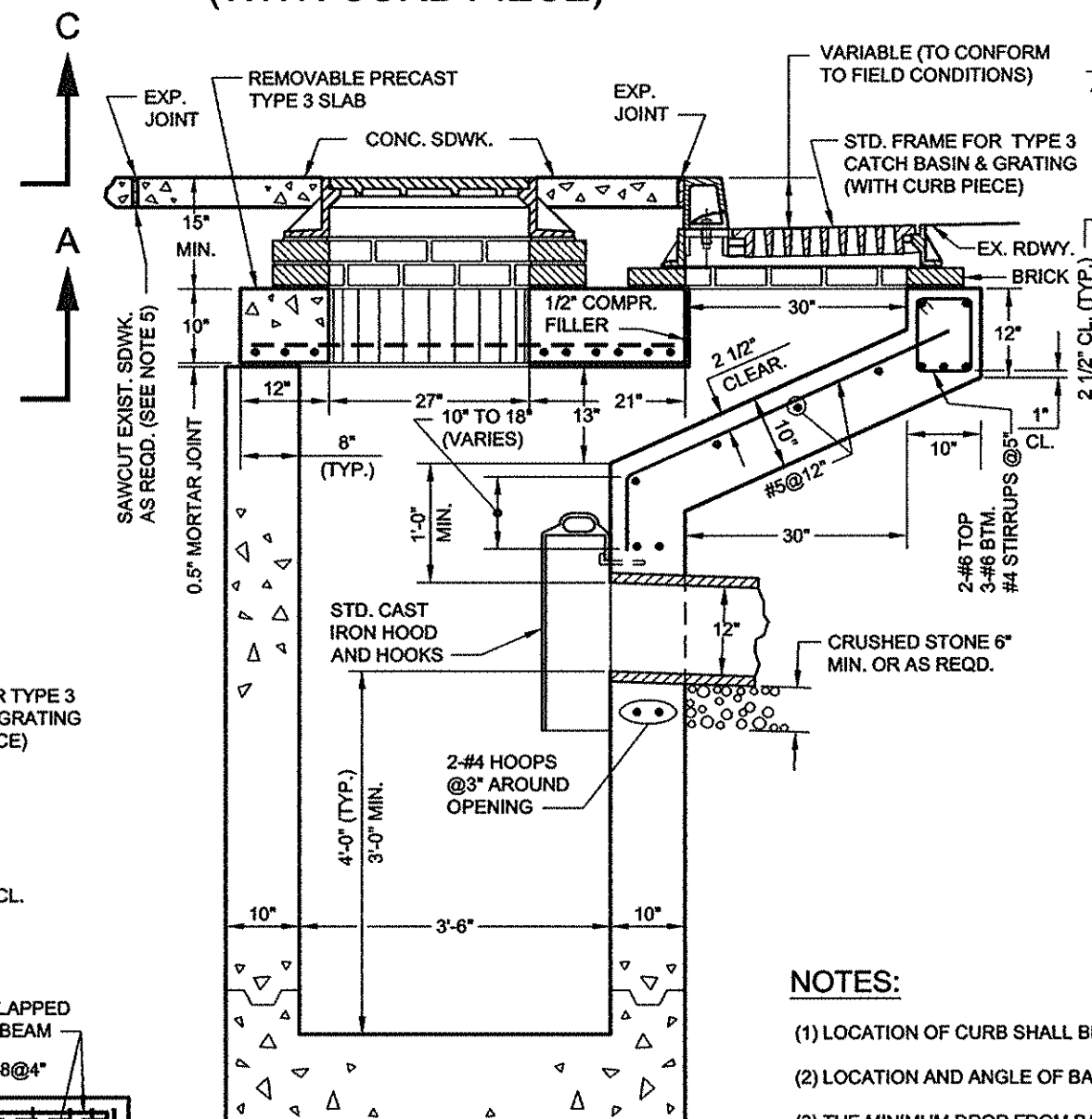
PLAN



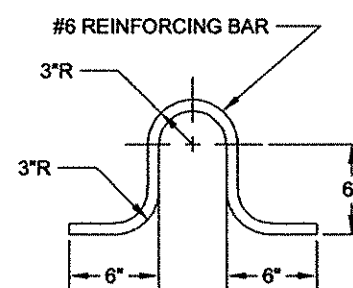
SECTION C-C

Gurdeep S. Saini

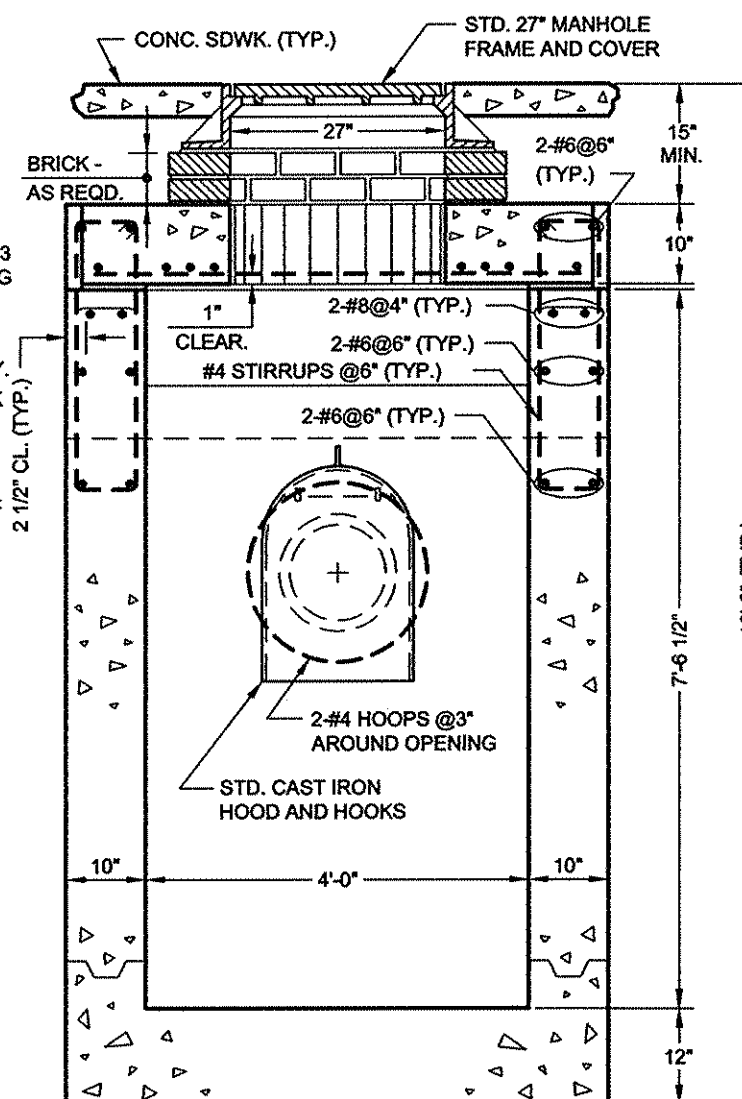
ASSOCIATE COMMISSIONER, DESIGN
DEPARTMENT OF DESIGN AND CONSTRUCTION



SECTION A-A



LIFTING BAR DETAIL



SECTION B-B

NOTES:

- (1) LOCATION OF CURB SHALL BE AS SHOWN UNLESS OTHERWISE DIRECTED BY THE ENGINEER.
- (2) LOCATION AND ANGLE OF BASIN CONNECTION MAY BE VARIED TO SUIT FIELD CONDITIONS.
- (3) THE MINIMUM DROP FROM BASIN TO SEWER SHALL BE 6".
- (4) KEYED CONSTRUCTION JOINTS ARE REQUIRED BETWEEN ANY SUCCESSIVE POURS.
- (5) EXPANSION JOINTS ARE REQUIRED IN THE CONC. SIDEWALK AREA AT A DISTANCE OF 1'-0" AROUND THE PERIMETER OF THE BASIN.
- (6) ALL REINFORCEMENT FOR ROOF SLAB IS #6 REINFORCING BARS UNLESS OTHERWISE SHOWN.
- (7) CONCRETE IS TO BE CLASS 40. REBARS- GRADE 60.
- (8) COVER FOR ALL REINFORCEMENT IS 2" CLEARANCE UNLESS OTHERWISE SPECIFIED.

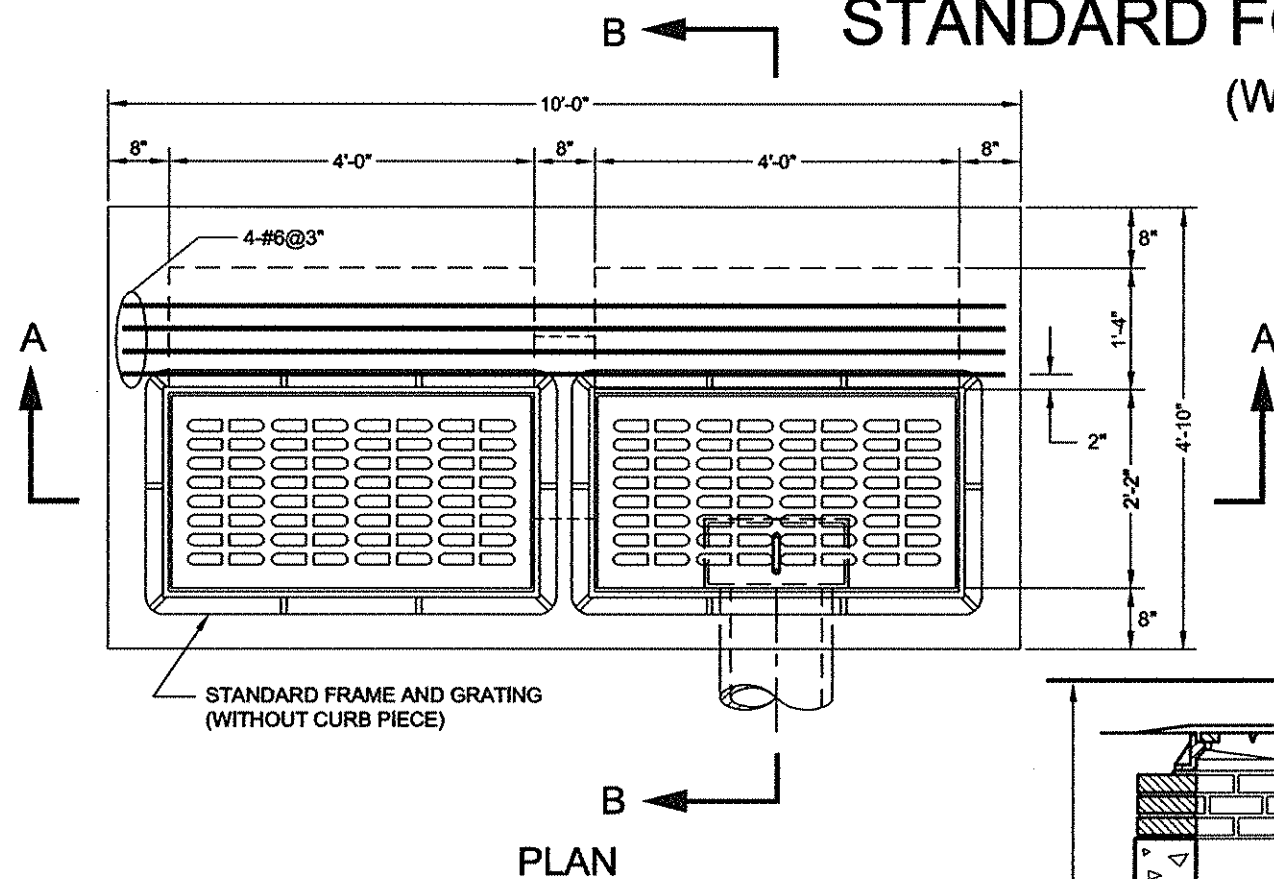
Thomas Wynne

EXECUTIVE DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION

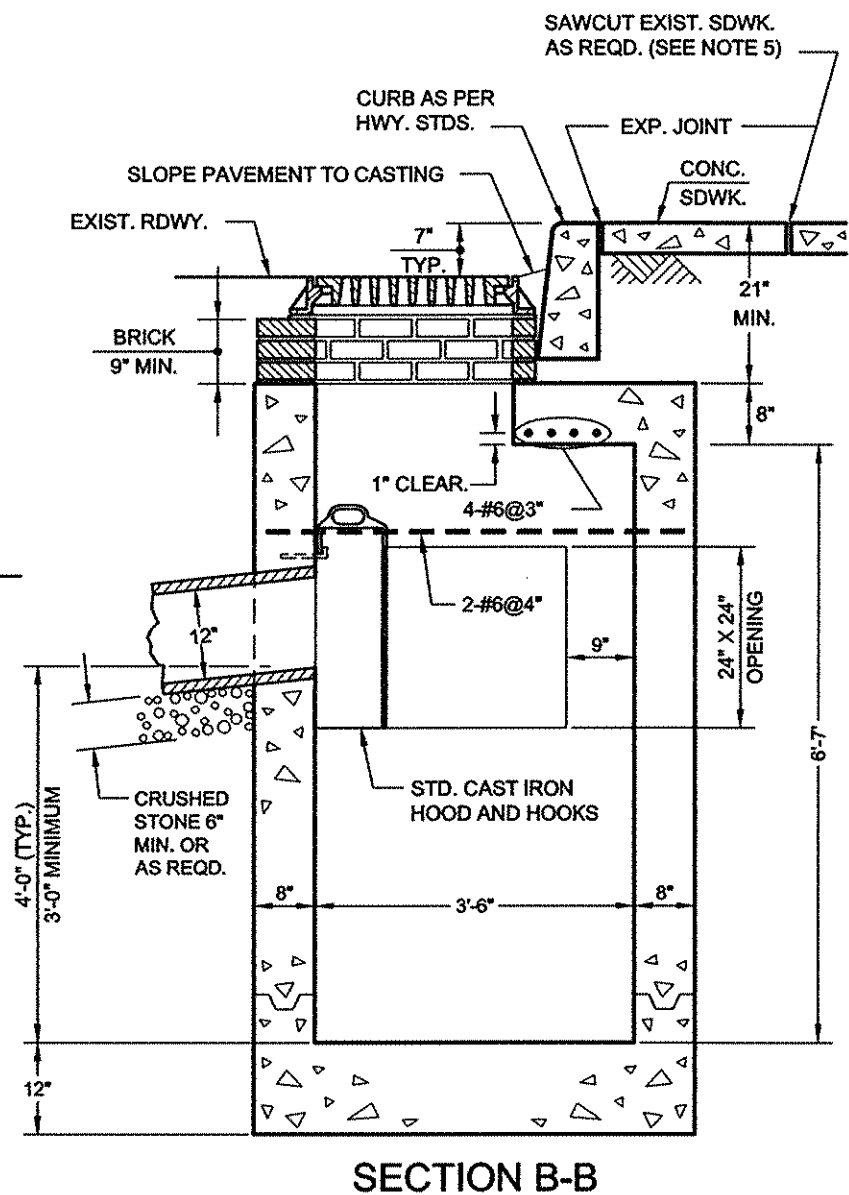
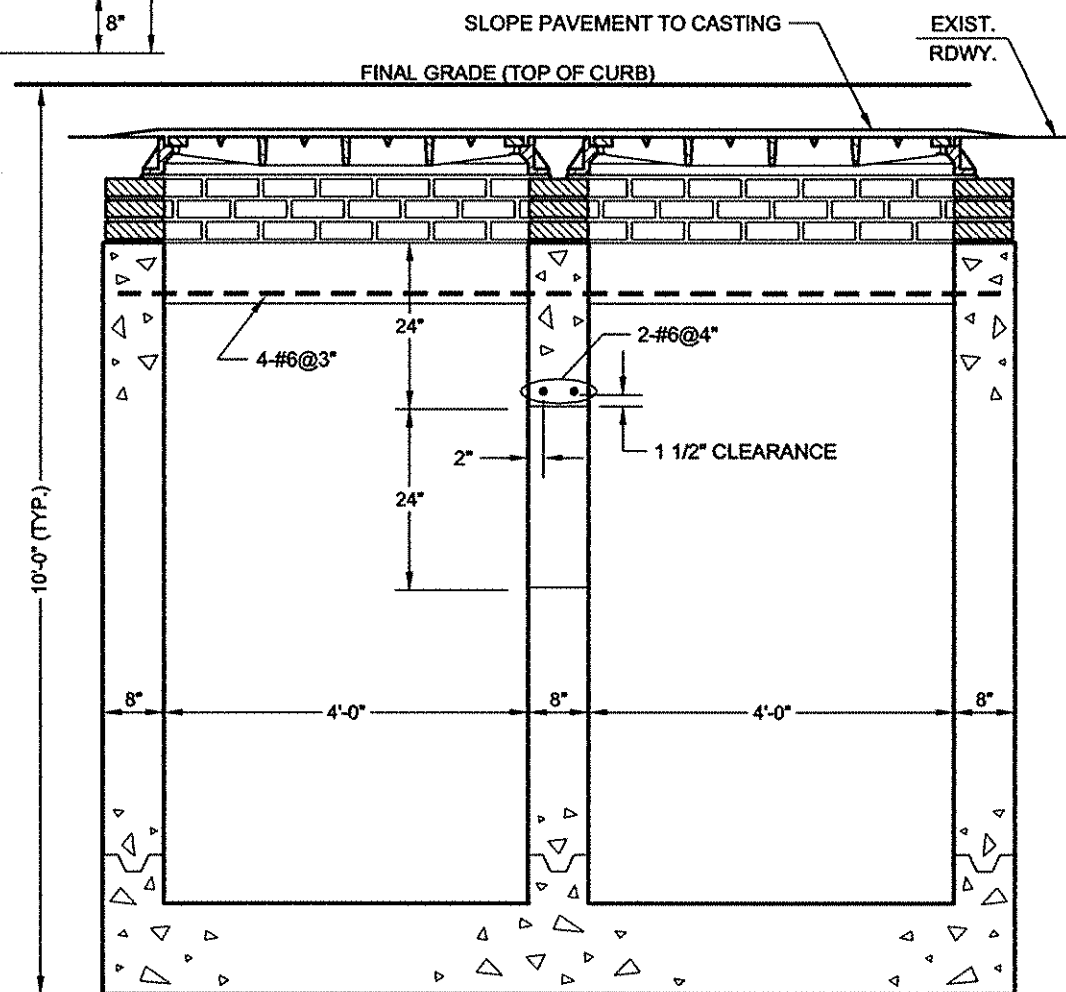
8/14/18

DATE _____

STANDARD FOR DOUBLE CATCH BASIN (WITHOUT CURB PIECE)



- NOTES:
- (1) LOCATION OF CURB SHALL BE AS SHOWN UNLESS OTHERWISE DIRECTED BY THE ENGINEER.
 - (2) LOCATION AND ANGLE OF BASIN CONNECTION MAY BE VARIED TO SUIT FIELD CONDITIONS.
 - (3) KEYED CONSTRUCTION JOINTS ARE REQUIRED BETWEEN ANY SUCCESSIVE POURS.
 - (4) THE MINIMUM DROP FROM BASIN TO SEWER SHALL BE 6".
 - (5) EXPANSION JOINTS ARE REQUIRED IN THE CONCRETE SIDEWALK AREA AT A DISTANCE OF 1'-0" AROUND THE PERIMETER OF THE BASIN.
 - (6) CONCRETE IS TO BE CLASS 40. REBARS- GRADE 60.
 - (7) COVER FOR ALL REINFORCEMENT IS 2" CLEARANCE UNLESS OTHERWISE SPECIFIED.



REVISED DECEMBER 2017-P. LEUNG
W. PATALANO/P. MOY

Gurdeep S. Saini P.E.
ASSOCIATE COMMISSIONER, DESIGN
DEPARTMENT OF DESIGN AND CONSTRUCTION

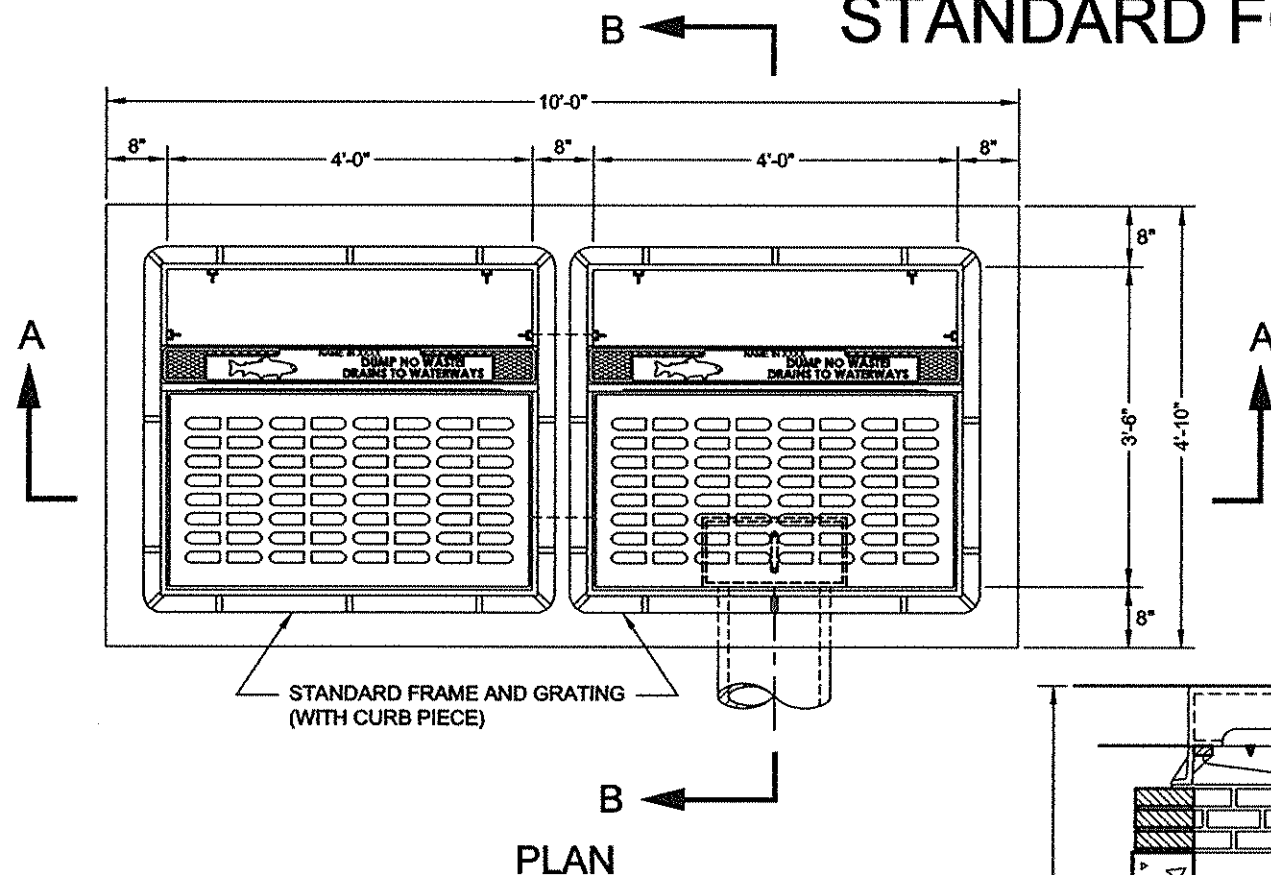
8/14/18
DATE

SECTION A-A

Thomas Wayne P.E.
EXECUTIVE DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION

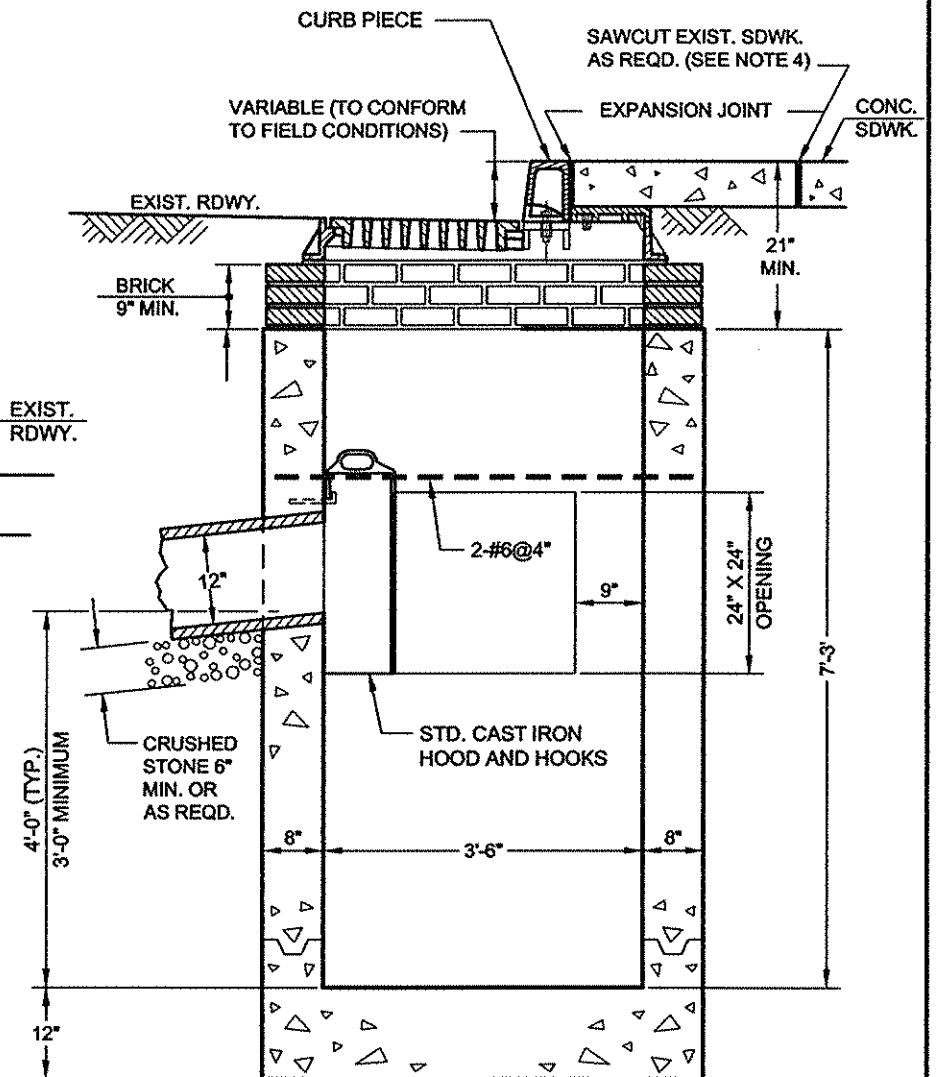
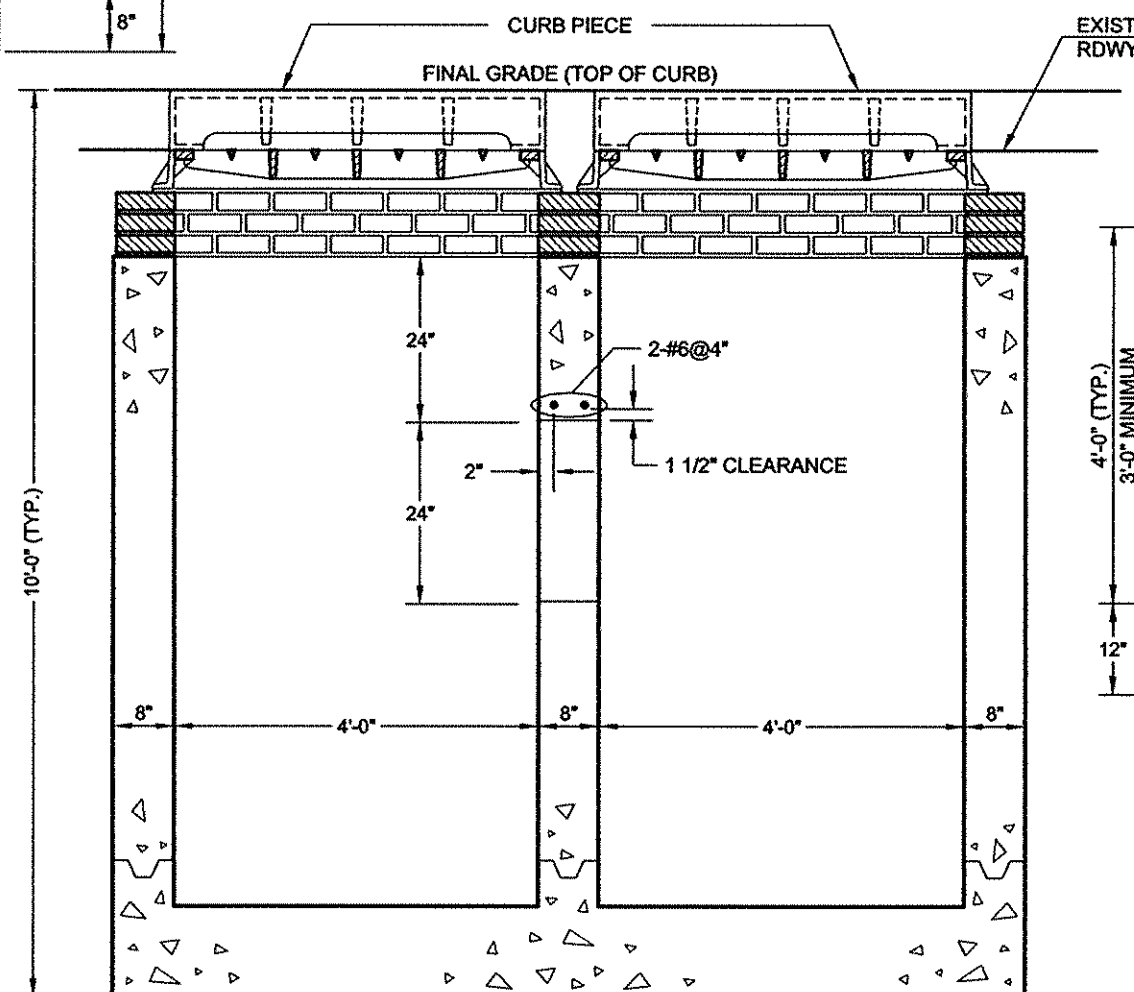
8/14/18
DATE

STANDARD FOR DOUBLE CATCH BASIN (WITH CURB PIECE)



NOTES:

- (1) LOCATION OF CURB SHALL BE AS SHOWN UNLESS OTHERWISE DIRECTED BY THE ENGINEER.
- (2) LOCATION AND ANGLE OF BASIN CONNECTION MAY BE VARIED TO SUIT FIELD CONDITIONS.
- (3) KEYED CONSTRUCTION JOINTS ARE REQUIRED BETWEEN ANY SUCCESSIVE POURS.
- (4) THE MINIMUM DROP FROM BASIN TO SEWER SHALL BE 6".
- (5) EXPANSION JOINTS ARE REQUIRED IN THE CONCRETE SIDEWALK AREA AT A DISTANCE OF 1'-0" AROUND THE PERIMETER OF THE BASIN.
- (6) CONCRETE IS TO BE CLASS 40. REBARS-GRADE 60.
- (7) COVER FOR ALL REINFORCEMENT IS 2" CLEARANCE UNLESS OTHERWISE SPECIFIED.



SECTION B-B

SECTION A-A

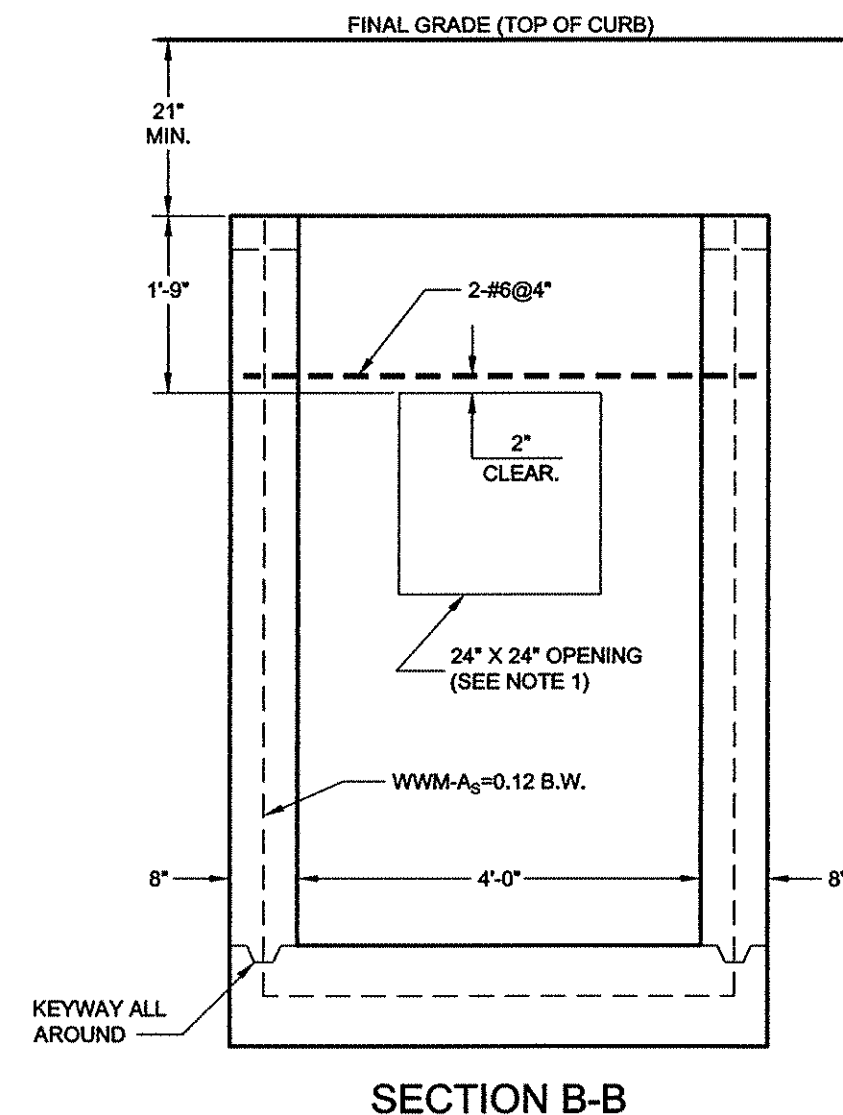
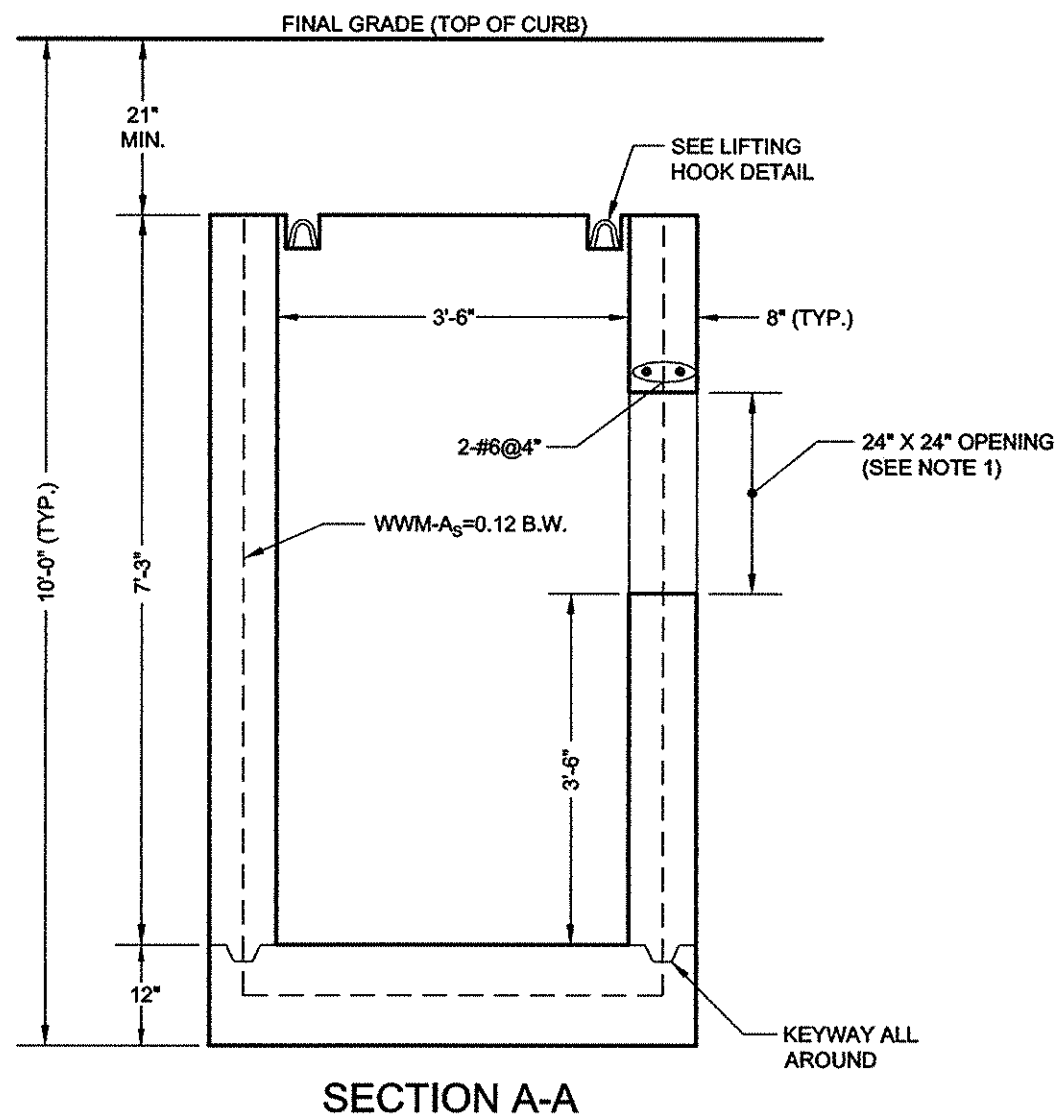
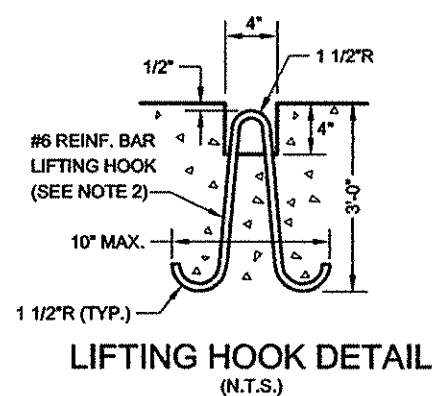
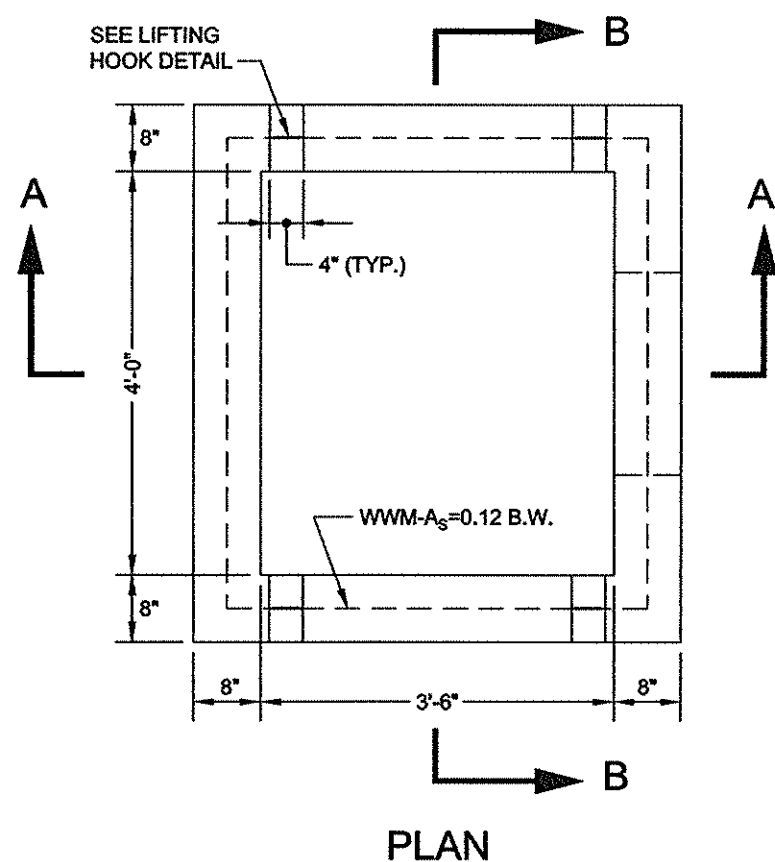
Gundip S. Saini
P.E.
ASSOCIATE COMMISSIONER, DESIGN
DEPARTMENT OF DESIGN AND CONSTRUCTION

8/14/18
DATE

Thomas Wayne
P.E.
EXECUTIVE DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION

8/14/18
DATE

STANDARD FOR PRECAST TYPE 1 CATCH BASIN



NOTES:

- (1) LOCATION OF OPENING SHALL BE DETERMINED PRIOR TO MANUFACTURE OF BASIN BY LOCATION AND ANGLE OF BASIN CONNECTION REQUIRED DUE TO FIELD CONDITIONS AND OPENING SHALL BE PLACED IN THE PROPER WALL AT THE TIME OF MANUFACTURE.
- (2) LIFTING HOOKS SHALL BE LOCATED IN THE SECTION AS PER MANUFACTURERS RECOMMENDATIONS AND GROUTED PRIOR TO BACKFILLING. (FOUR (4) LIFTING HOOKS SHALL BE PROVIDED FOR EACH SECTION AND SHALL BE PLACED SYMMETRICALLY AND IN SUCH A MANNER AS TO PROVIDE FOR THE EVEN LIFTING OF THE SECTION.)
- (3) CONCRETE IS TO BE CLASS 40 AND 5% AIR ENTRAINED. REBARS-GRADE 60. WWM-F_s=65,000 PSI.
- (4) COVER FOR ALL REINFORCEMENT IS 2" CLEARANCE UNLESS OTHERWISE SPECIFIED.

Gundip S. Saini
ASSOCIATE COMMISSIONER, DESIGN
DEPARTMENT OF DESIGN AND CONSTRUCTION

P.E.

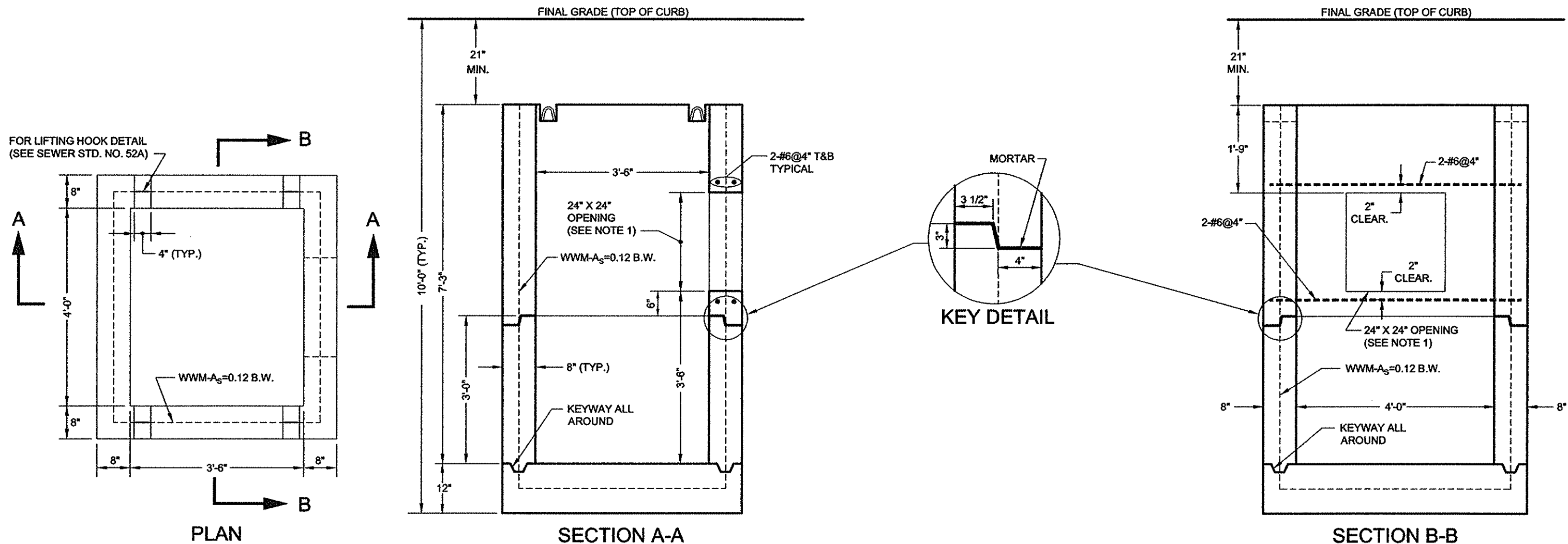
8/14/18
DATE

Thomas Wynne
EXECUTIVE DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION

P.E.

8/14/18
DATE

STANDARD FOR SPLIT PRECAST TYPE 1 CATCH BASIN



NOTES:

- (1) LOCATION OF OPENING SHALL BE DETERMINED PRIOR TO MANUFACTURE OF BASIN BY LOCATION AND ANGLE OF BASIN CONNECTION REQUIRED DUE TO FIELD CONDITIONS AND OPENING SHALL BE PLACED IN THE PROPER WALL AT THE TIME OF MANUFACTURE.
- (2) LIFTING HOOKS SHALL BE LOCATED IN THE SECTION AS PER MANUFACTURERS RECOMMENDATIONS AND GROUTED PRIOR TO BACKFILLING. (FOUR (4) LIFTING HOOKS SHALL BE PROVIDED FOR EACH SECTION AND SHALL BE PLACED SYMMETRICALLY AND IN SUCH A MANNER AS TO PROVIDE FOR THE EVEN LIFTING OF THE SECTION.)
- (3) SPLIT BASINS WILL ONLY BE PERMITTED WHERE STANDARD BASINS CAN NOT BE INSTALLED DUE TO VERTICAL HEIGHT RESTRICTIONS.
- (4) CONCRETE IS TO BE CLASS 40 AND 5% AIR ENTRAINED. REBARS-GRADE 60. WWM-F_s=65,000 PSI.
- (5) COVER FOR ALL REINFORCEMENT IS 2" CLEARANCE UNLESS OTHERWISE SPECIFIED.

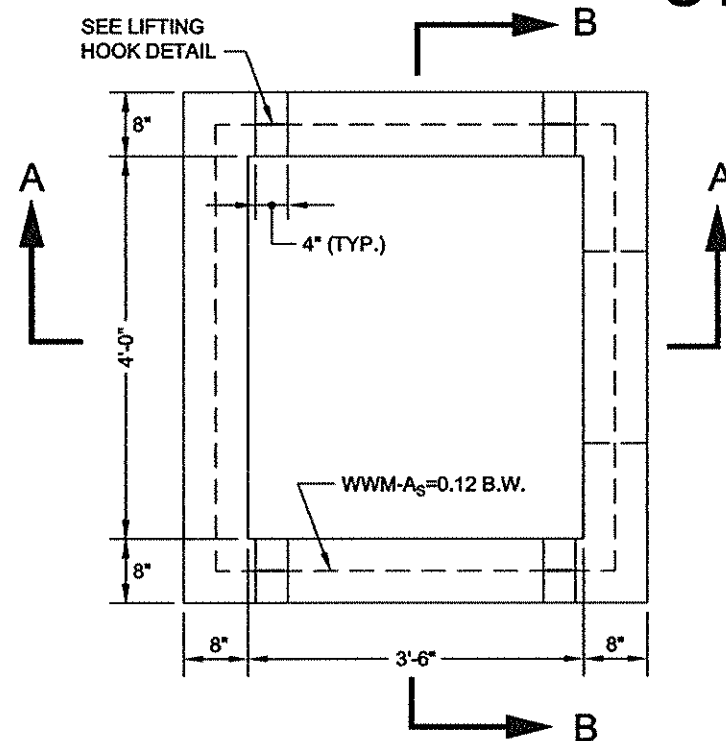
Gurdip S. Saini
P.E.
ASSOCIATE COMMISSIONER, DESIGN
DEPARTMENT OF DESIGN AND CONSTRUCTION

8/14/18
DATE

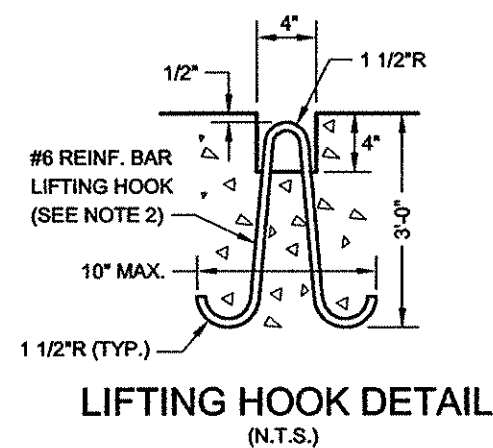
Thomas Wayne
P.E.
EXECUTIVE DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION

8/14/18
DATE

STANDARD FOR PRECAST TYPE 2 CATCH BASIN

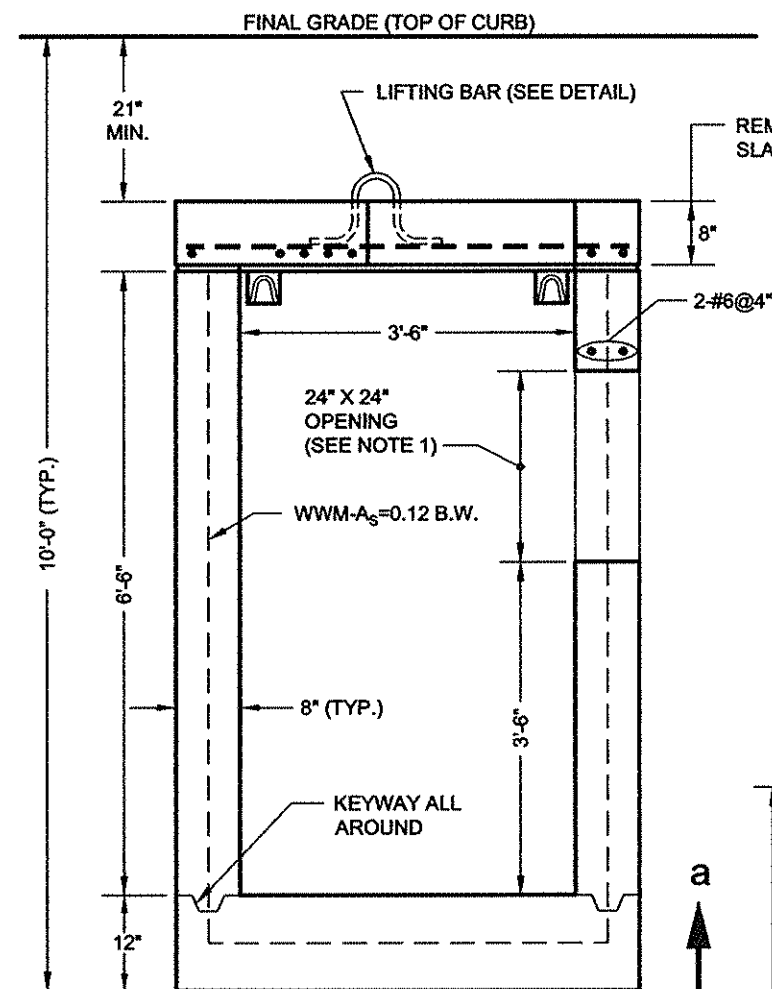


PLAN

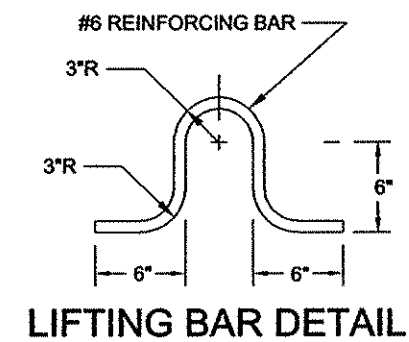
LIFTING HOOK DETAIL
(N.T.S.)

NOTES:

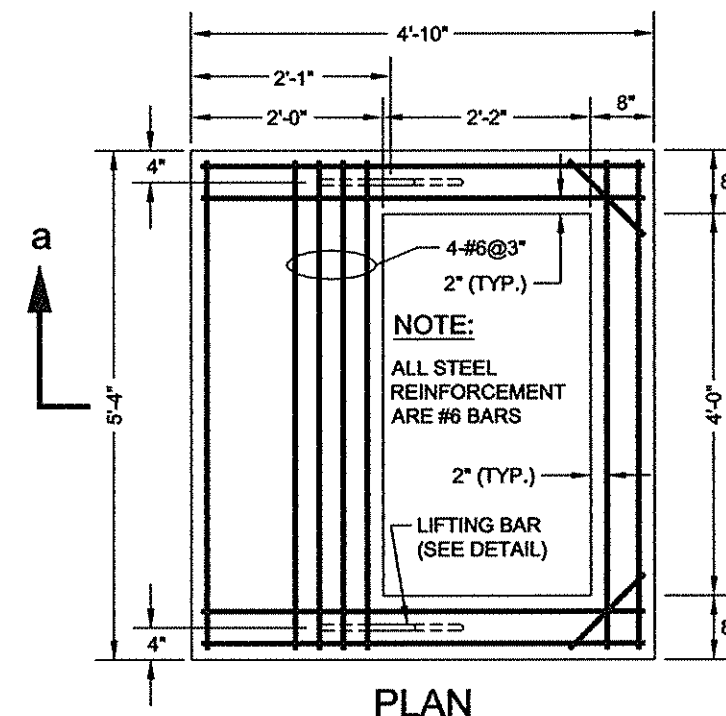
- (1) LOCATION OF OPENING SHALL BE DETERMINED PRIOR TO MANUFACTURE OF BASIN BY LOCATION AND ANGLE OF BASIN CONNECTION REQUIRED DUE TO FIELD CONDITIONS AND OPENING SHALL BE PLACED IN THE PROPER WALL AT THE TIME OF MANUFACTURE.
- (2) LIFTING HOOKS SHALL BE LOCATED IN THE SECTION AS PER MANUFACTURERS RECOMMENDATIONS AND GROUTED PRIOR TO BACKFILLING. (FOUR (4) LIFTING HOOKS SHALL BE PROVIDED FOR EACH SECTION AND SHALL BE PLACED SYMMETRICALLY AND IN SUCH A MANNER AS TO PROVIDE FOR THE EVEN LIFTING OF THE SECTION.)
- (3) CONCRETE IS TO BE CLASS 40 AND 5% AIR ENTRAINED. REBARS-GRADE 60. WWM-F₈=65,000 PSI.
- (4) COVER FOR ALL REINFORCEMENT IS 2" CLEARANCE UNLESS OTHERWISE SPECIFIED.



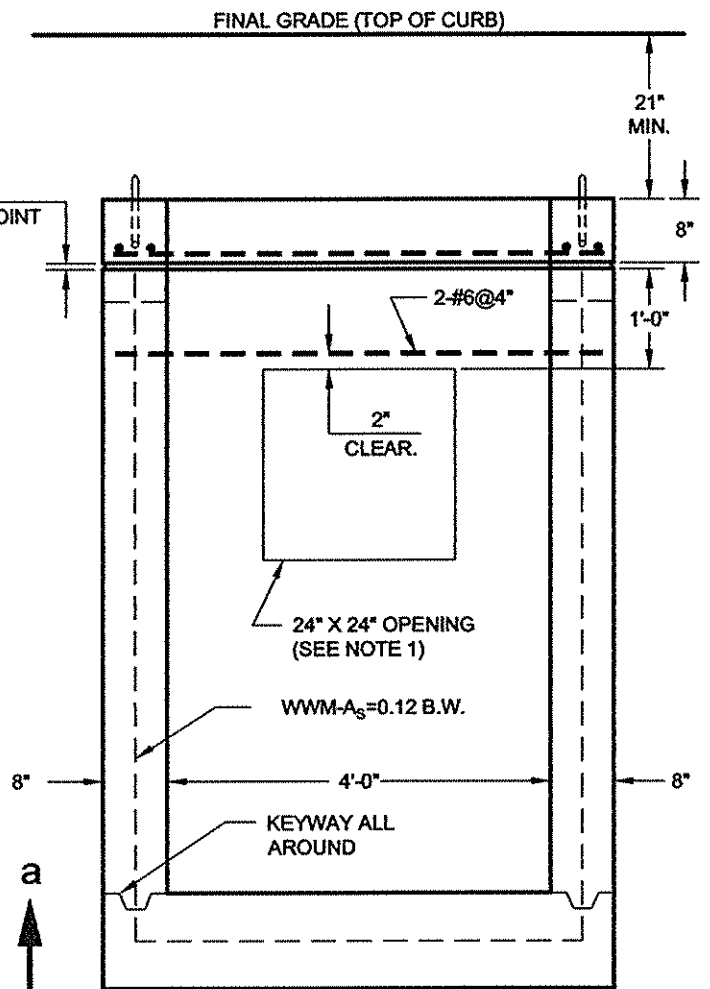
SECTION A-A



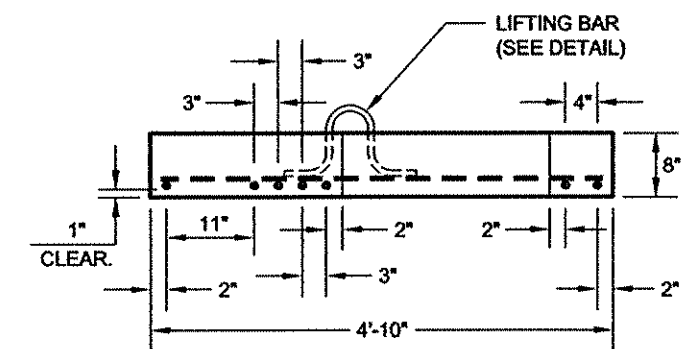
LIFTING BAR DETAIL



PLAN



SECTION B-B

SECTION a-a
REMOVABLE PRECAST TYPE 2 SLAB

Sanjay S. Seini
ASSOCIATE COMMISSIONER, DESIGN
DEPARTMENT OF DESIGN AND CONSTRUCTION

P.E.

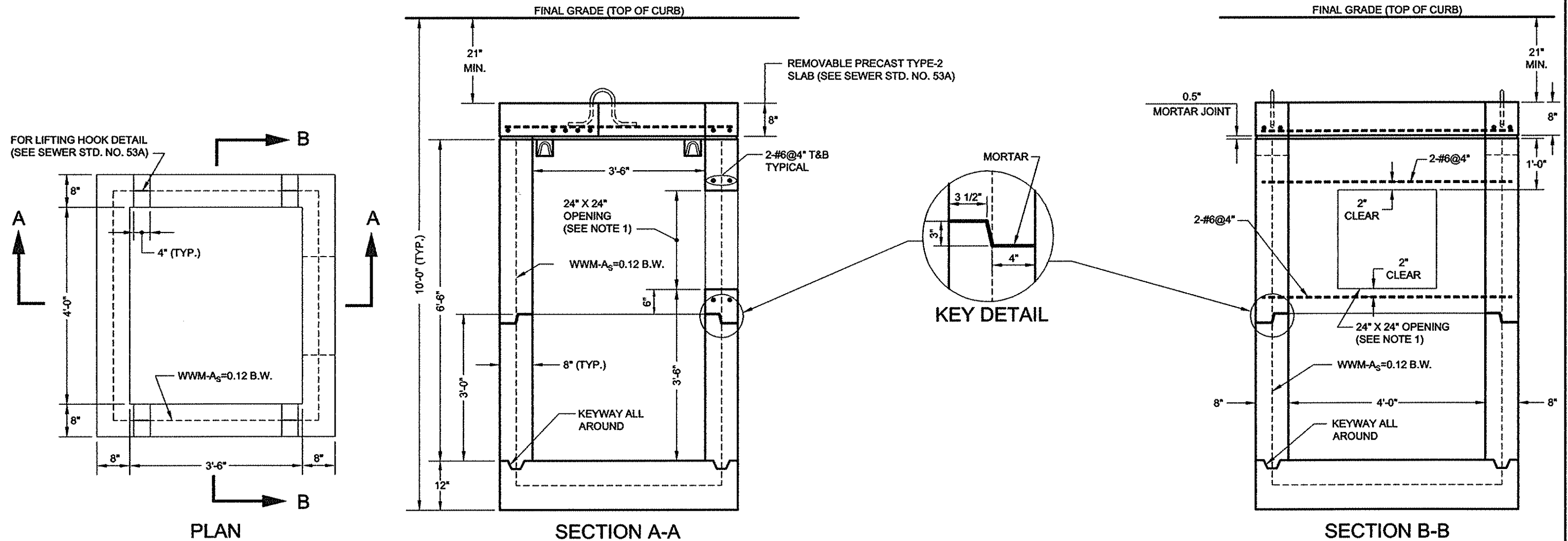
8/14/18
DATE

Thomas Wynne
EXECUTIVE DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION

P.E.

8/14/18
DATE

STANDARD FOR SPLIT PRECAST TYPE 2 CATCH BASIN



NOTES:

- (1) LOCATION OF OPENING SHALL BE DETERMINED PRIOR TO MANUFACTURE OF BASIN BY LOCATION AND ANGLE OF BASIN CONNECTION REQUIRED DUE TO FIELD CONDITIONS AND OPENING SHALL BE PLACED IN THE PROPER WALL AT THE TIME OF MANUFACTURE.
- (2) LIFTING HOOKS SHALL BE LOCATED IN THE SECTION AS PER MANUFACTURERS RECOMMENDATIONS AND GROUTED PRIOR TO BACKFILLING. (FOUR (4) LIFTING HOOKS SHALL BE PROVIDED FOR EACH SECTION AND SHALL BE PLACED SYMMETRICALLY AND IN SUCH A MANNER AS TO PROVIDE FOR THE EVEN LIFTING OF THE SECTION.)
- (3) SPLIT BASINS WILL ONLY BE PERMITTED WHERE STANDARD BASINS CAN NOT BE INSTALLED DUE TO VERTICAL HEIGHT RESTRICTIONS.
- (4) CONCRETE IS TO BE CLASS 40 AND 5% AIR ENTRAINED. REBARS-GRADE 60. WWM-F_s=65,000 PSI.
- (5) COVER FOR ALL REINFORCEMENT IS 2" CLEARANCE UNLESS OTHERWISE SPECIFIED.

Gurdeep S. Seervi
P.E.

ASSOCIATE COMMISSIONER, DESIGN
DEPARTMENT OF DESIGN AND CONSTRUCTION

8/14/18

DATE

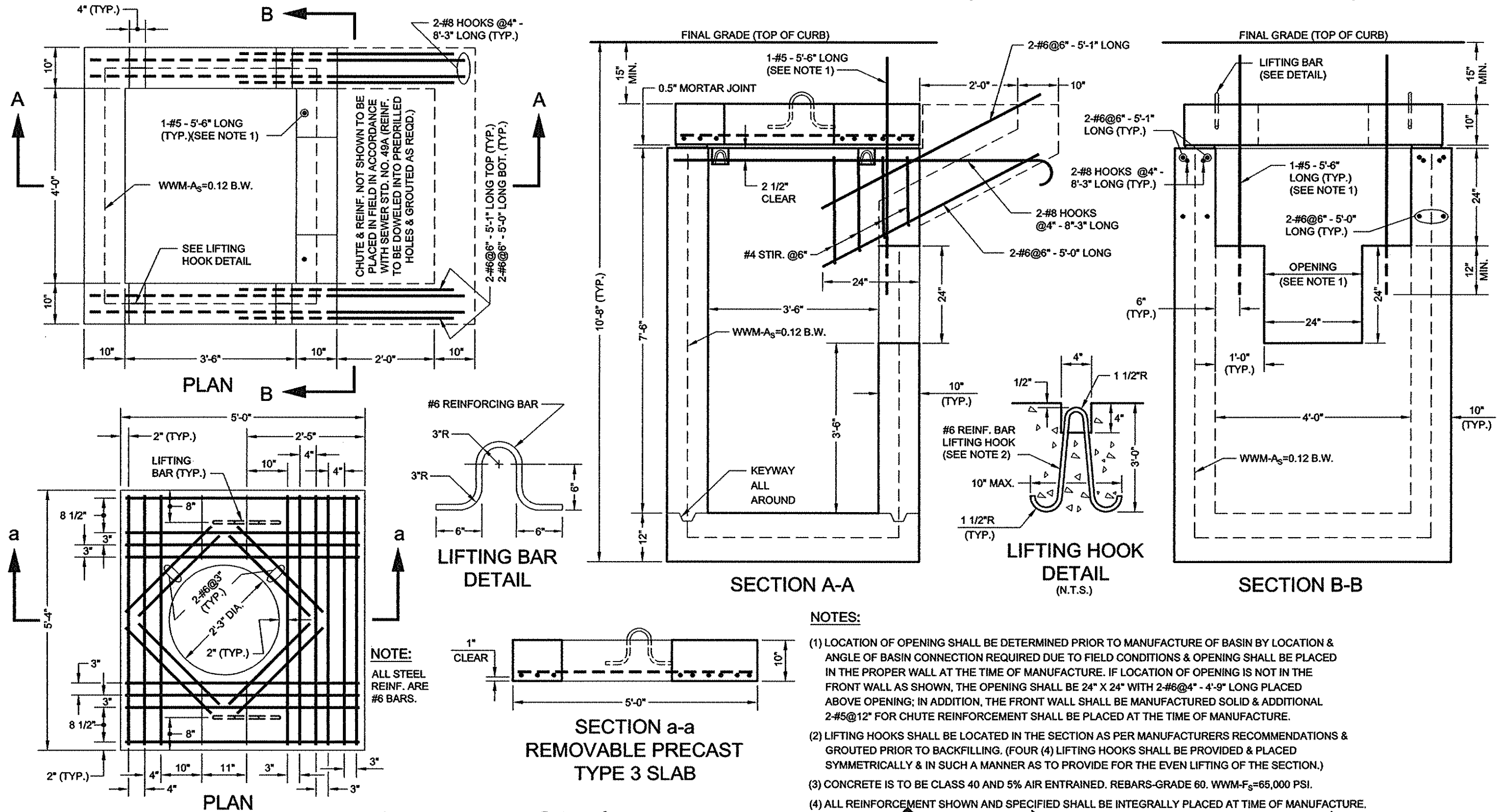
Thomas Wyne
P.E.

EXECUTIVE DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION

8/14/18

DATE

STANDARD FOR PRECAST TYPE 3 CATCH BASIN (WITHOUT CURB PIECE)



Associate Commissioner, Design
Department of Design and Construction

DATE

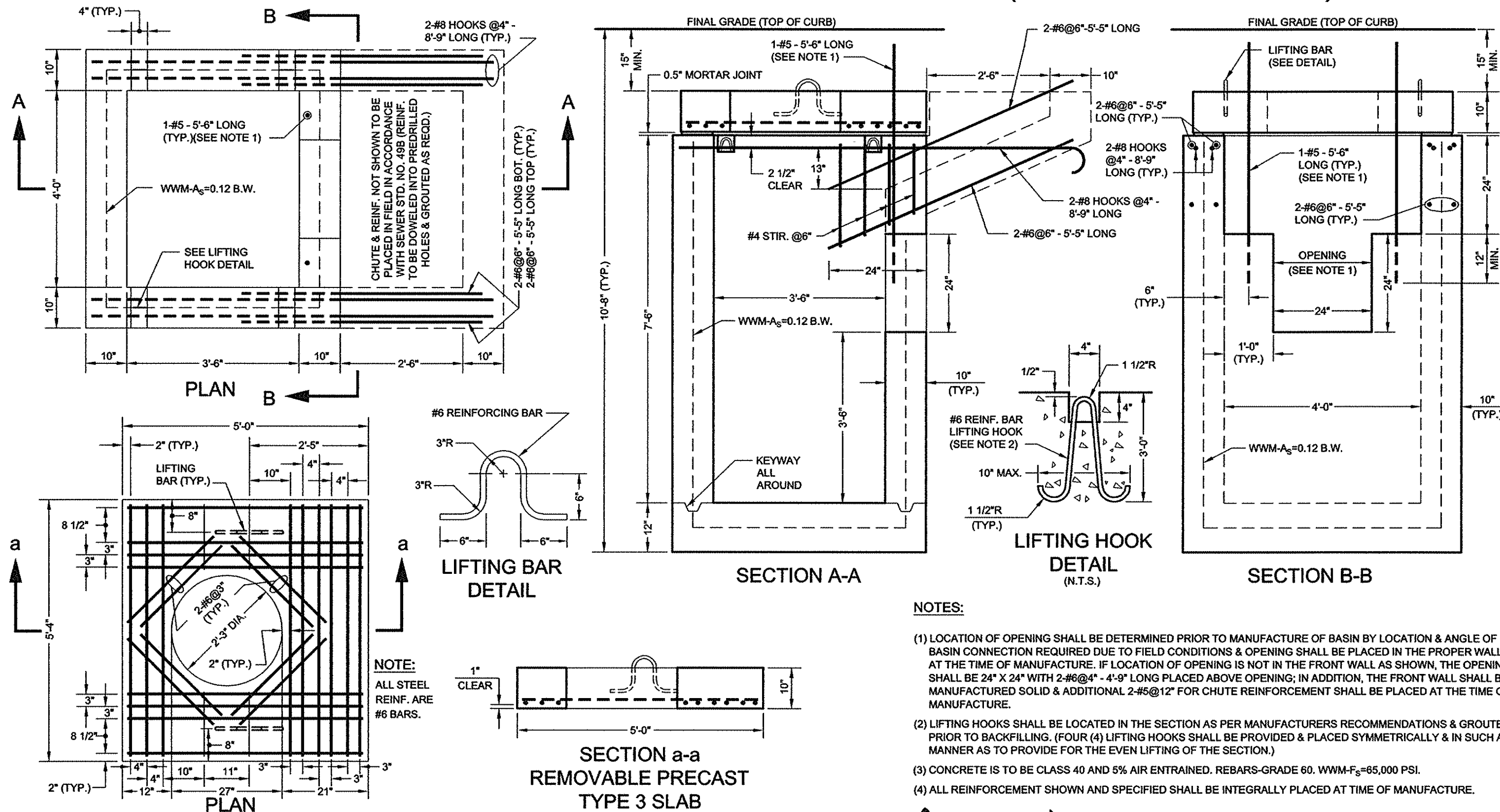
8/14/18

Executive Director of Engineering
Department of Environmental Protection

DATE

8/14/18

STANDARD FOR PRECAST TYPE 3 CATCH BASIN (WITH CURB PIECE)



NOTES:

- (1) LOCATION OF OPENING SHALL BE DETERMINED PRIOR TO MANUFACTURE OF BASIN BY LOCATION & ANGLE OF BASIN CONNECTION REQUIRED DUE TO FIELD CONDITIONS & OPENING SHALL BE PLACED IN THE PROPER WALL AT THE TIME OF MANUFACTURE. IF LOCATION OF OPENING IS NOT IN THE FRONT WALL AS SHOWN, THE OPENING SHALL BE 24" X 24" WITH 2-#6 @ 4" - 4'-9" LONG PLACED ABOVE OPENING; IN ADDITION, THE FRONT WALL SHALL BE MANUFACTURED SOLID & ADDITIONAL 2-#5 @ 12" FOR CHUTE REINFORCEMENT SHALL BE PLACED AT THE TIME OF MANUFACTURE.
- (2) LIFTING HOOKS SHALL BE LOCATED IN THE SECTION AS PER MANUFACTURER'S RECOMMENDATIONS & GROUTED PRIOR TO BACKFILLING. (FOUR (4) LIFTING HOOKS SHALL BE PROVIDED & PLACED SYMMETRICALLY & IN SUCH A MANNER AS TO PROVIDE FOR THE EVEN LIFTING OF THE SECTION.)
- (3) CONCRETE IS TO BE CLASS 40 AND 5% AIR ENTRAINED. REBARS-GRADE 60. WWM-F_s=65,000 PSI.
- (4) ALL REINFORCEMENT SHOWN AND SPECIFIED SHALL BE INTEGRALLY PLACED AT TIME OF MANUFACTURE.

Sanjiv S. Scriver
ASSOCIATE COMMISSIONER, DESIGN
DEPARTMENT OF DESIGN AND CONSTRUCTION

P.E.

8/14/18
DATE

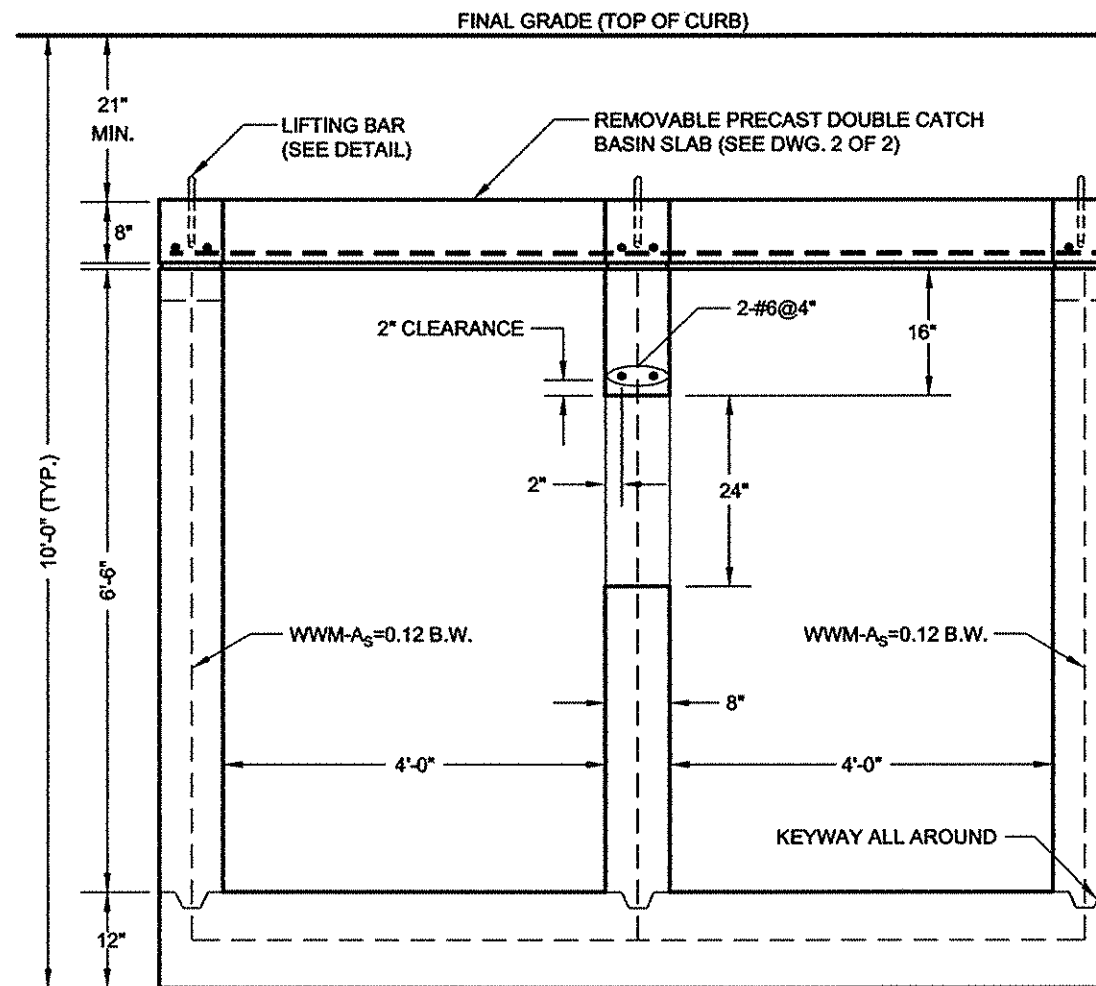
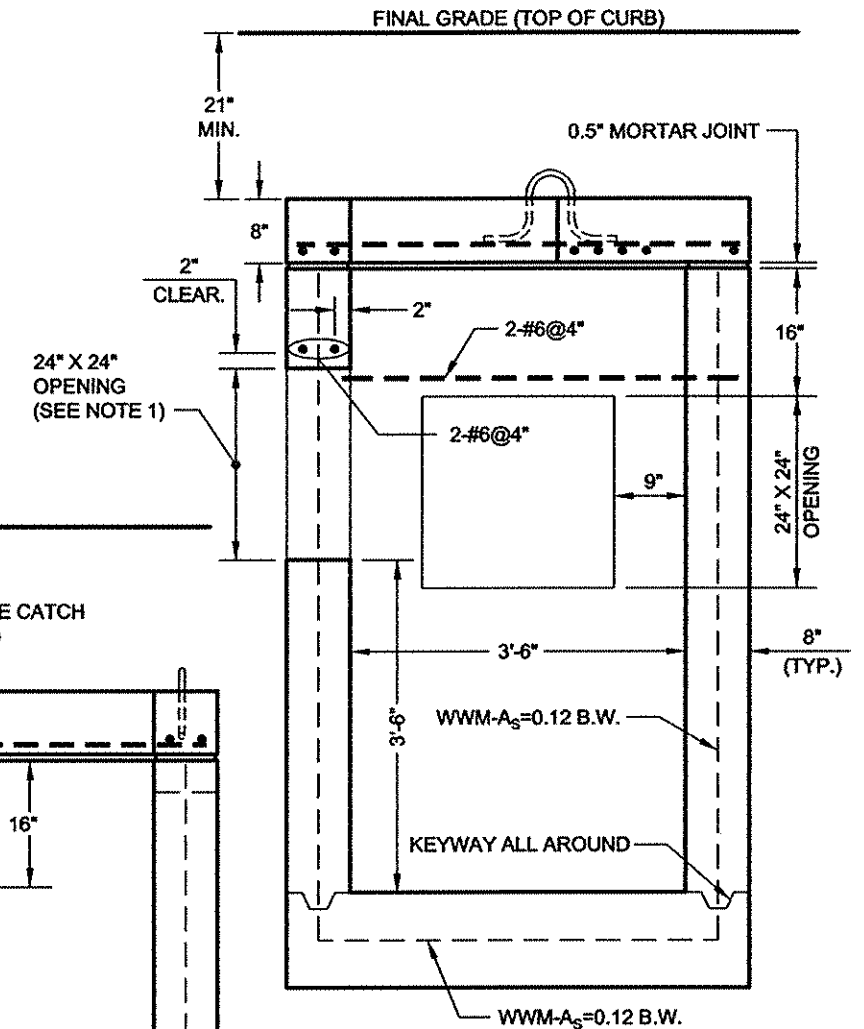
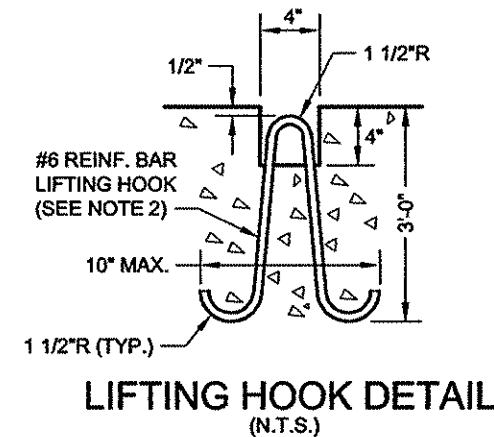
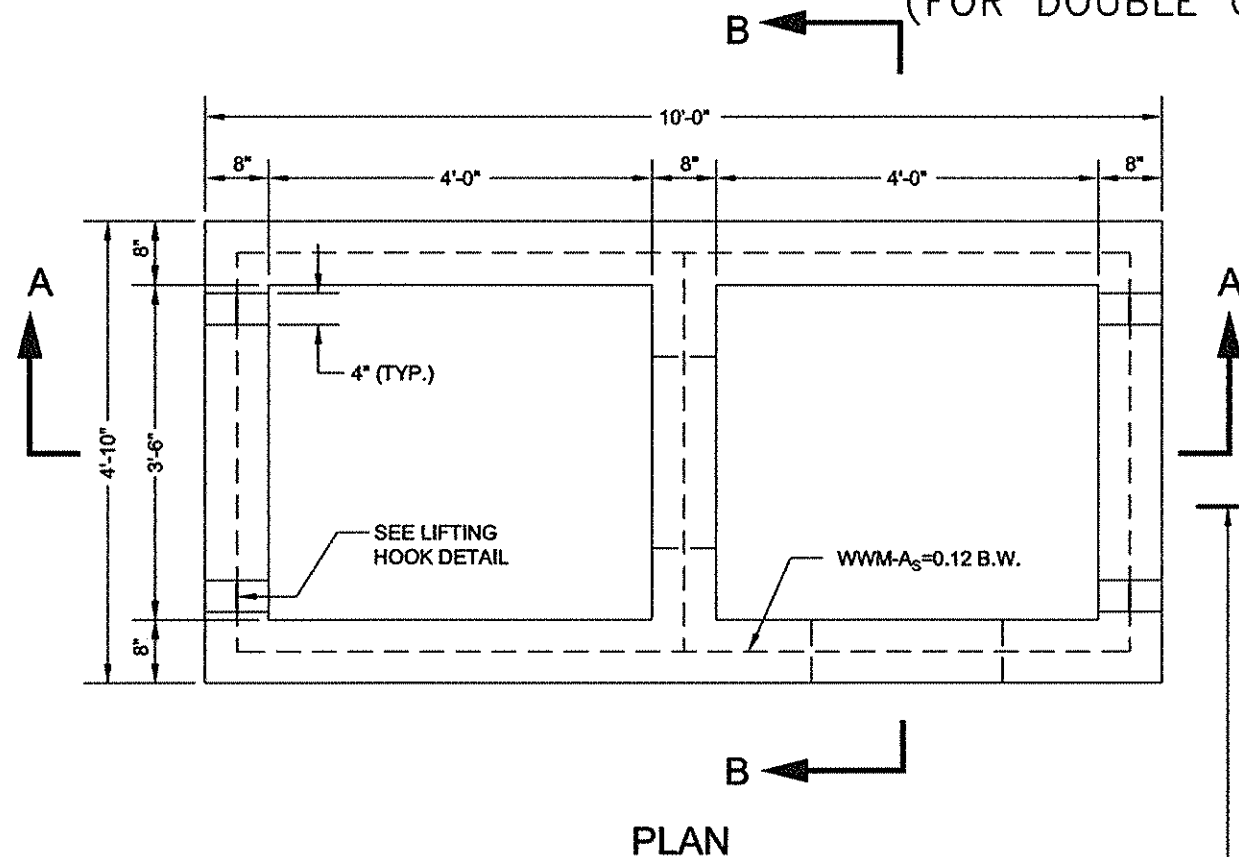
Thomas Wyne
EXECUTIVE DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION

P.E.

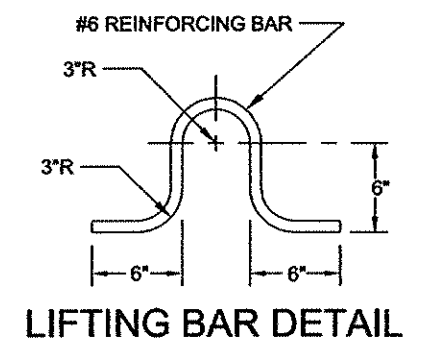
8/14/18
DATE

STANDARD FOR PRECAST DOUBLE CATCH BASIN (DWG. 1 OF 2)

(FOR DOUBLE CATCH BASIN WITHOUT CURB PIECE)



SECTION B-B



NOTES:

- (1) LOCATION OF OPENING SHALL BE DETERMINED PRIOR TO MANUFACTURE OF BASIN BY LOCATION AND ANGLE OF BASIN CONNECTION REQUIRED DUE TO FIELD CONDITIONS AND OPENING SHALL BE PLACED IN THE PROPER WALL AT THE TIME OF MANUFACTURE.
- (2) LIFTING HOOKS SHALL BE LOCATED IN THE SECTION AS PER MANUFACTURER'S RECOMMENDATIONS AND GROUTED PRIOR TO BACKFILLING. (FOUR (4) LIFTING HOOKS SHALL BE PROVIDED FOR EACH SECTION AND SHALL BE PLACED SYMMETRICALLY AND IN SUCH A MANNER AS TO PROVIDE FOR THE EVEN LIFTING OF THE SECTIONS.)
- (3) CONCRETE IS TO BE CLASS 40 AND 5% AIR ENTRAINED. REBARS-GRADE 60. WWM-F_s=65,000 PSI.

Gurdeep S. Saini
ASSOCIATE COMMISSIONER, DESIGN
DEPARTMENT OF DESIGN AND CONSTRUCTION

P.E.

8/14/18
DATE

SECTION A-A

Thomas W. Lyons
EXECUTIVE DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION

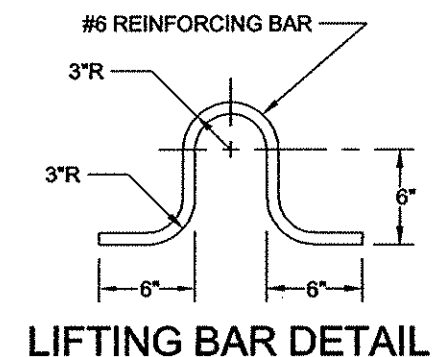
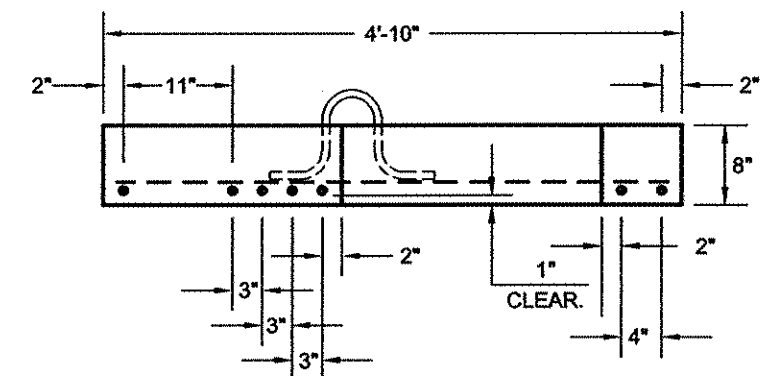
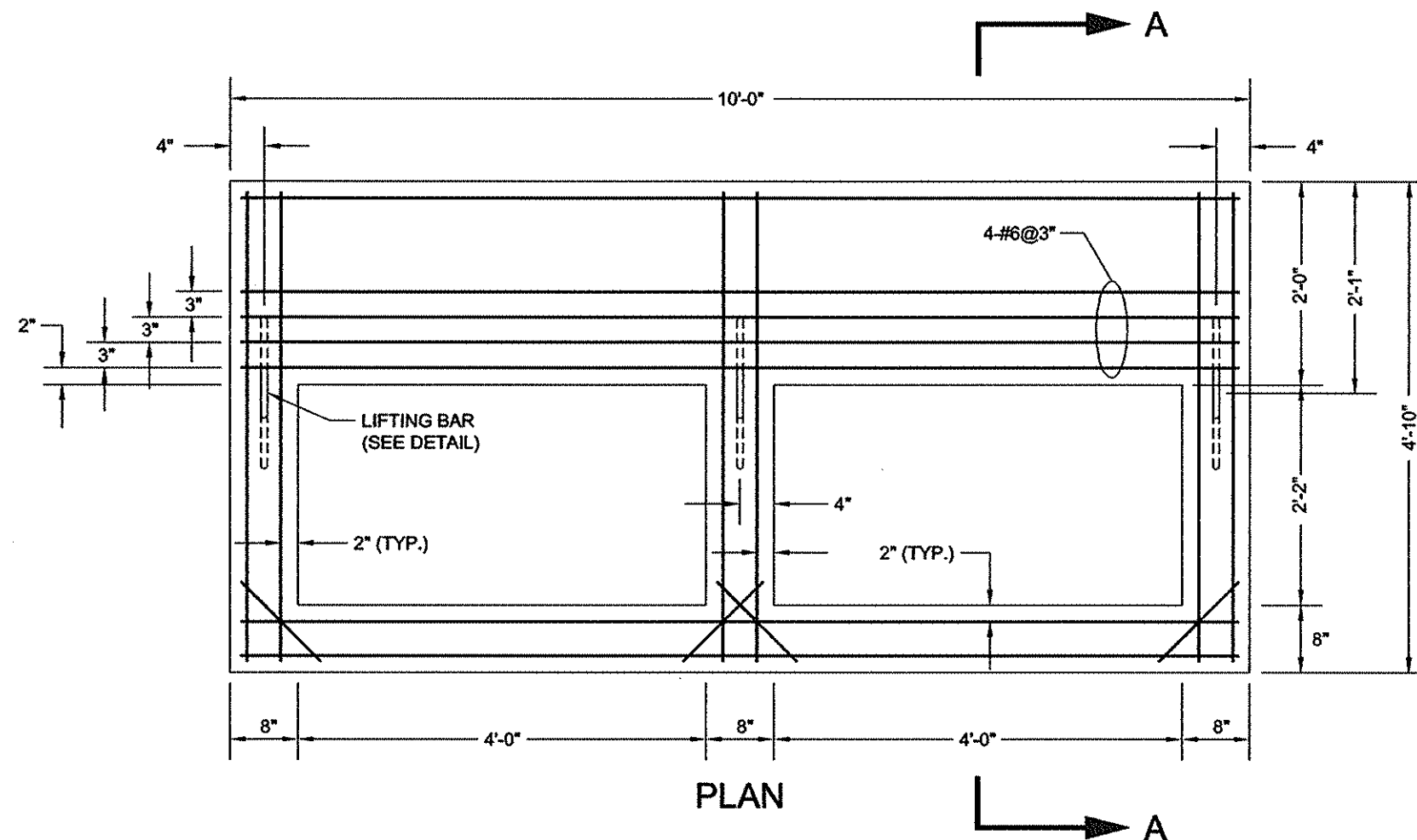
P.E.

8/14/18
DATE

CITY OF NEW YORK
DEPARTMENT OF ENVIRONMENTAL PROTECTION

STANDARD FOR PRECAST DOUBLE CATCH BASIN (DWG. 2 OF 2)

(FOR DOUBLE CATCH BASIN WITHOUT CURB PIECE)
(REMOVABLE PRECAST DOUBLE CATCH BASIN SLAB)



NOTES:

- (1) ALL STEEL REINFORCEMENT ARE #6 BARS.
- (2) CONCRETE IS TO BE CLASS 40. REBARS-GRADE 60.

Sandeep S. Saini
P.E.
ASSOCIATE COMMISSIONER, DESIGN
DEPARTMENT OF DESIGN AND CONSTRUCTION

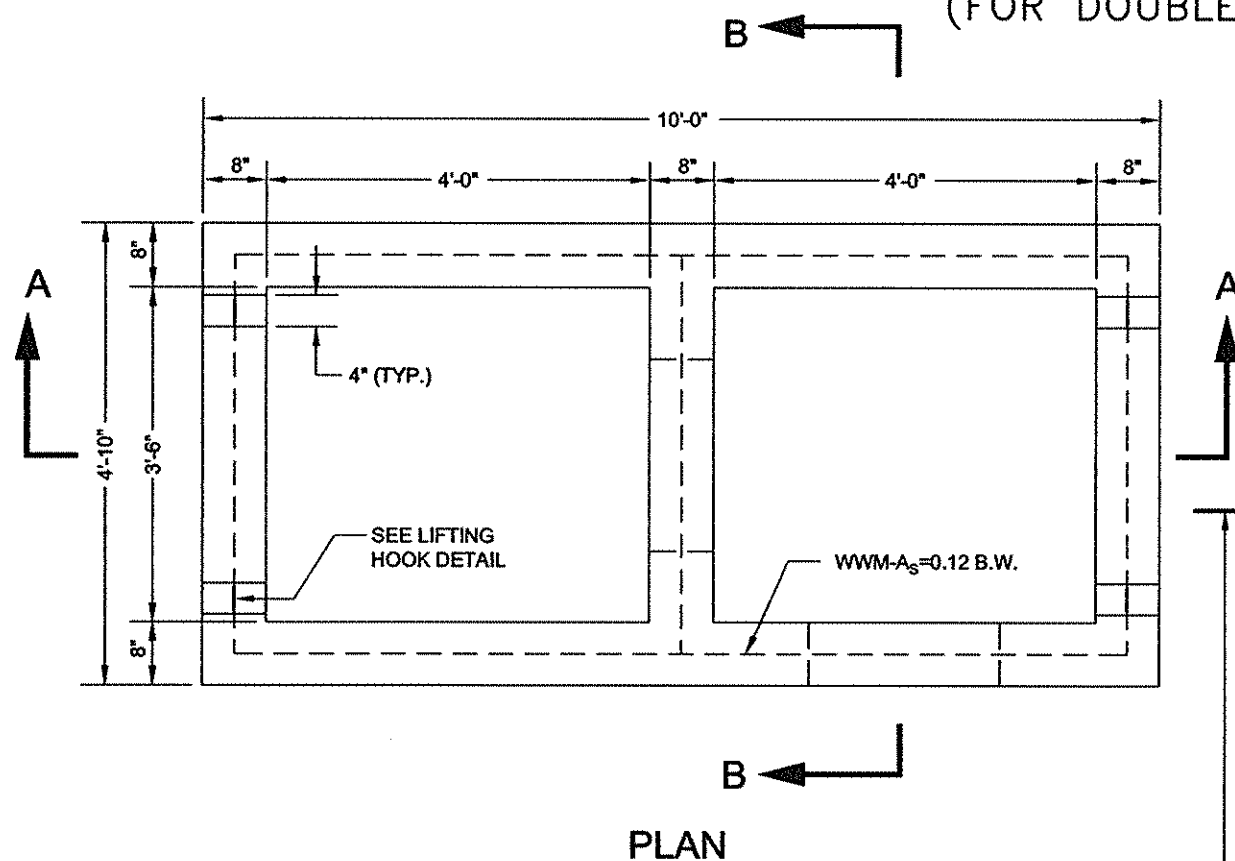
8/14/18
DATE

Thomas Wynne
P.E.
EXECUTIVE DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION

8/14/18
DATE

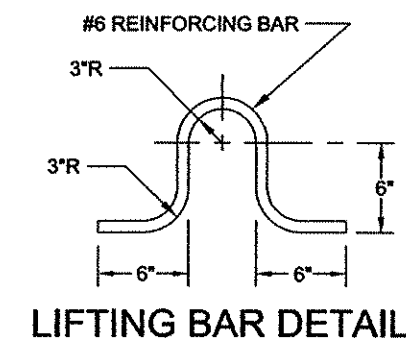
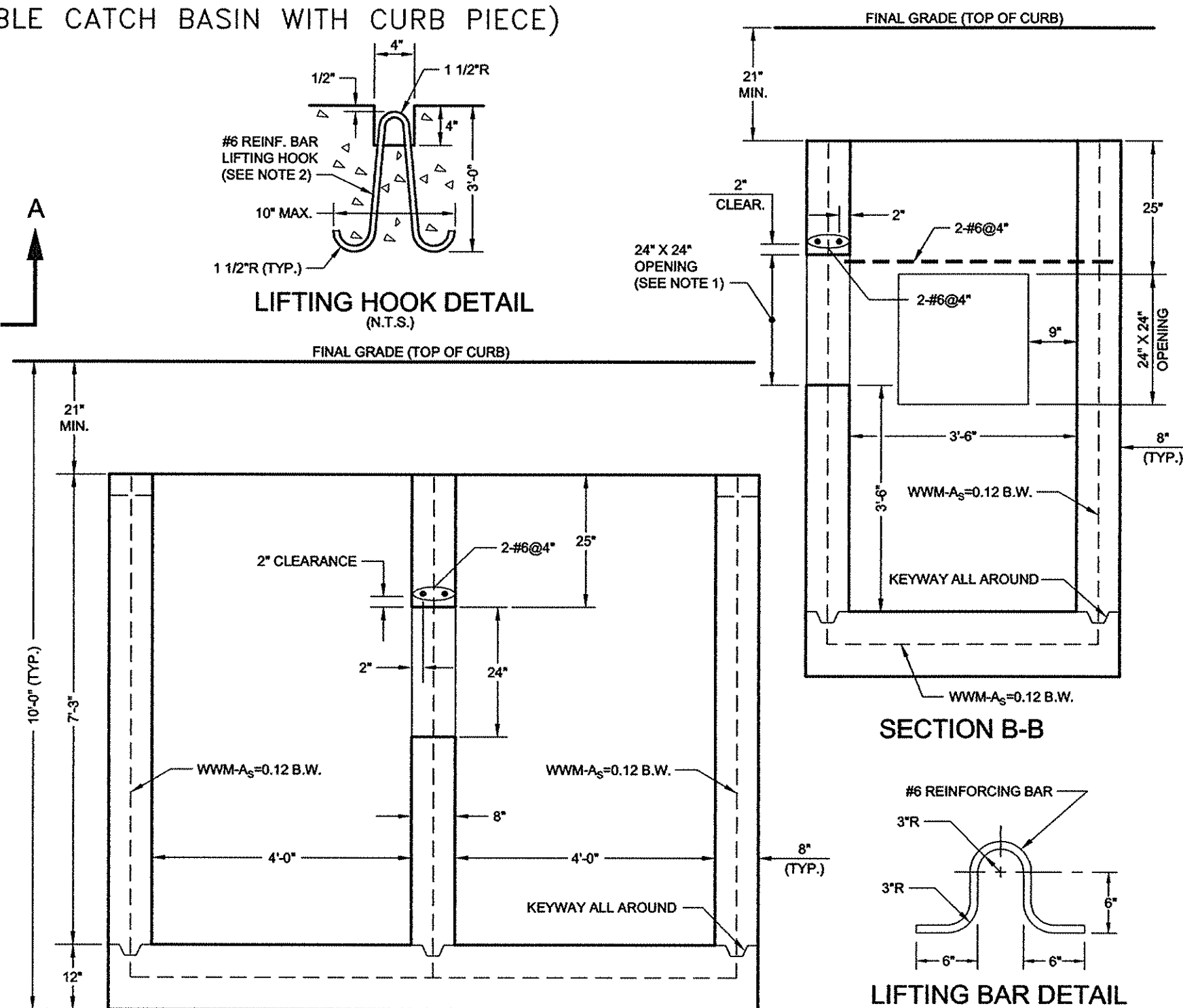
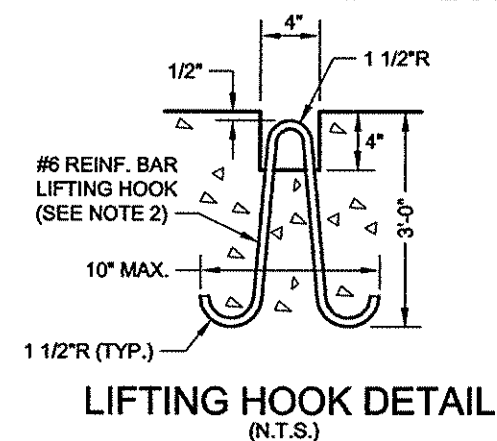
STANDARD FOR PRECAST DOUBLE CATCH BASIN

(FOR DOUBLE CATCH BASIN WITH CURB PIECE)



NOTES:

- (1) LOCATION OF OPENING SHALL BE DETERMINED PRIOR TO MANUFACTURE OF BASIN BY LOCATION AND ANGLE OF BASIN CONNECTION REQUIRED DUE TO FIELD CONDITIONS AND OPENING SHALL BE PLACED IN THE PROPER WALL AT THE TIME OF MANUFACTURE.
- (2) LIFTING HOOKS SHALL BE LOCATED IN THE SECTION AS PER MANUFACTURER'S RECOMMENDATIONS AND GROUTED PRIOR TO BACKFILLING. (FOUR (4) LIFTING HOOKS SHALL BE PROVIDED FOR EACH SECTION AND SHALL BE PLACED SYMMETRICALLY AND IN SUCH A MANNER AS TO PROVIDE FOR THE EVEN LIFTING OF THE SECTIONS.)
- (3) CONCRETE IS TO BE CLASS 40 AND 5% AIR ENTRAINED. REBARS-GRADE 60. WWM-F_s=65,000 PSI.



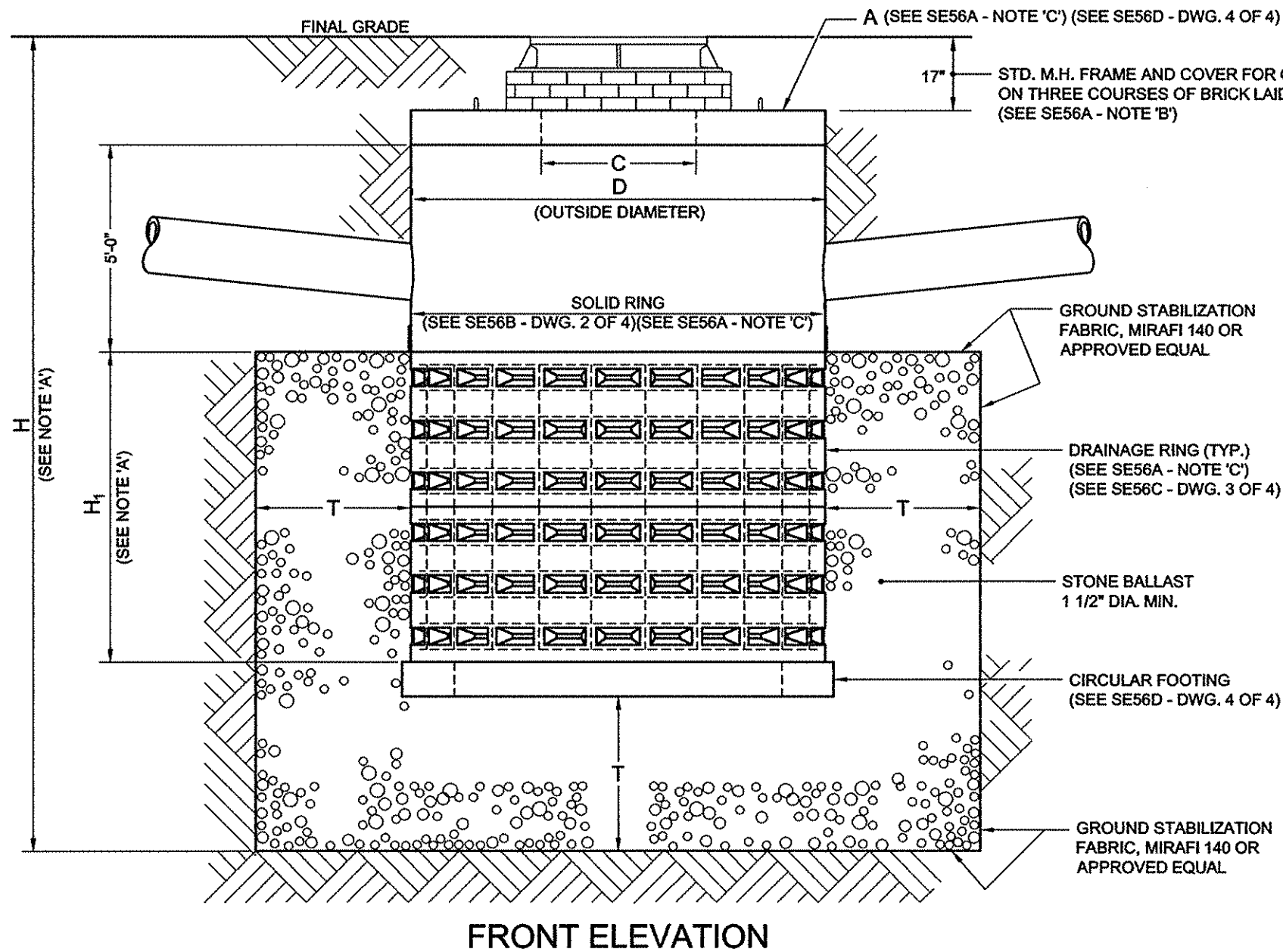
Sanjay S. Scaria
P.E.
ASSOCIATE COMMISSIONER, DESIGN
DEPARTMENT OF DESIGN AND CONSTRUCTION

8/14/18
DATE

Thomas Wynne
P.E.
EXECUTIVE DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION

8/14/18
DATE

STANDARD FOR PRECAST SEEPAGE BASIN (DWG. 1 OF 4)
(SEEPAGE BASIN INSTALLATION)



| D OUTSIDE DIAMETER | C STD. M.H. FRAME & COVER | A BASIN TOP SLAB | T STONE BALLAST | H ₁ DEPTH OF DRAINAGE RINGS |
|------------------------------------|---------------------------------|--------------------------------------|-----------------------|--|
| 4'-0" | 27" | STD. REMOVABLE R.C. CIRCULAR SLAB | 2'-0" MIN. | 7'-0" |
| 6'-0", 8'-0", 10'-0" AND 12'-0" | 36" | STD. REMOVABLE R.C. CIRCULAR SLAB | 3'-0" MIN. | 6'-0" |

- NOTES:**
- (A) UNLESS OTHERWISE SPECIFIED, THE TOTAL DEPTH OF A SEEPAGE BASIN SHALL BE APPROXIMATELY SEVENTEEN (17) FEET, WITH H₁ AS SPECIFIED IN CHART ABOVE.
- (B) THE LOCATION OF ALL SEEPAGE BASINS SHALL BE SUCH THAT THE OPENING IN THE TOP SLAB TOGETHER WITH FRAME AND COVER SHALL BE TOTALLY IN THE ROADWAY AREA OR TOTALLY IN THE SIDEWALK AREA.
- (C) ALL SLABS AND RINGS SHALL BE PLACED ON A ONE-HALF (1/2) INCH THICK FULL BED OF FRESH MORTAR.
- (D) WHEN IMPERMEABLE STRATUM IS ENCOUNTERED, SEEPAGE BASIN INSTALLATION SHALL BE JUSTIFIED BEFORE CONSTRUCTION.

REVISED DECEMBER 2017. P. LEUNG
W. PATALANO/P. MOY

Gurdeep S. Saini
ASSOCIATE COMMISSIONER, DESIGN
DEPARTMENT OF DESIGN AND CONSTRUCTION

P.E.

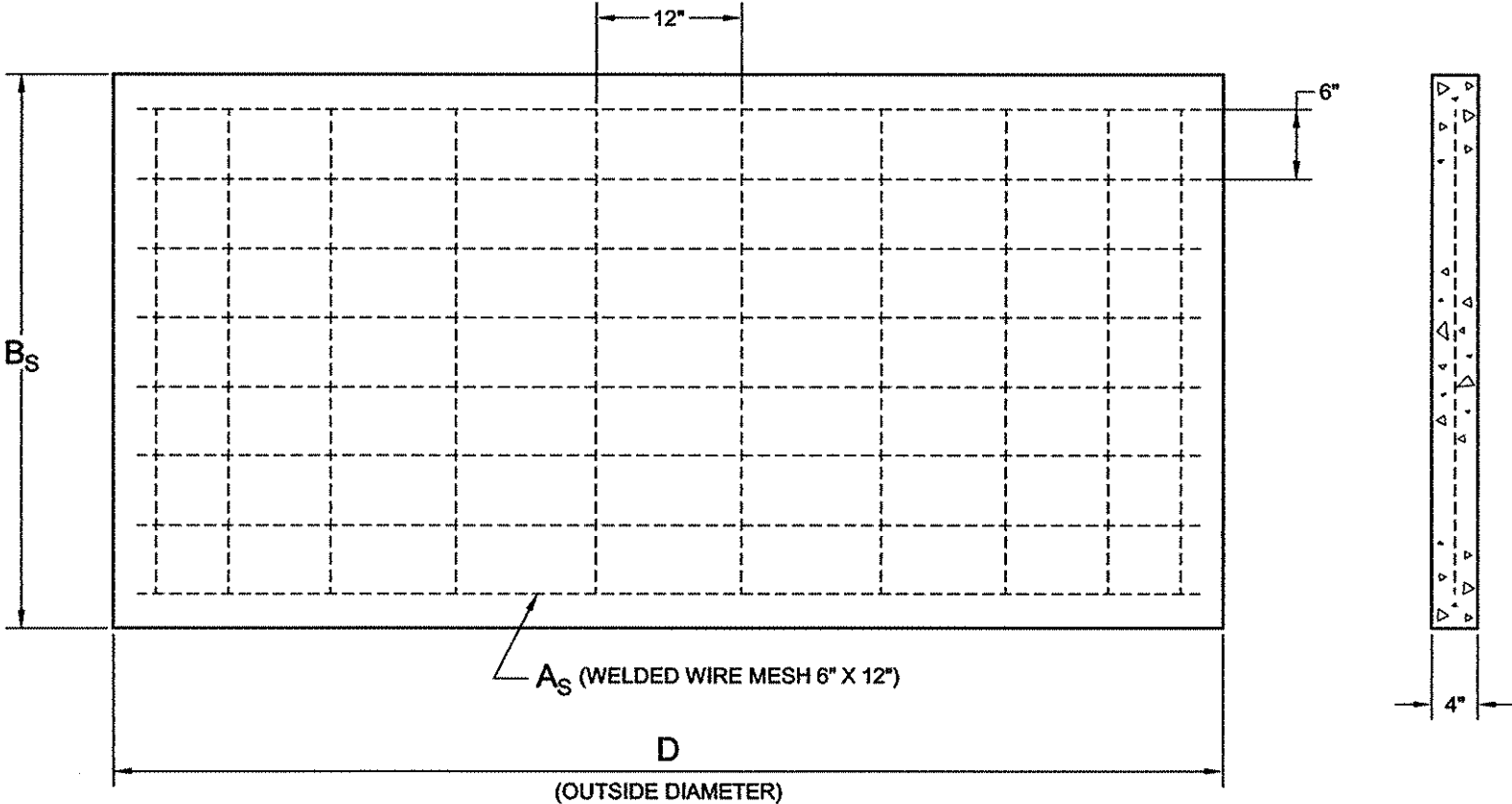
8/14/18
DATE

Thomas Wynne
EXECUTIVE DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION

P.E.

8/14/18
DATE

STANDARD FOR PRECAST SEEPAGE BASIN (DWG. 2 OF 4)
(PRECAST SOLID RING)



ELEVATION

SECTION

NOTES:

- (1) SEEPAGE BASIN SOLID RING AND DRAINAGE RING REINFORCING COMPLIES WITH AREA REQUIREMENTS OF ASTM C478, EXCEPT THAT ALL WALL SECTIONS SHALL BE REINFORCED WITH WWM, A_s =(SEE CHARTS), PLACED IN CENTER OF WALL. IN SOLID RING 1-#4 HOOP SHALL BE PLACED AROUND ALL CAST PIPE OPENINGS. (THE 1-#4 HOOP WILL NOT BE REQUIRED AT CORED OPENINGS FOR BASIN CONNECTIONS IN SOLID RING.) (ALL VALUES OF AREA OF STEEL (A_s) ARE IN SQUARE INCHES AND ARE A MINIMUM.)
- (2) CAST PIPE OPENINGS AND CORED OPENINGS WILL BE PLACED IN SOLID RING ONLY. NO CAST PIPE OPENING OR CORED OPENING WILL BE ALLOWED IN DRAINAGE RING AND NO BASIN CONNECTION SHALL BE MADE INTO A DRAINAGE RING.
- (3) CORED OPENINGS IN SOLID RING WILL BE PERMITTED FOR 12" DIA. BASIN CONNECTIONS ONLY. THE MAXIMUM CORED OPENING SHALL BE 16" FOR THESE BASIN CONNECTIONS.
- (4) PIPE OPENINGS WILL NOT BE PERMITTED THROUGH JOINTS. DISTANCE FROM TOP OR BOTTOM OF ANY SOLID RING SECTION SHALL BE A MINIMUM OF 3" FOR CAST PIPE OPENINGS AND A MINIMUM OF 6" FOR CORED OPENINGS FOR BASIN CONNECTIONS.
- (5) CONCRETE DESIGN MIX = 5,000 PSI (MIN. 28 DAY STRENGTH = 4,000 PSI; MAX. W/C = 0.47). REBARS - F_s = 60,000 PSI. WWM - F_s = 65,000 PSI.
- (6) OPENINGS FOR SPACING AND HANDLING WILL BE ALLOWED IN UPPER PORTION OF SOLID RING. HOWEVER, THE CONTRACTOR SHALL FILL ALL SUCH OPENINGS WITH NONSHRINK GROUT IMMEDIATELY AFTER INSTALLATION.
- (7) IN NO CASE SHALL THE AREA OF THE DRAIN OPENING BE LESS THAN 3.0 SQ. IN.

| B_s | A_s | | | | |
|-------|----------------|----------------|----------------|-----------------|-----------------|
| | D = 4'-0" O.D. | D = 6'-0" O.D. | D = 8'-0" O.D. | D = 10'-0" O.D. | D = 12'-0" O.D. |
| 2'-0" | 0.058 CIR. | 0.068 CIR. | 0.080 CIR. | 0.093 CIR. | 0.108 CIR. |
| 3'-0" | BY | BY | BY | BY | BY |
| 5'-0" | 0.029 LONG. | 0.034 LONG. | 0.040 LONG. | 0.047 LONG. | 0.054 LONG. |

REVISED DECEMBER 2017: P. LEUNG
W. PATALANO/P. MOY

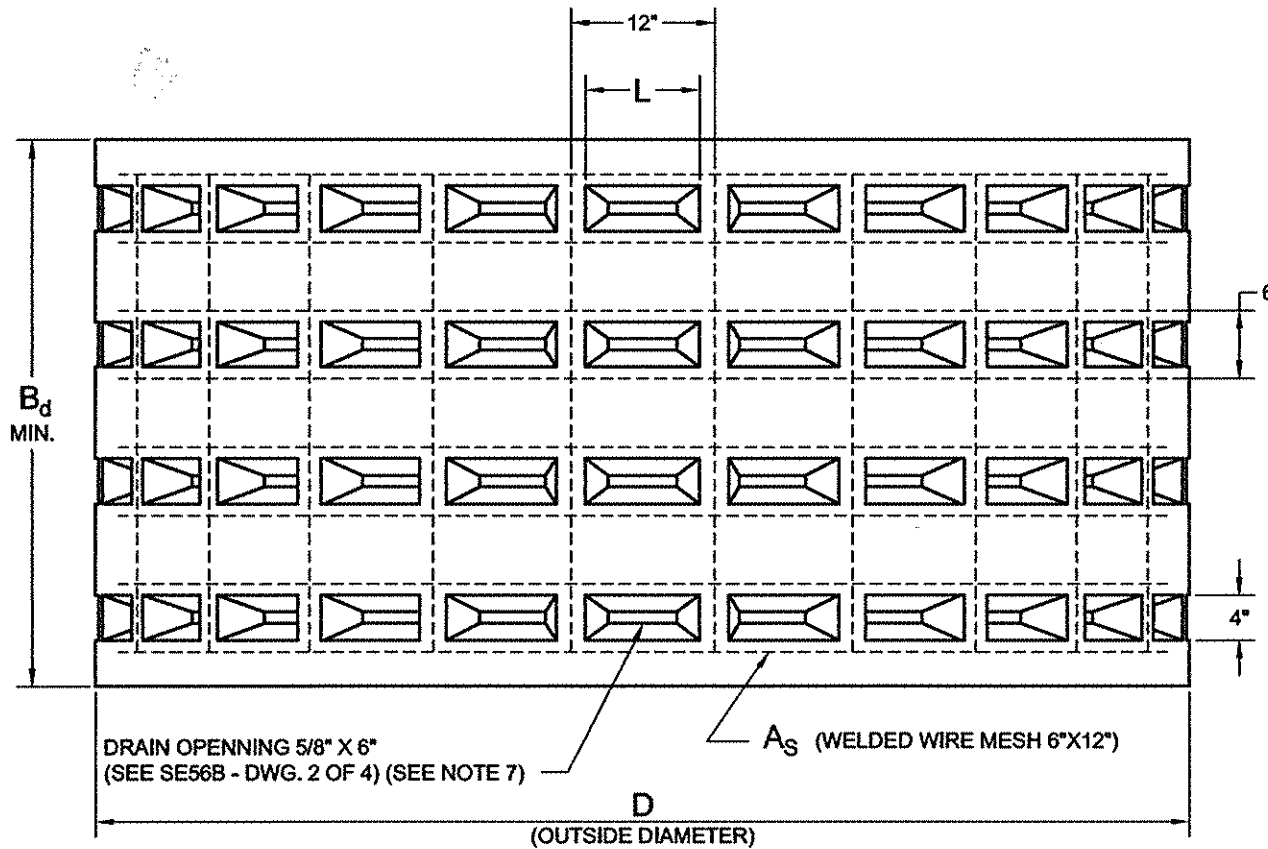
Chandip S. Saini
ASSOCIATE COMMISSIONER, DESIGN
DEPARTMENT OF DESIGN AND CONSTRUCTION
P.E.

8/14/18
DATE

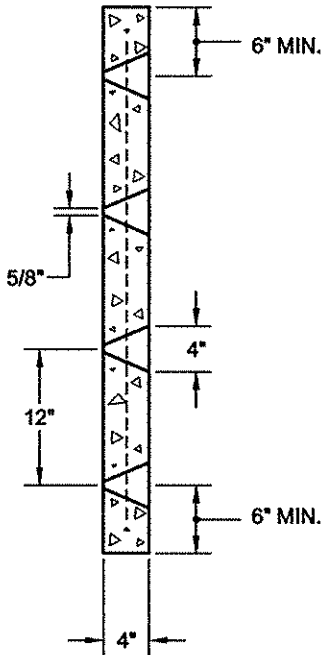
Thomas Wayne
EXECUTIVE DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION
P.E.

8/14/18
DATE

CITY OF NEW YORK
DEPARTMENT OF ENVIRONMENTAL PROTECTION
STANDARD FOR PRECAST SEEPAGE BASIN (DWG. 3 OF 4)
(PRECAST DRAINAGE RING)



ELEVATION



SECTION

| B _d MIN. | MIN. INTERNAL VOL. | | MIN. DRAIN OPENINGS | | ROWS OF DRAIN OPENINGS PER SECTION | L MAX. | A _s |
|------------------------|--------------------|-------|---------------------|---------|--|-----------|---------------------------------|
| | CU. FT. | GALS. | TOTAL | PER ROW | | | |
| D = 4'-0" O.D. | | | | | | | |
| 2'-0" | 17.4 | 130 | 20 | 10 | 2 | 9" | 0.058 CIR. BY 0.029 LONG. |
| 3'-0" | 26.1 | 195 | 30 | 10 | 3 | 9" | |
| 4'-0" | 34.9 | 261 | 40 | 10 | 4 | 9" | |
| 5'-0" | 43.6 | 326 | 50 | 10 | 5 | 9" | |
| 6'-0" | 52.3 | 391 | 60 | 10 | 6 | 9" | |
| D = 6'-0" O.D. | | | | | | | |
| 2'-0" | 44.6 | 333 | 32 | 16 | 2 | 10" | 0.068 CIR. BY 0.034 LONG. |
| 3'-0" | 67.0 | 501 | 48 | 16 | 3 | 10" | |
| 4'-0" | 89.3 | 667 | 64 | 16 | 4 | 10" | |
| 5'-0" | 111.7 | 835 | 80 | 16 | 5 | 10" | |
| 6'-0" | 134.0 | 1002 | 96 | 16 | 6 | 10" | |
| D = 8'-0" O.D. | | | | | | | |
| 2'-0" | 84.4 | 631 | 46 | 23 | 2 | 10" | 0.080 CIR. BY 0.040 LONG. |
| 3'-0" | 126.7 | 947 | 69 | 23 | 3 | 10' | |
| 4'-0" | 168.9 | 1263 | 92 | 23 | 4 | 10" | |
| 5'-0" | 211 | 1579 | 115 | 23 | 5 | 10" | |
| 6'-0" | 253 | 1895 | 138 | 23 | 6 | 10" | |
| D = 10'-0" O.D. | | | | | | | |
| 2'-0" | 136.8 | 1023 | 58 | 29 | 2 | 10" | 0.093 CIR. BY 0.047 LONG. |
| 3'-0" | 205.2 | 1535 | 87 | 29 | 3 | 10" | |
| 4'-0" | 273.6 | 2047 | 116 | 29 | 4 | 10" | |
| 5'-0" | 342.0 | 2558 | 145 | 29 | 5 | 10" | |
| 6'-0" | 410.5 | 3070 | 174 | 29 | 6 | 10" | |
| D = 12'-0" O.D. | | | | | | | |
| 2'-0" | 201.7 | 1509 | 70 | 35 | 2 | 10" | 0.108 CIR. BY 0.054 LONG. |
| 3'-0" | 302.6 | 2263 | 105 | 35 | 3 | 10" | |
| 4'-0" | 403.5 | 3018 | 140 | 35 | 4 | 10' | |
| 5'-0" | 504.4 | 3773 | 175 | 35 | 5 | 10" | |
| 6'-0" | 605.2 | 4527 | 210 | 35 | 6 | 10" | |

REVISED DECEMBER 2017: P. LEUNG
W. PATALANO/P. MOY

Sandeep S. Saini
ASSOCIATE COMMISSIONER, DESIGN
DEPARTMENT OF DESIGN AND CONSTRUCTION

P.E.

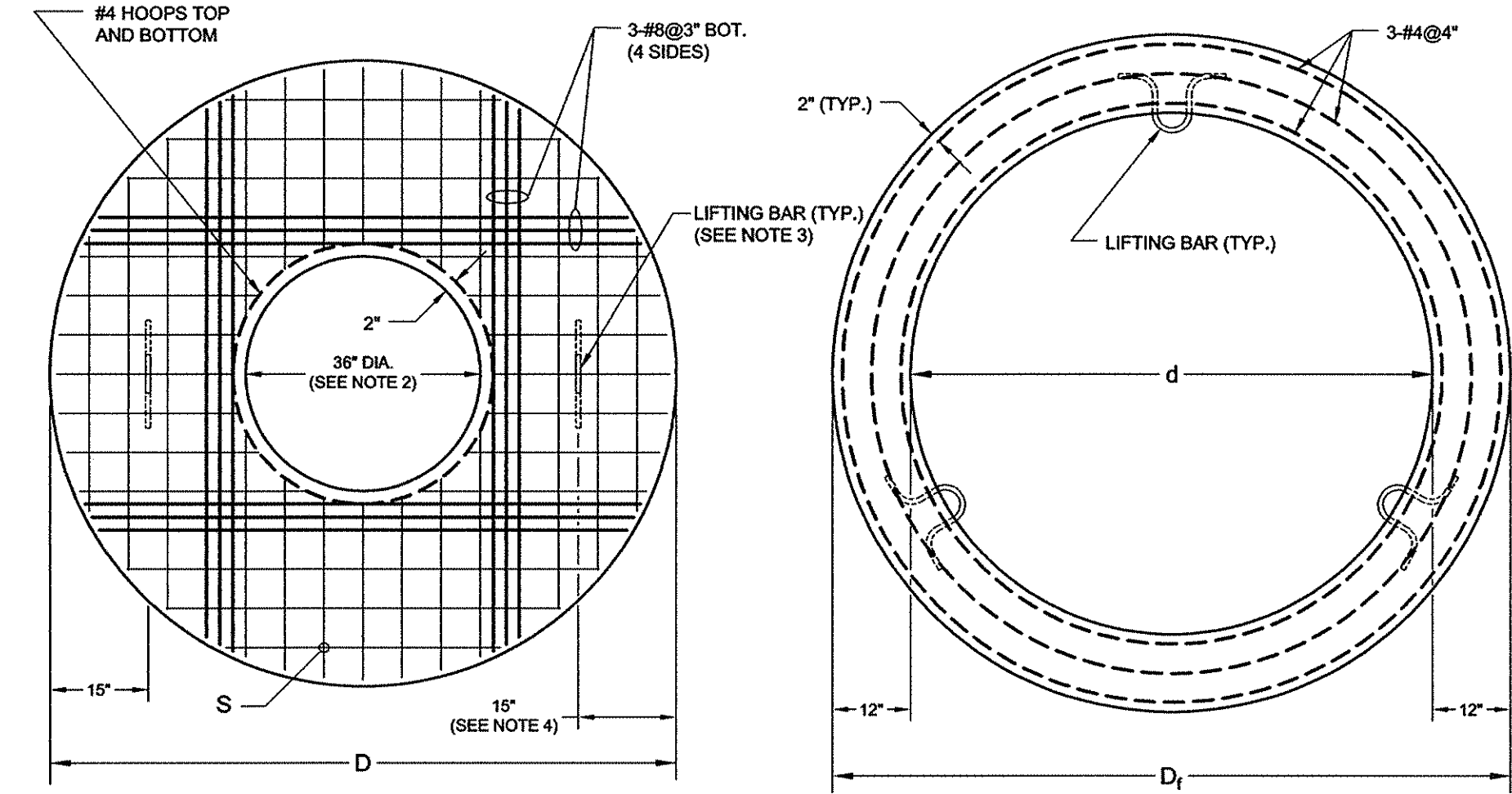
8/14/18
DATE

Thomas Wayne
EXECUTIVE DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION

P.E.

8/14/18
DATE

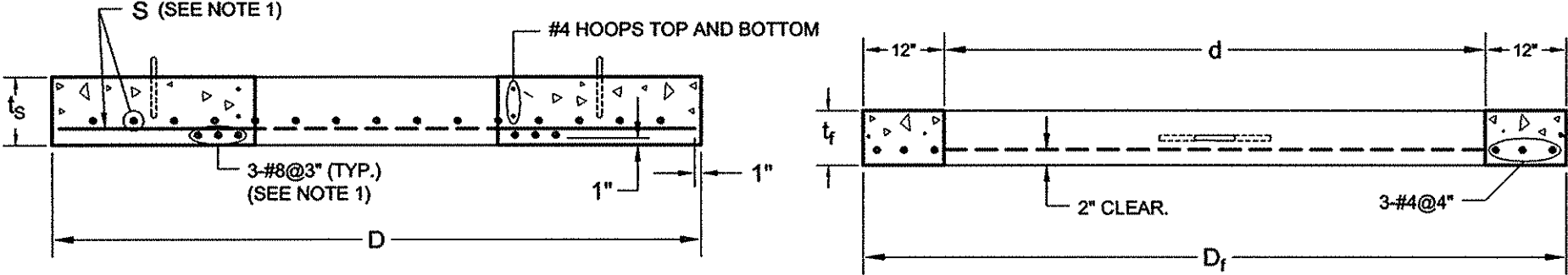
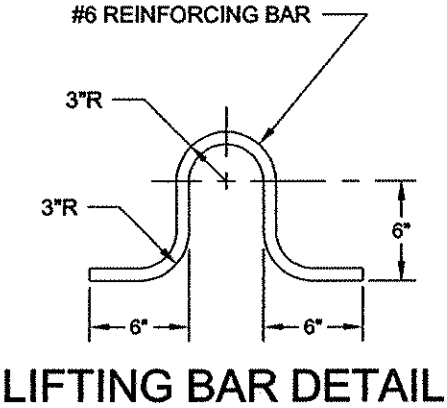
STANDARD FOR PRECAST SEEPAGE BASIN (DWG. 4 OF 4)
(CIRCULAR REINFORCED CONCRETE SLAB AND FOOTING)



| CIRCULAR SLAB | | |
|---------------|------------|------------|
| D | S | t_s MIN. |
| 4'-0" | SEE NOTE 1 | 8" |
| 6'-0" | #4@6" | 10" |
| 8'-0" | #5@6" | 10" |
| 10'-0" | #6@6" | 12" |
| 12'-0" | #6@4" | 12" |

| CIRCULAR FOOTING | | |
|------------------|--------|------------|
| D_f MAX. | d MAX. | t_f MIN. |
| 4'-4" | 2'-4" | 6" |
| 6'-4" | 4'-4" | 8" |
| 8'-4" | 6'-4" | 8" |
| 10'-4" | 8'-4" | 8" |
| 12'-4" | 10'-4" | 8" |

* IN NO CASE SHALL " D_f " BE LESS THAN THE OUTSIDE DIAMETER OF THE DRAINAGE RING.



- NOTES:
- (1) FOR 4'-0" DIA. CIRCULAR SLAB, THE REINFORCEMENT SHALL BE 3-#4 HOOPS @3" PLACED 2" CLEAR FROM THE BOTTOM. IN ADDITION #4 HOOPS TOP AND BOTTOM SHALL BE PLACED AROUND 27" OPENING.
 - (2) OPENING FOR 4'-0" DIA. CIRCULAR SLAB SHALL BE 27" DIAMETER.
 - (3) THREE (3) LIFTING BARS IN THE 4'-0" DIA. CIRCULAR SLAB SHALL BE PLACED IN THE MANNER SHOWN ON THE PLAN AND SECTION VIEWS OF CIRCULAR FOOTING.
 - (4) LIFTING BARS IN THE 6'-0" DIA. CIRCULAR SLAB SHALL BE PLACED AT A DISTANCE OF 10" FROM THE EDGE OF THE CIRCULAR SLAB.

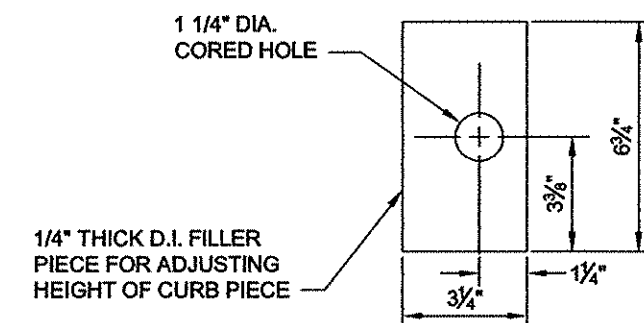
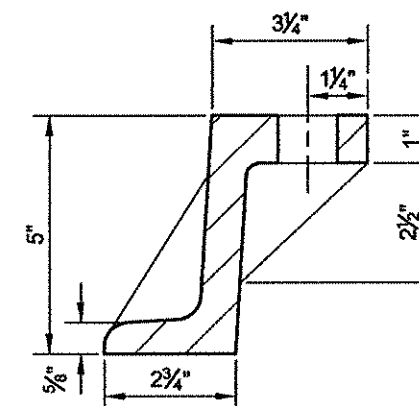
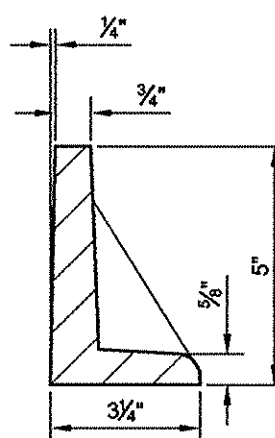
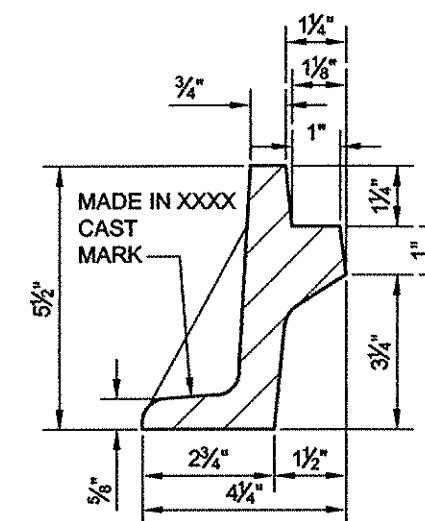
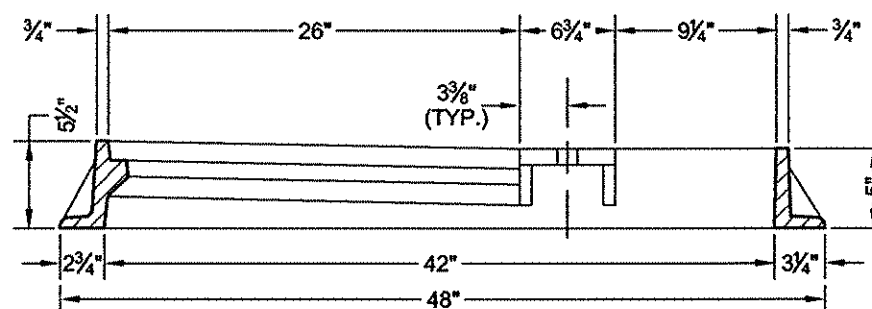
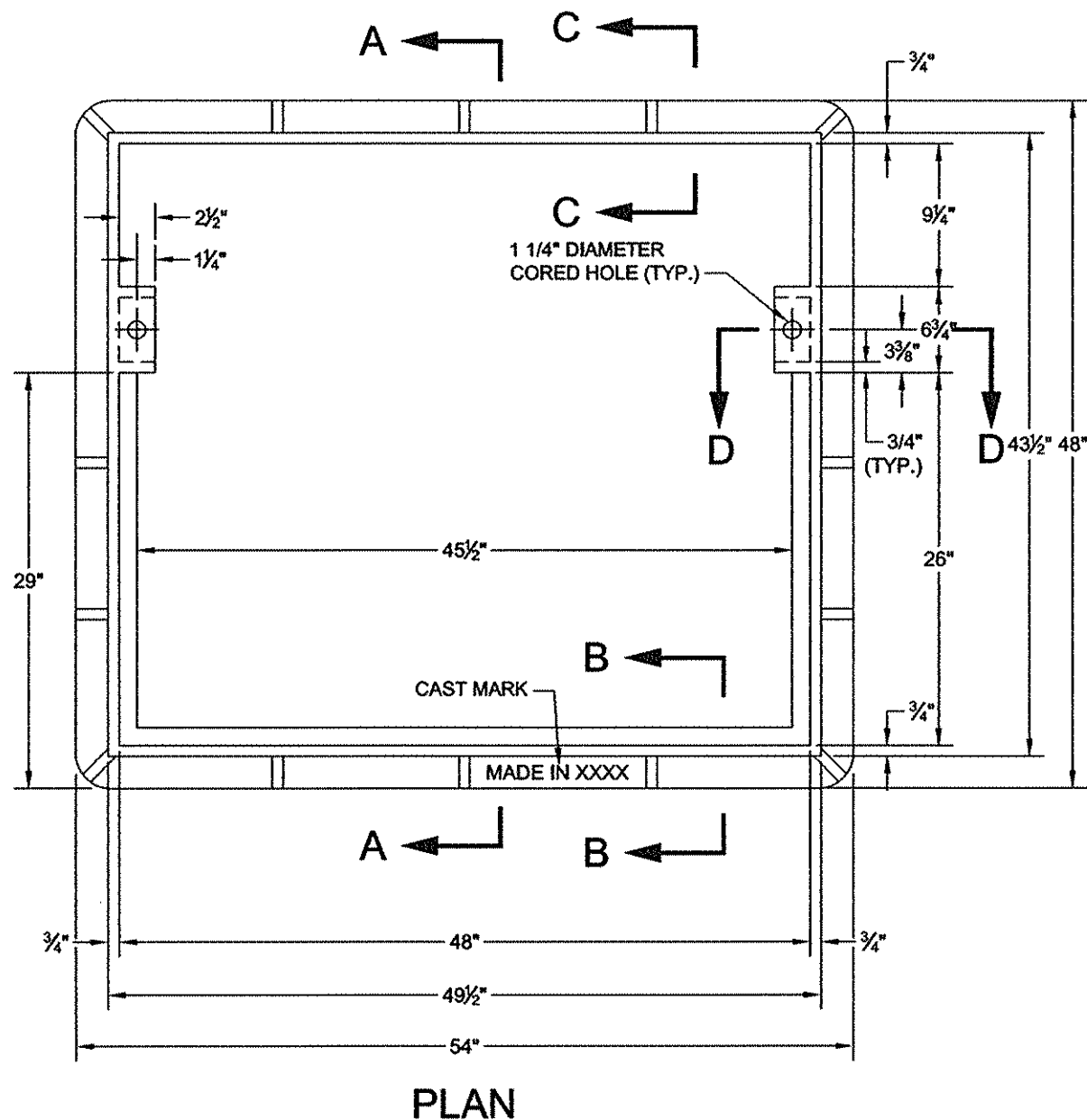
REVISED DECEMBER 2017: P. LEUNG
W. PATALANO/P. MOY

Gurdeep S. Saini
P.E.
ASSOCIATE COMMISSIONER, DESIGN
DEPARTMENT OF DESIGN AND CONSTRUCTION

8/14/18
DATE

Thomas Wyne
P.E.
EXECUTIVE DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION

8/14/18
DATE

STANDARD FOR CAST IRON FRAME FOR CATCH BASINS
(WITH CURB PIECE)

NOTES:

- (1) MATERIAL: GRAY CAST IRON ASTM A-48 CLASS 35B. MINIMUM WEIGHT OF FRAME IS 360 LBS.
- (2) DESIGN LOADING: HS20-44 HIGHWAY LOADING.
- (3) TWO (2) - 3/4" DIA. CARBON STEEL BOLTS ASTM 307 GRADE - 3 1/2" LONG WITH HEXAGONAL HEAD AND NUT WITH TWO (2) FLAT WASHERS PER BOLT TO BE FURNISHED WITH EACH FRAME TOGETHER WITH 6" CURB PIECE OR 8" CURB PIECE. LONGER BOLTS TO BE FURNISHED FOR CURB HEIGHTS GREATER THAN 6" WHERE FILLER PIECES ARE USED.
- (4) ALL CATCH BASIN FRAMES SHALL HAVE THE MANUFACTURER'S IDENTIFICATION, CAST DATE OR HEAT NUMBER AND COUNTRY OF ORIGIN INTEGRALLY CAST INDIVIDUAL PIECES AT THE TIME OF MANUFACTURE IN ACCORDANCE WITH THE DEP SPECIFICATION.

Gurdeep S. Saini
ASSOCIATE COMMISSIONER, DESIGN
DEPARTMENT OF DESIGN AND CONSTRUCTION

P.E.

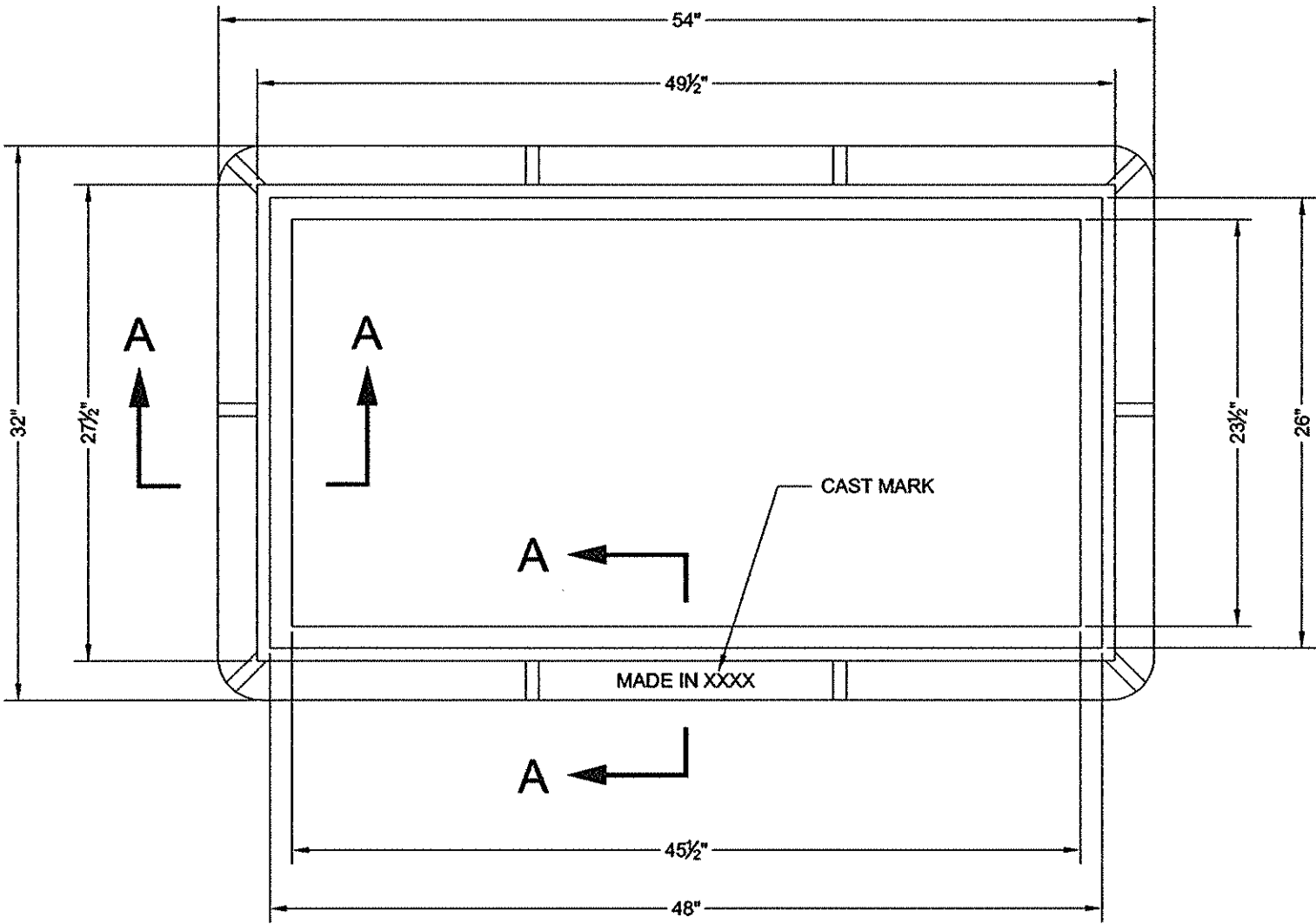
8/14/18
DATE

Thomas W. Byrne
EXECUTIVE DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION

P.E.

8/14/18
DATE

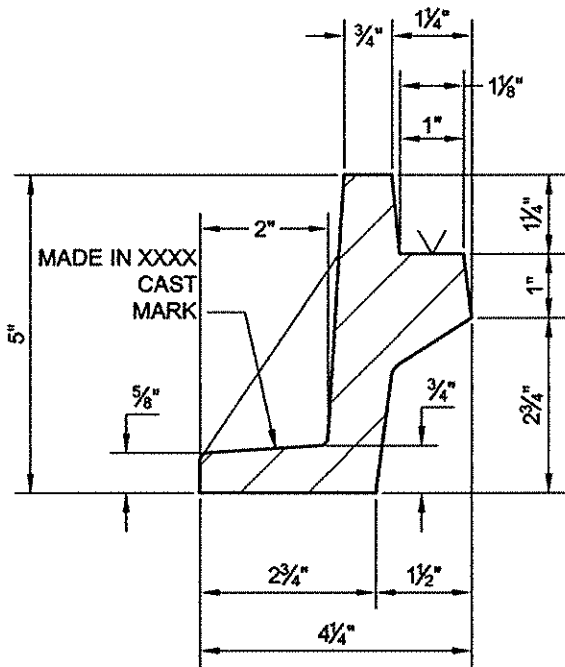
CITY OF NEW YORK
DEPARTMENT OF ENVIRONMENTAL PROTECTION
STANDARD FOR CAST IRON FRAME FOR CATCH BASINS
(WITHOUT CURB PIECE)



PLAN



SECTION



SECTION A-A

NOTES:

- (1) MATERIAL: GRAY CAST IRON ASTM A-48 CLASS 35B. MINIMUM WEIGHT OF FRAME IS 275 LBS.
- (2) DESIGN LOADING: HS20-44 HIGHWAY LOADING.
- (3) ALL FRAMES SHALL HAVE THE MANUFACTURER'S IDENTIFICATION, CAST DATE OR HEAT NUMBER AND COUNTRY OF ORIGIN INTEGRALLY CAST ON INDIVIDUAL PIECES AT THE TIME OF MANUFACTURE IN ACCORDANCE WITH THE DEP SPECIFICATION.

Gurdeep S. Saini

P.E.

ASSOCIATE COMMISSIONER, DESIGN
DEPARTMENT OF DESIGN AND CONSTRUCTION

8/14/18

DATE

Thomas Wynne

P.E.

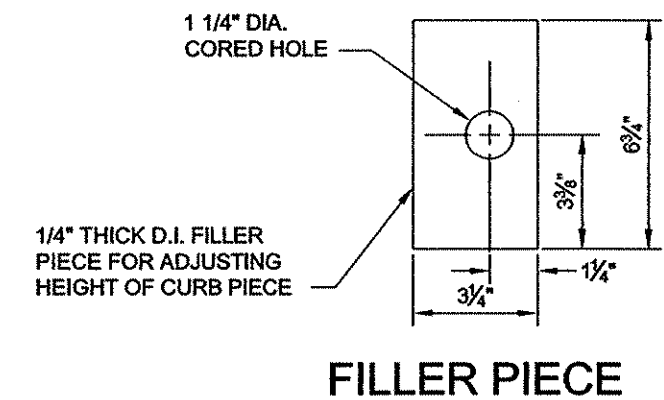
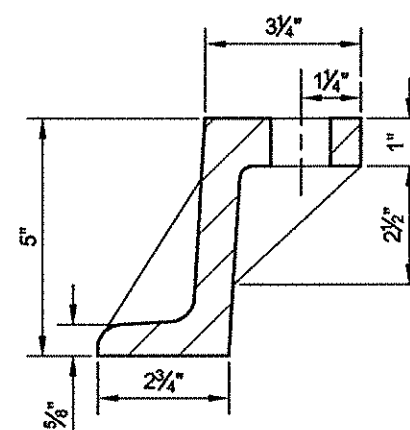
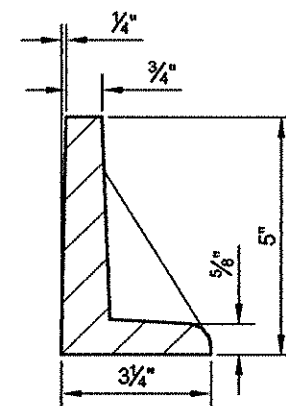
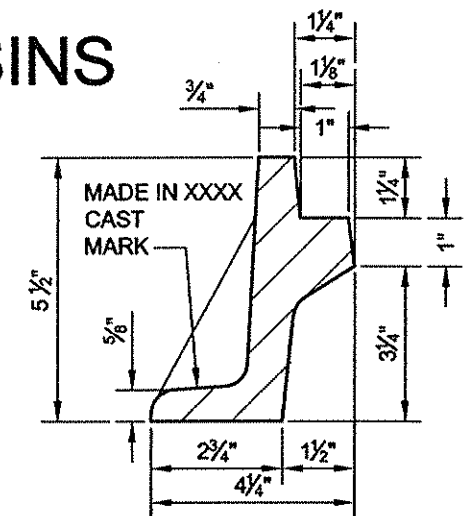
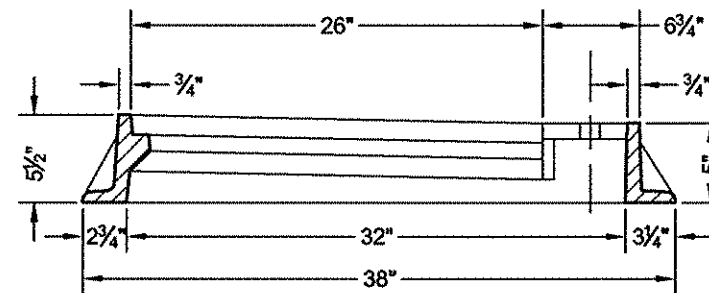
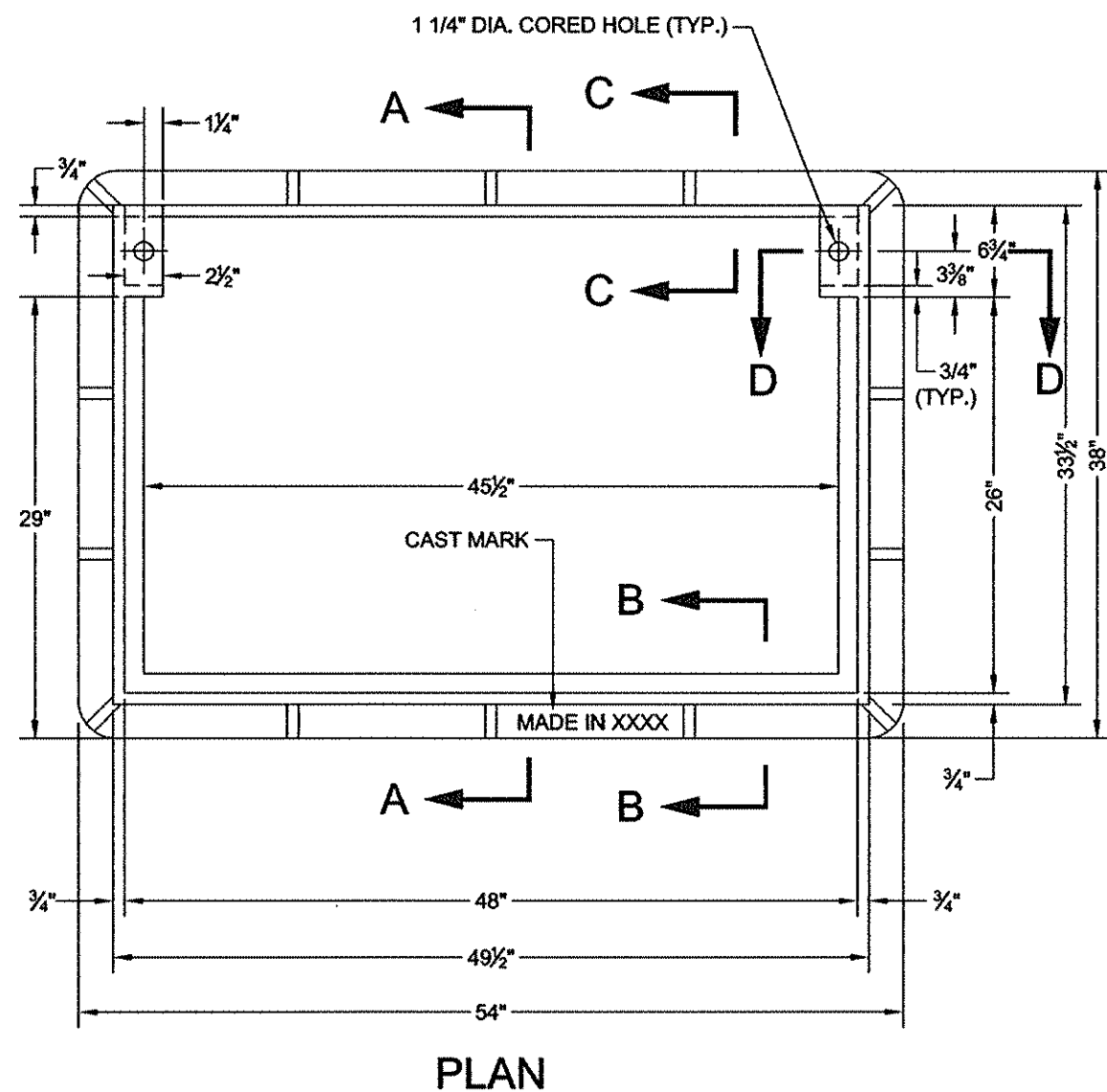
EXECUTIVE DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION

8/14/18

DATE

CITY OF NEW YORK
DEPARTMENT OF ENVIRONMENTAL PROTECTION

STANDARD FOR CAST IRON FRAME FOR TYPE 3 CATCH BASINS (WITH CURB PIECE)



NOTES:

- (1) MATERIAL: GRAY CAST IRON ASTM A-48 CLASS 35B. MINIMUM WEIGHT OF FRAME IS 360 LBS.
- (2) DESIGN LOADING: HS20-44 HIGHWAY LOADING.
- (3) TWO (2) - 3/4" DIA. CARBON STEEL BOLTS ASTM 307 GRADE - 3 1/2" LONG WITH HEXAGONAL HEAD AND NUT WITH TWO (2) FLAT WASHERS PER BOLT TO BE FURNISHED WITH EACH FRAME TOGETHER WITH 6" CURB PIECE OR 8" CURB PIECE. LONGER BOLTS TO BE FURNISHED FOR CURB HEIGHTS GREATER THAN 6" WHERE FILLER PIECES ARE USED.
- (4) ALL CATCH BASIN FRAMES SHALL HAVE THE MANUFACTURER'S IDENTIFICATION, CAST DATE OR HEAT NUMBER AND COUNTRY OF ORIGIN INTEGRALLY CAST INDIVIDUAL PIECES AT THE TIME OF MANUFACTURE IN ACCORDANCE WITH THE DEP SPECIFICATION.

Gurdeep S. Saini
ASSOCIATE COMMISSIONER, DESIGN
DEPARTMENT OF DESIGN AND CONSTRUCTION

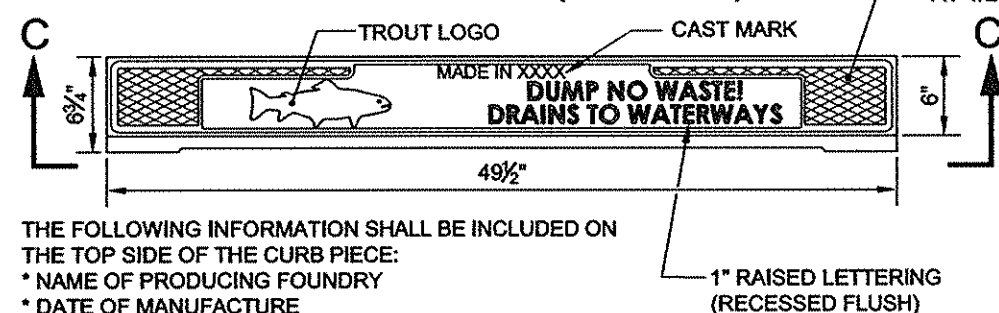
P.E.

8/14/18
DATE

Thomas W. Lyne
EXECUTIVE DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION

P.E.

8/14/18
DATE



- * NAME OF PRODUCING FOUNDRY
- * DATE OF MANUFACTURE
- * PRODUCT NUMBER
- * CAST IRON ASTM A-48

PLAN OF CURB PIECE

(1) GRATING MATERIAL: GRAY CAST IRON ASTM A-48 CLASS 35B.
MINIMUM WEIGHT OF TYPE R GRATING IS 425 LBS.

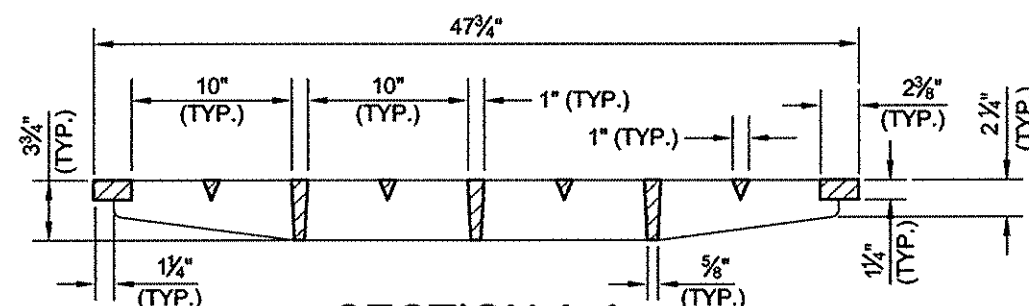
(2) CURB PIECE MATERIAL: GRAY CAST IRON ASTM A-48 CLASS 35B.
MINIMUM WEIGHT OF 6" IS 172 LBS.
MINIMUM WEIGHT OF 8" IS 219 LBS.

(3) BACK PLATE MATERIAL: GRAY CAST IRON ASTM A-48 CLASS 35B.
MINIMUM WEIGHT IS 178 LBS.

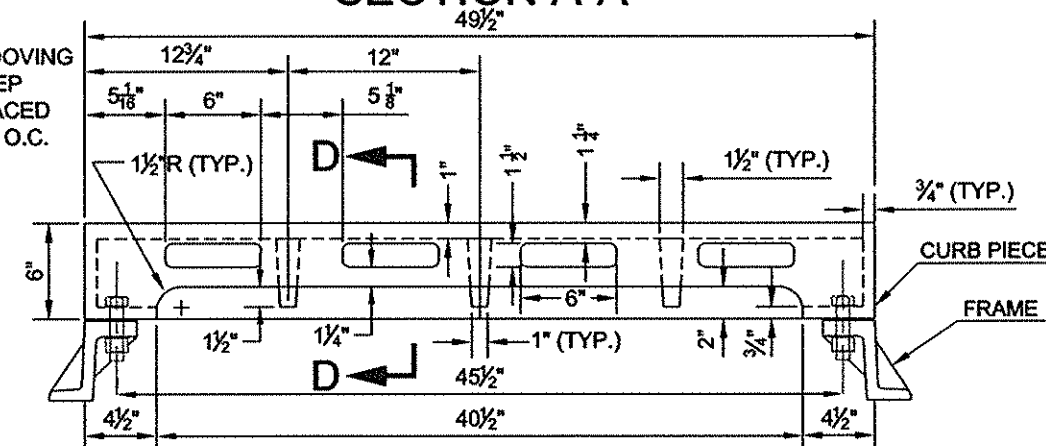
(4) DESIGN LOADING: HS20-44 HIGHWAY LOADING.

(5) ALL CATCH BASIN FRAMES AND GRATES SHALL HAVE THE MANUFACTURER'S IDENTIFICATION, CAST DATE OR HEAT NUMBER AND COUNTRY OF ORIGIN INTEGRALLY CAST ON INDIVIDUAL PIECES AT THE TIME OF MANUFACTURE IN ACCORDANCE WITH THE DEP SPECIFICATION.

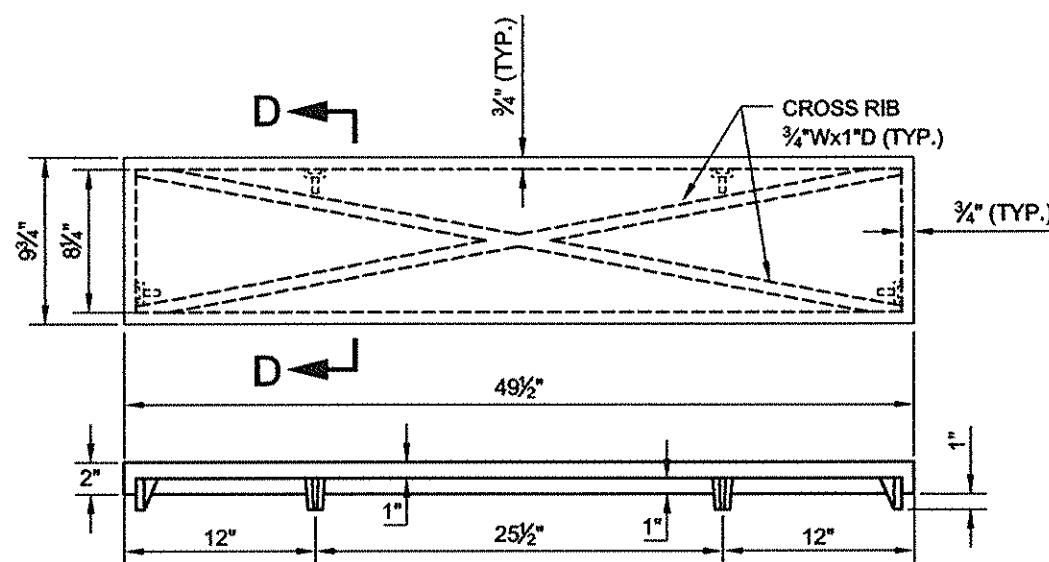
(6) TWO (2) - 3/4" DIA. CARBON STEEL BOLTS ASTM 307 GRADE - 3 1/2" LONG WITH HEXAGONAL HEAD AND NUT WITH TWO (2) FLAT WASHERS PER BOLT TO BE FURNISHED WITH EACH FRAME TOGETHER WITH 6" CURB PIECE OR 8" CURB PIECE. LONGER BOLTS TO BE FURNISHED FOR CURB HEIGHTS GREATER THAN 6" WHERE FILLER PIECES ARE USED.



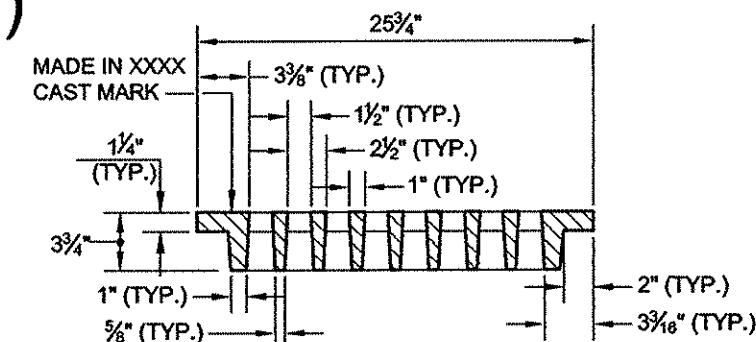
SECTION A-A



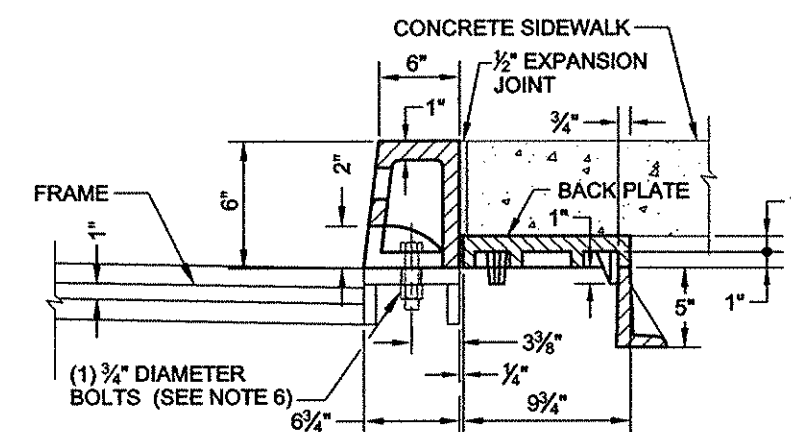
SECTION C-C
ELEVATION OF CURB PIECE



BACK PLATE



SECTION B-B



SECTION D-D

- * NAME OF PRODUCING FOUNDRY
- * DATE OF MANUFACTURE
- * PRODUCT NUMBER
- * CAST IRON ASTM A-48

Gurdeep S. Savici

ASSOCIATE COMMISSIONER, DESIGN
DEPARTMENT OF DESIGN AND CONSTRUCTION

23.

8/14/18

DATE _____

Thomas Wynne

EXECUTIVE DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION

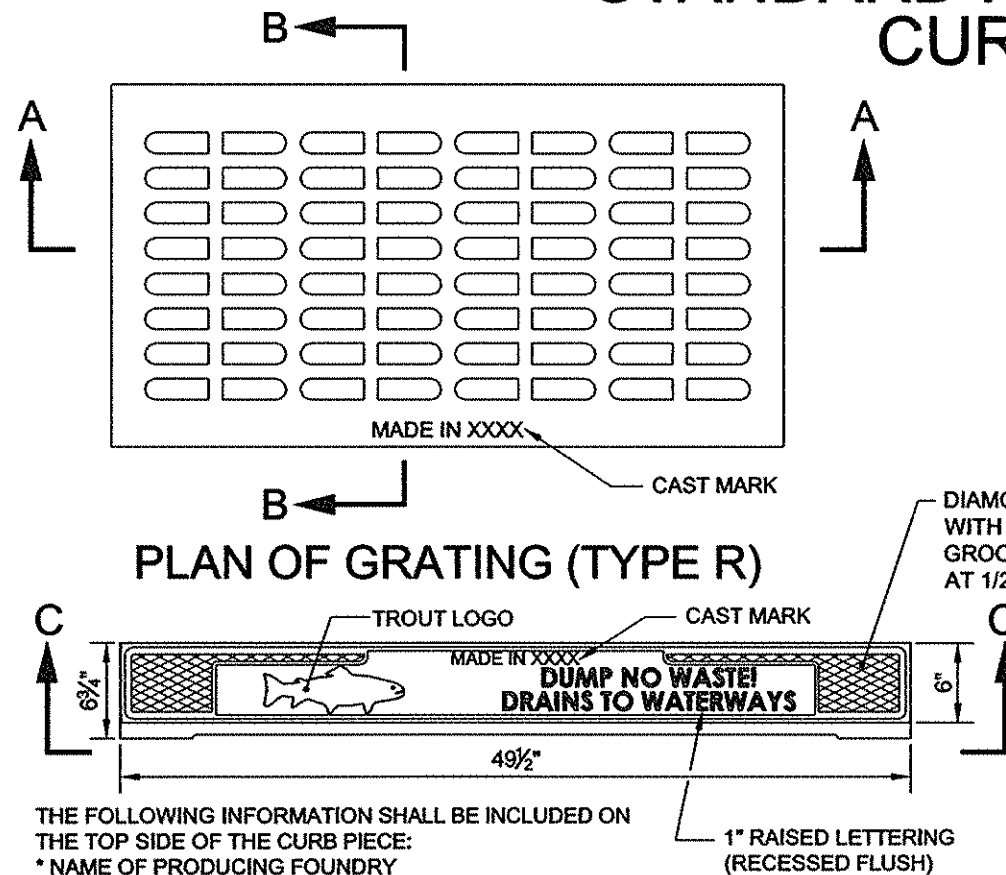
P.B.

8/14/18

DATE _____

CITY OF NEW YORK
DEPARTMENT OF ENVIRONMENTAL PROTECTION

STANDARD FOR CAST IRON GRATING, BACK PLATE, AND CURB PIECE FOR CATCH BASINS (H=8")



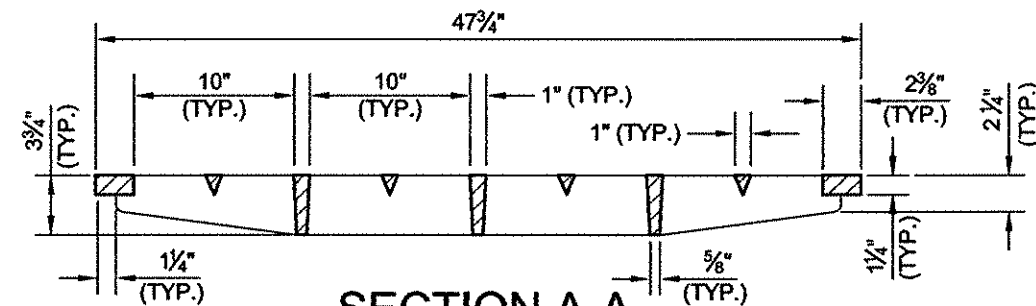
THE FOLLOWING INFORMATION SHALL BE INCLUDED ON THE TOP SIDE OF THE CURB PIECE:

- * NAME OF PRODUCING FOUNDRY
- * DATE OF MANUFACTURE
- * PRODUCT NUMBER
- * CAST IRON ASTM A-48

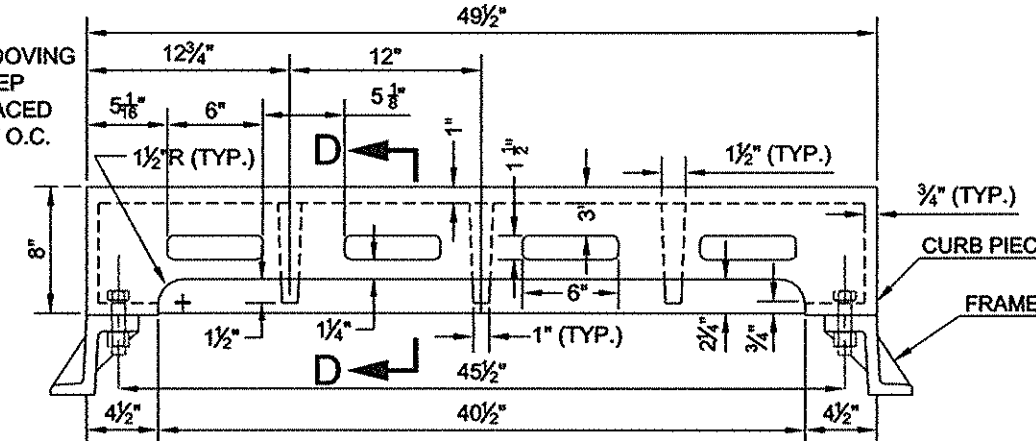
PLAN OF CURB PIECE

NOTES:

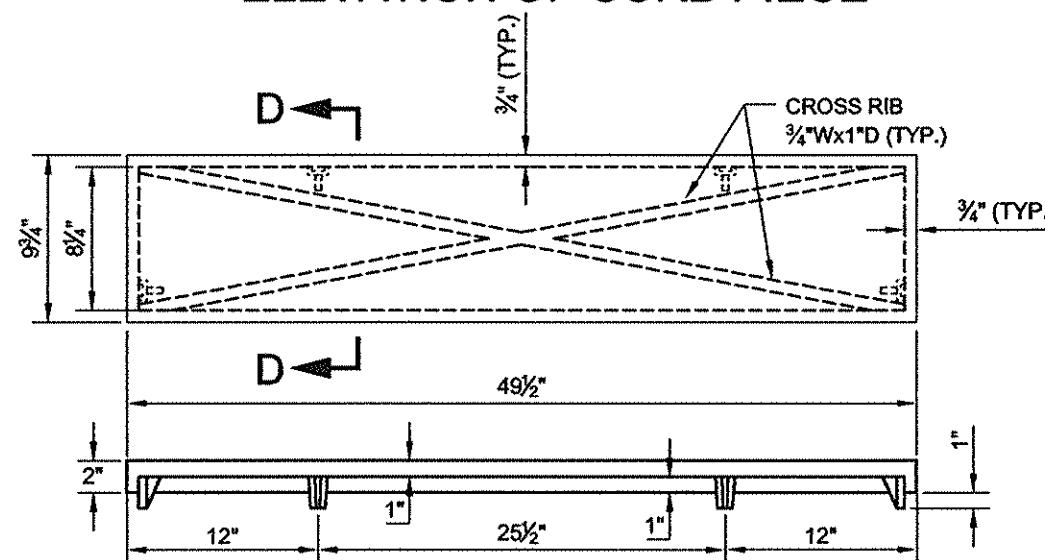
- (1) GRATING MATERIAL: GRAY CAST IRON ASTM A-48 CLASS 35B. MINIMUM WEIGHT OF TYPE R GRATING IS 425 LBS.
- (2) CURB PIECE MATERIAL: GRAY CAST IRON ASTM A-48 CLASS 35B. MINIMUM WEIGHT OF 6" IS 172 LBS. MINIMUM WEIGHT OF 8" IS 219 LBS.
- (3) BACK PLATE MATERIAL: GRAY CAST IRON ASTM A-48 CLASS 35B. MINIMUM WEIGHT IS 178 LBS.
- (4) DESIGN LOADING: HS20-44 HIGHWAY LOADING.
- (5) ALL CATCH BASIN FRAMES AND GRATES SHALL HAVE THE MANUFACTURER'S IDENTIFICATION, CAST DATE OR HEAT NUMBER AND COUNTRY OF ORIGIN INTEGRALLY CAST ON INDIVIDUAL PIECES AT THE TIME OF MANUFACTURE IN ACCORDANCE WITH THE DEP SPECIFICATION.
- (6) TWO (2) - 3/4" DIA. CARBON STEEL BOLTS ASTM 307 GRADE - 3 1/2" LONG WITH HEXAGONAL HEAD AND NUT WITH TWO (2) FLAT WASHERS PER BOLT TO BE FURNISHED WITH EACH FRAME TOGETHER WITH 6" CURB PIECE OR 8" CURB PIECE. LONGER BOLTS TO BE FURNISHED FOR CURB HEIGHTS GREATER THAN 6" WHERE FILLER PIECES ARE USED.



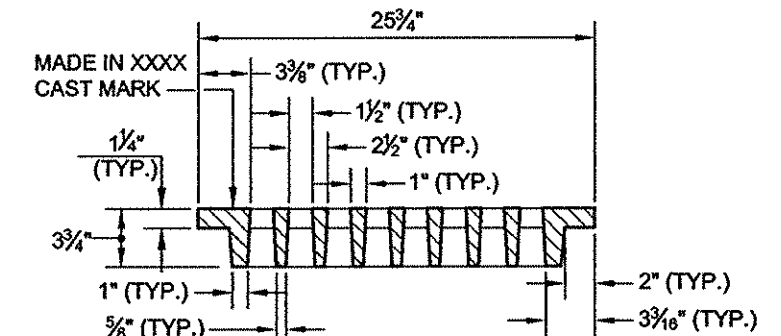
SECTION A-A



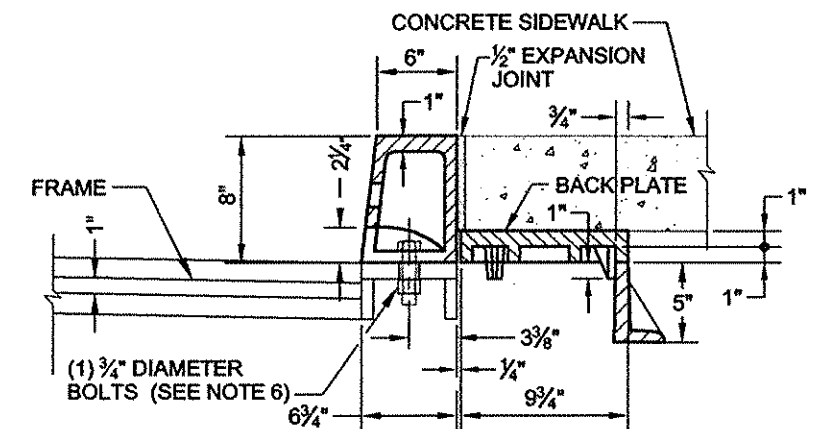
SECTION C-C
ELEVATION OF CURB PIECE



BACK PLATE



SECTION B-B



SECTION D-D

THE FOLLOWING INFORMATION SHALL BE INCLUDED ON THE TOP SIDE OF THE BACK PLATE:

- * NAME OF PRODUCING FOUNDRY
- * DATE OF MANUFACTURE
- * PRODUCT NUMBER
- * CAST IRON ASTM A-48

Gurdeep S. Saini

P.E.

ASSOCIATE COMMISSIONER, DESIGN
DEPARTMENT OF DESIGN AND CONSTRUCTION

8/14/18

DATE

Thomas Wayne

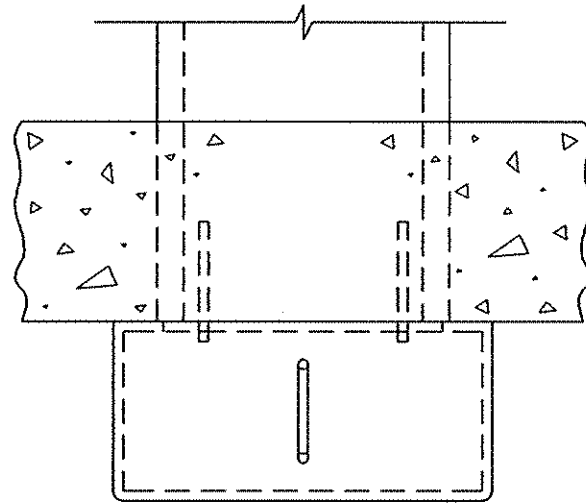
P.E.

EXECUTIVE DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION

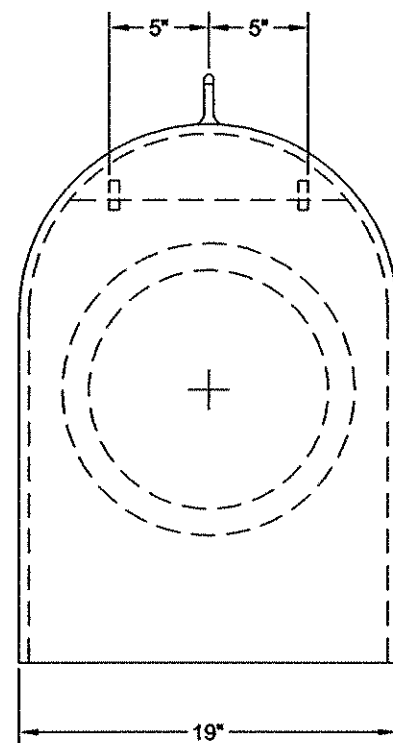
8/14/18

DATE

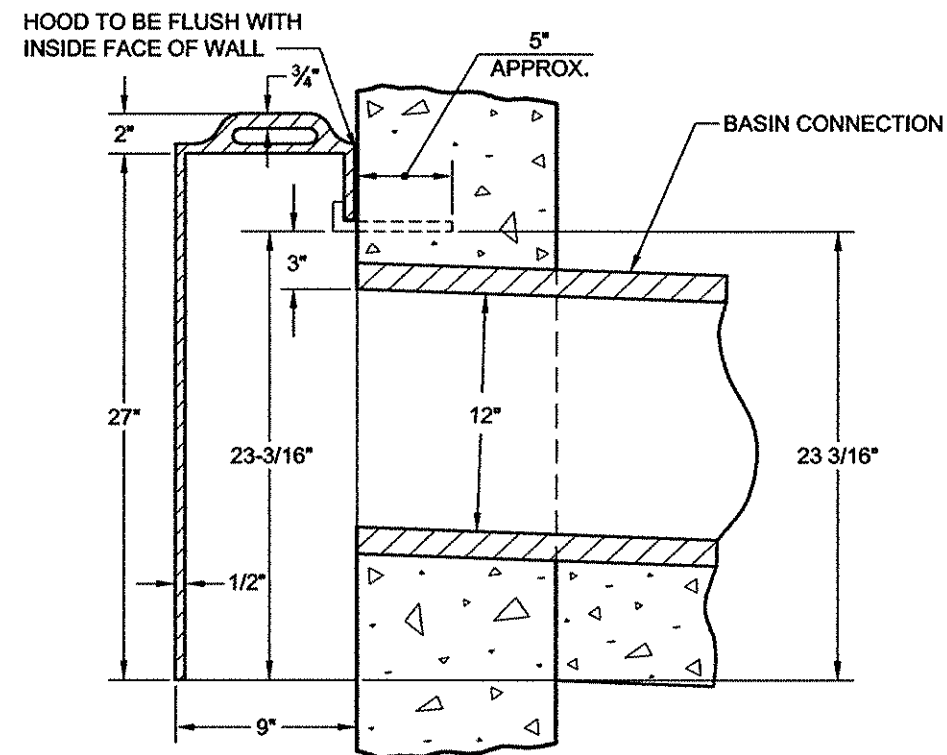
CITY OF NEW YORK
DEPARTMENT OF ENVIRONMENTAL PROTECTION
**STANDARD FOR CAST IRON
HOOD AND HOOKS FOR CATCH BASINS**



PLAN OF HOOD
IN PLACE



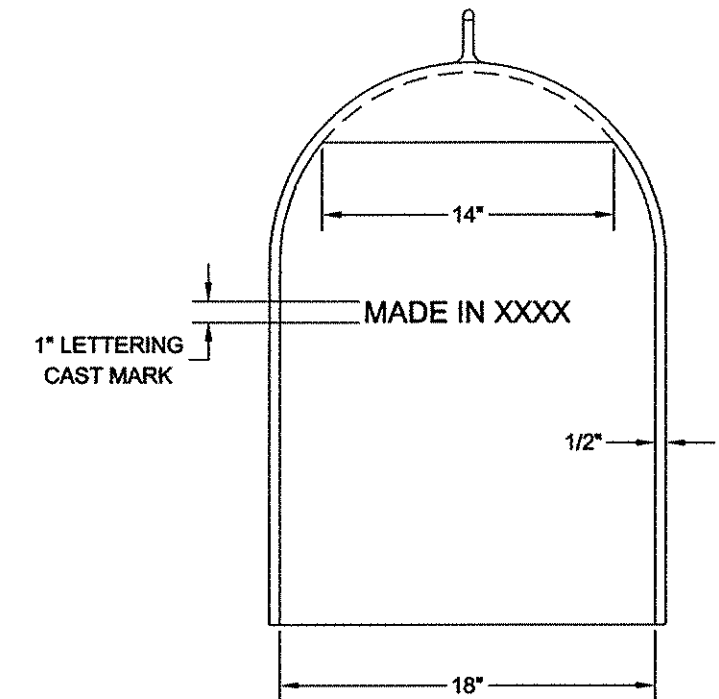
REAR ELEVATION
OF HOOD IN PLACE



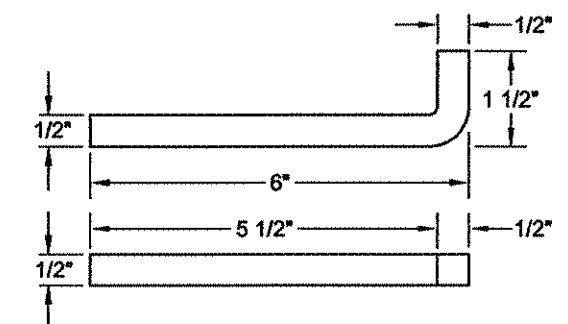
SECTION OF HOOD
IN PLACE

NOTES:

- (1) MATERIAL FOR HOOD: GRAY CAST IRON ASTM A-48 CLASS 35B. MINIMUM WEIGHT OF HOOD IS 140 LBS.
- (2) MATERIAL FOR HOOK: 18-8 STAINLESS STEEL 1/2" SQUARE BAR STOCK TYPE 303 ASTM A-582.
- (3) ALL CATCH BASIN HOODS SHALL HAVE THE MANUFACTURER'S IDENTIFICATION, CAST DATE OR HEAT NUMBER AND COUNTRY OF ORIGIN INTEGRALLY CAST ON INDIVIDUAL PIECES AT THE TIME OF MANUFACTURE IN ACCORDANCE WITH THE DEP SPECIFICATION.



FRONT ELEVATION
OF HOOD



HOOK DETAIL
(2 REQUIRED)

Gundeep S. Saini
ASSOCIATE COMMISSIONER, DESIGN
DEPARTMENT OF DESIGN AND CONSTRUCTION

P.E.

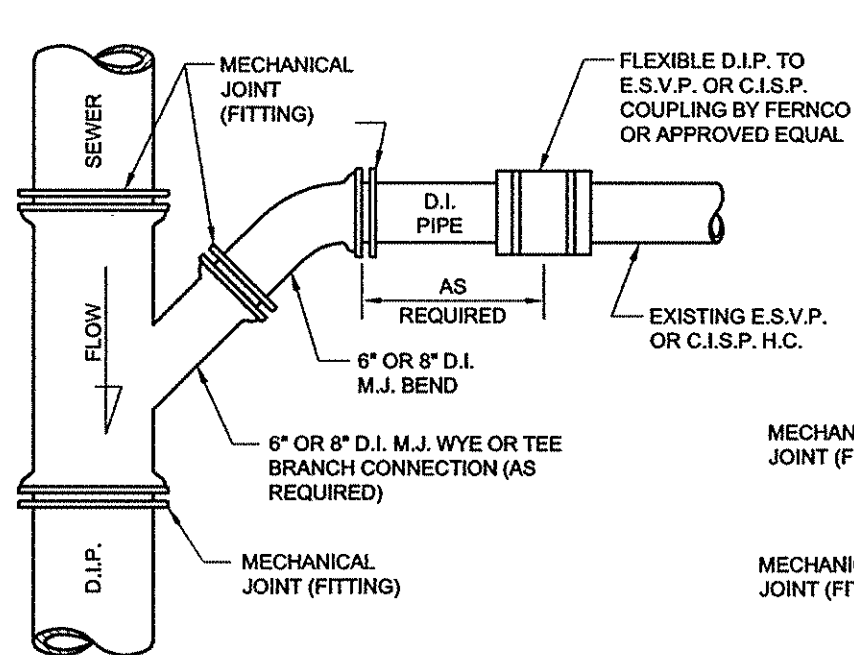
8/14/18
DATE

Thomas Wynne
EXECUTIVE DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION

P.E.

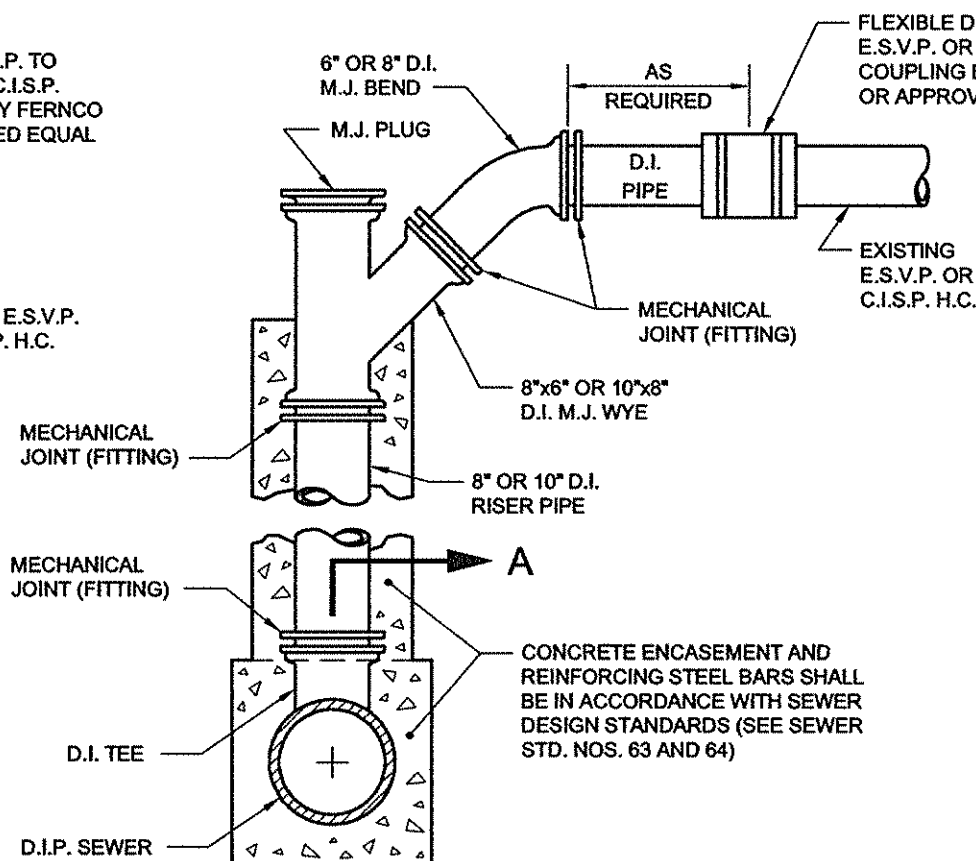
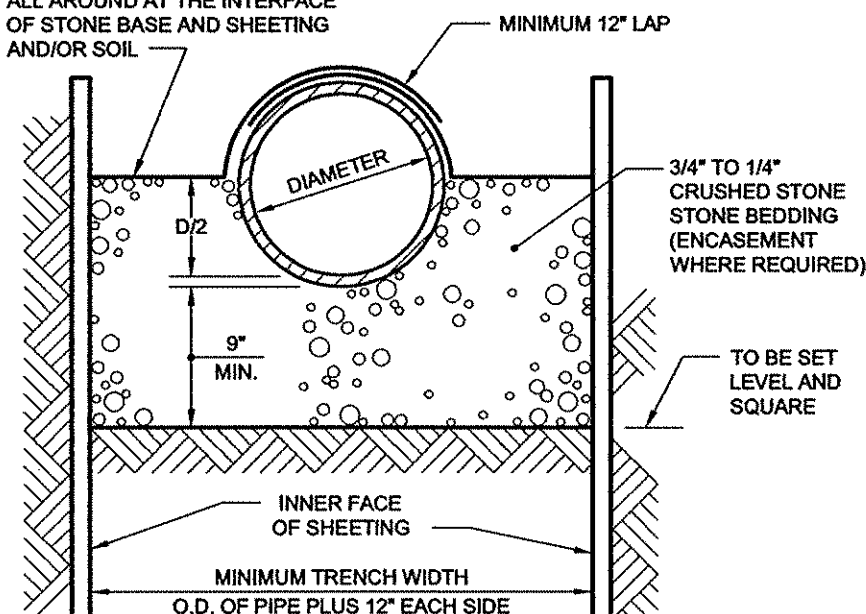
8/14/18
DATE

STANDARD FOR DUCTILE IRON PIPE ALTERNATE



PLAN
TYPICAL HOUSE CONNECTION
(D.I.P.) OFF D.I.P. SEWER

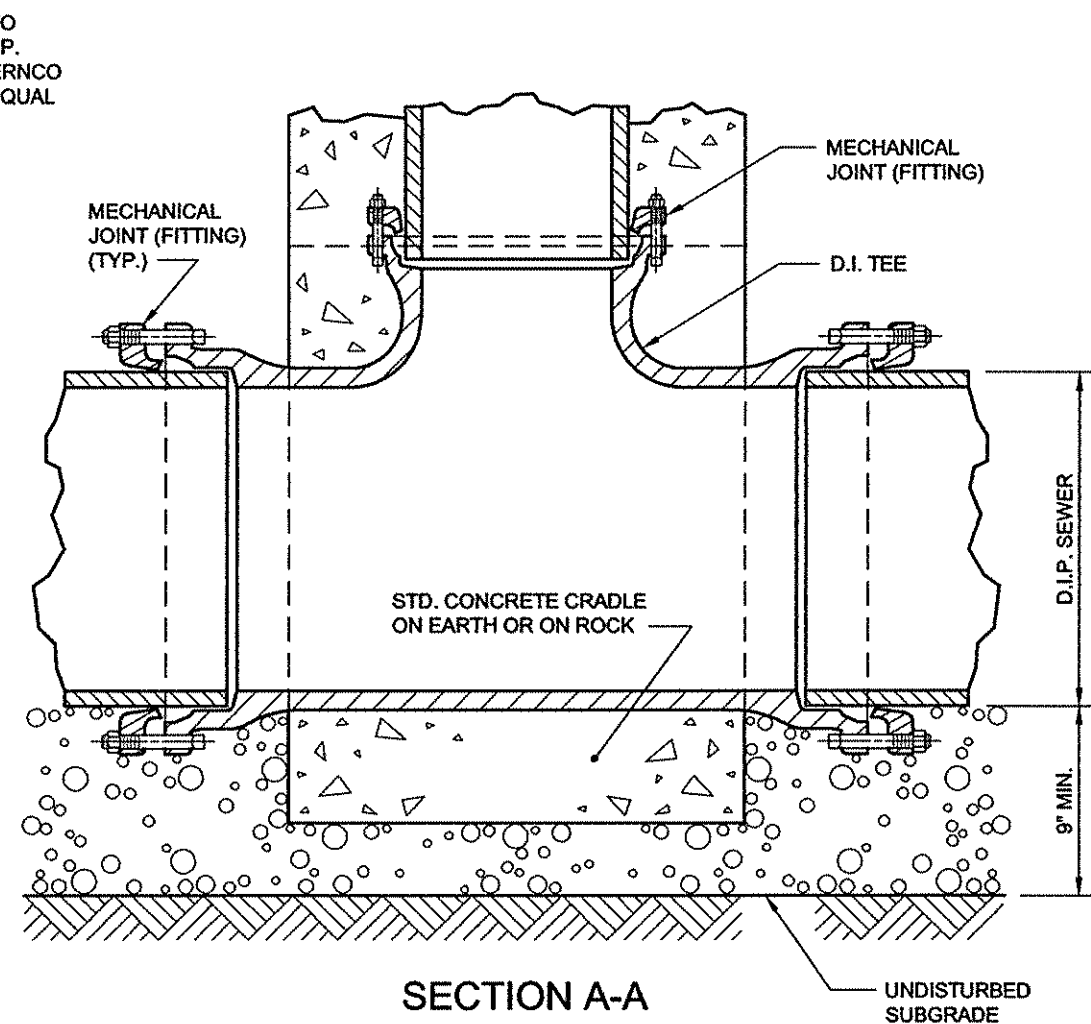
FILTER FABRIC, MIRAFI 140 OR
APPROVED EQUAL, TO BE PLACED
ALL AROUND AT THE INTERFACE
OF STONE BASE AND SHEETING
AND/OR SOIL



TYPICAL D.I.P. RISER FOR HOUSE
CONNECTION OFF D.I.P. SEWER

NOTES:

- (1) THIS ALTERNATE WILL BE PERMITTED ONLY WHEN SO STATED IN THE SPECIFICATIONS.
- (2) MATERIAL: THE DUCTILE IRON PIPE SHALL BE 60-42-10 GRADE AND CLASS 56, UNLESS OTHERWISE SPECIFIED. THE DUCTILE IRON PIPE SHALL BE LINED WITH CERAMIC EPOXY.
- (3) JOINTS: (A) ALL JOINTS FOR DUCTILE IRON PIPE SEWERS SHALL BE "PUSH-ON" JOINT TYPE, EXCEPT AS NOTED ABOVE FOR SPUR AND RISER PIPE WHICH SHALL BE MECHANICAL JOINT TYPE, MEETING THE REQUIREMENTS OF ANSI STANDARD A.21.11, LATEST REVISION.
(B) JOINTS SHALL BE MADE IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS FOR ASSEMBLING THE TYPE OF JOINT FURNISHED.
(C) FITTINGS SHALL BE DUCTILE IRON OR GRAY IRON (250 PSI) MECHANICAL JOINTS IN ACCORDANCE WITH THE LATEST REVISIONS OF ANSI/AWWA C110/A21.10 AND ANSI/AWWA C111/A21.11.
- (4) LEVELING BLOCKS ARE NOT PERMITTED.



SECTION A-A

| PIPE DIA. | |
|--------------|------------|
| FOR E.S.V.P. | USE D.I.P. |
| 15" | 16" |

SUBSTITUTION
CHART

Gurdeep S. Saini
P.E.
ASSOCIATE COMMISSIONER, DESIGN
DEPARTMENT OF DESIGN AND CONSTRUCTION

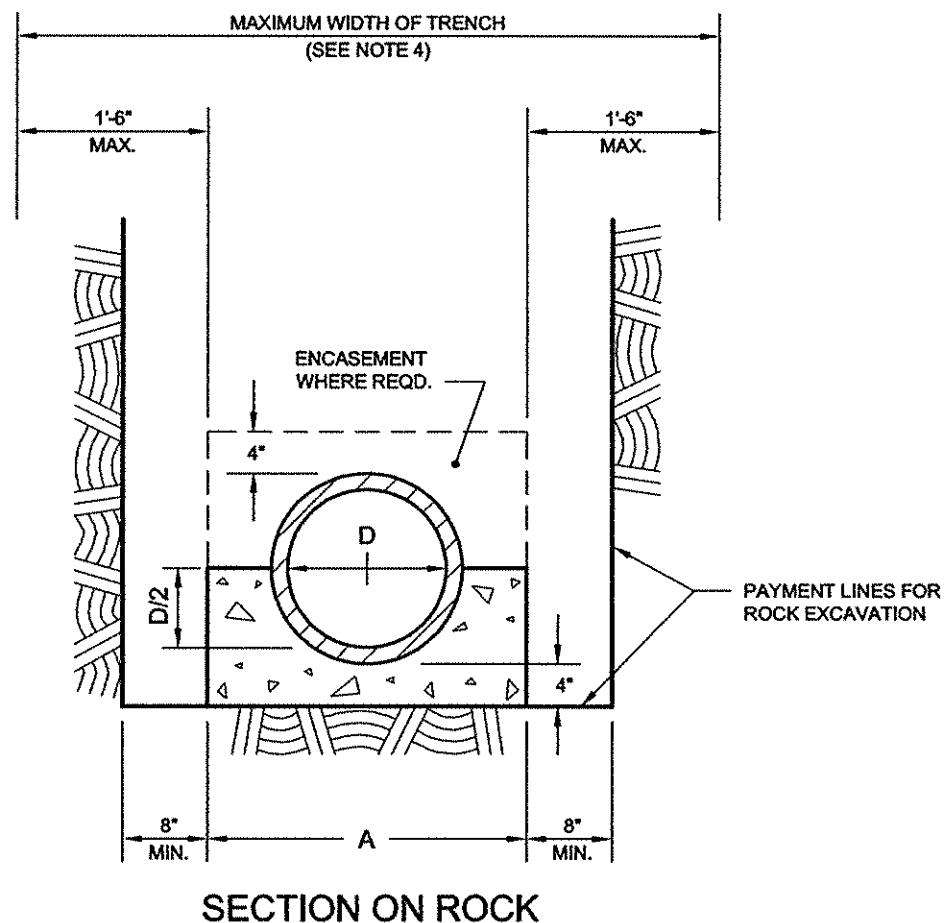
8/14/18
DATE

Thomas Wyne
P.E.
EXECUTIVE DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION

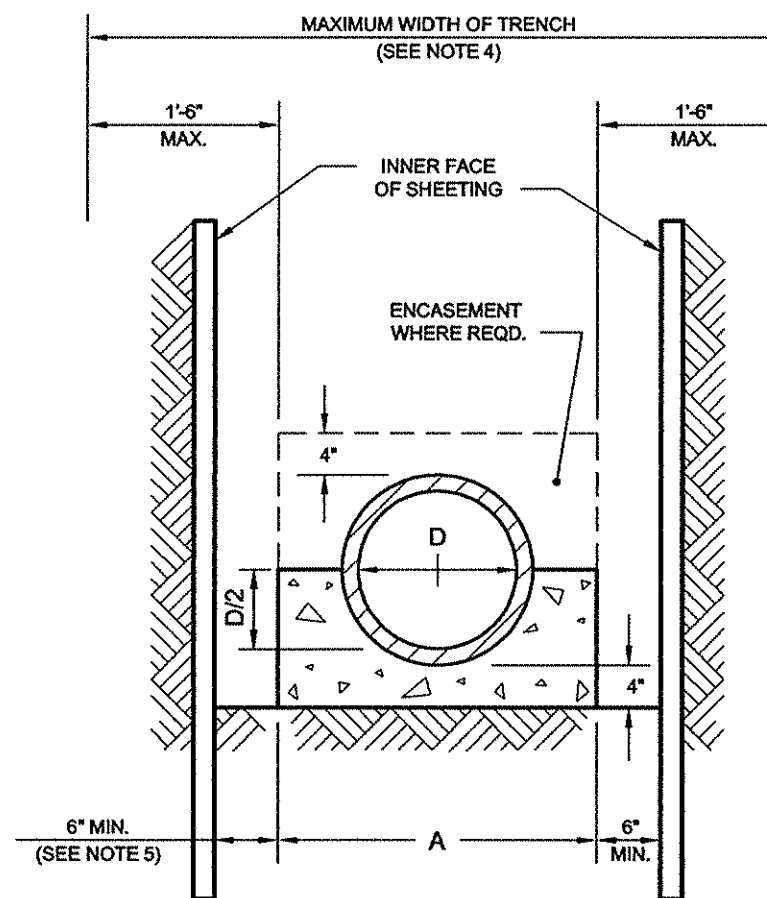
8/14/18
DATE

STANDARD FOR HOUSE CONNECTIONS

(FOR 6" AND 8" DIA. CAST IRON SOIL PIPE OR VITRIFIED CLAY PIPE
ON CONCRETE CRADLE OR ENCASED IN CONCRETE ON EARTH OR ON ROCK)



SECTION ON ROCK



SECTION ON EARTH

NOTES:

- (1) CRADLE AND ENCASEMENT ARE CLASS 40 CONCRETE FOR ALL HOUSE CONNECTIONS.
- (2) ENTIRE CRADLE OR ENCASEMENT IS TO BE PLACED MONOLITHICALLY.
- (3) ENCASEMENT REQUIRED ON H.C. PIPE WHICH HAS A COVER, FROM FINAL GRADE TO THE OUTER TOP OF THE PIPE, OF LESS THAN THREE (3) FEET OR WHEN THE UPPER LIMIT OF COVER IS EXCEEDED.
- (4) UNLESS OTHERWISE APPROVED BY THE ENGINEER, THE MAXIMUM WIDTH OF TRENCH BETWEEN INNER FACES OF THE LOWEST STAGE OF SHEETING OR ROCK CUT LINES, FROM SUBGRADE OF TRENCH TO A MINIMUM HEIGHT OF TWO (2) FEET ABOVE THE OUTER TOP OF THE PIPE, SHALL NOT EXCEED THE WIDTH OF THE CRADLE BY MORE THAN THREE (3) FEET (1'-6" MAXIMUM EACH SIDE OF CRADLE).
- (5) SIX (6) INCH MINIMUM SHALL BE MAINTAINED AT ALL TIMES, EXCEPT WHERE SHEETING IS TO BE USED AS FORMWORK.

| D | A | MAX. COVER WITHOUT ENCSMT. | CONC. CRADLE CU. YD./L.F. | CONC. ENCSMT. CU. YD./L.F. |
|----|-------|-------------------------------|------------------------------|-------------------------------|
| 6" | 1'-4" | 20' | 0.0262 | 0.0523 |
| 8" | 1'-6" | 22' | 0.0315 | 0.0630 |

Sandeep S. Saini
ASSOCIATE COMMISSIONER, DESIGN
DEPARTMENT OF DESIGN AND CONSTRUCTION

P.E.

8/14/18
DATE

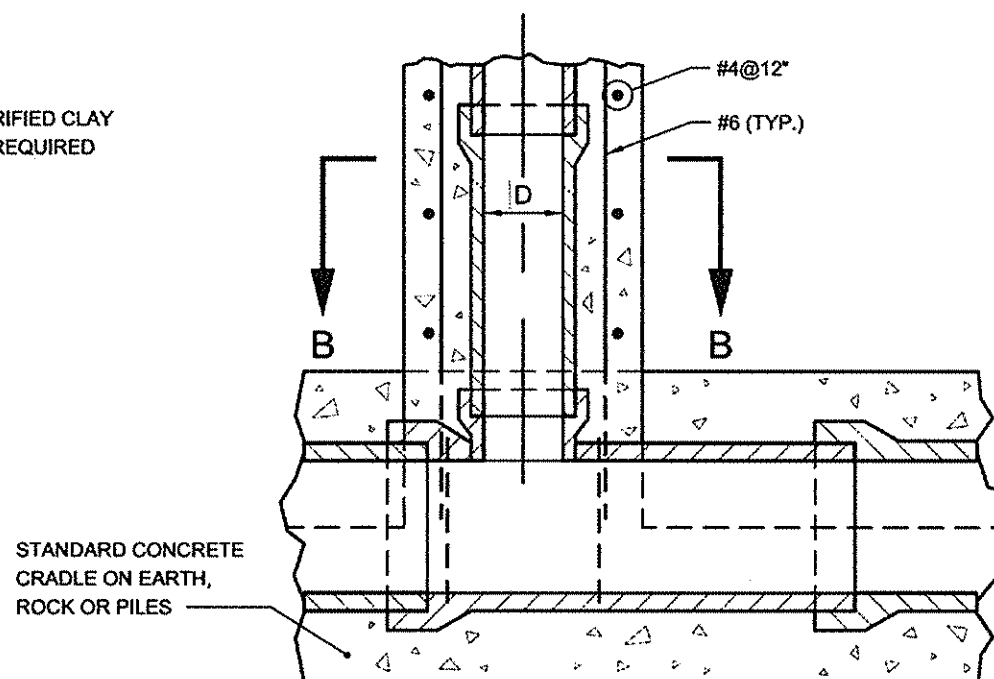
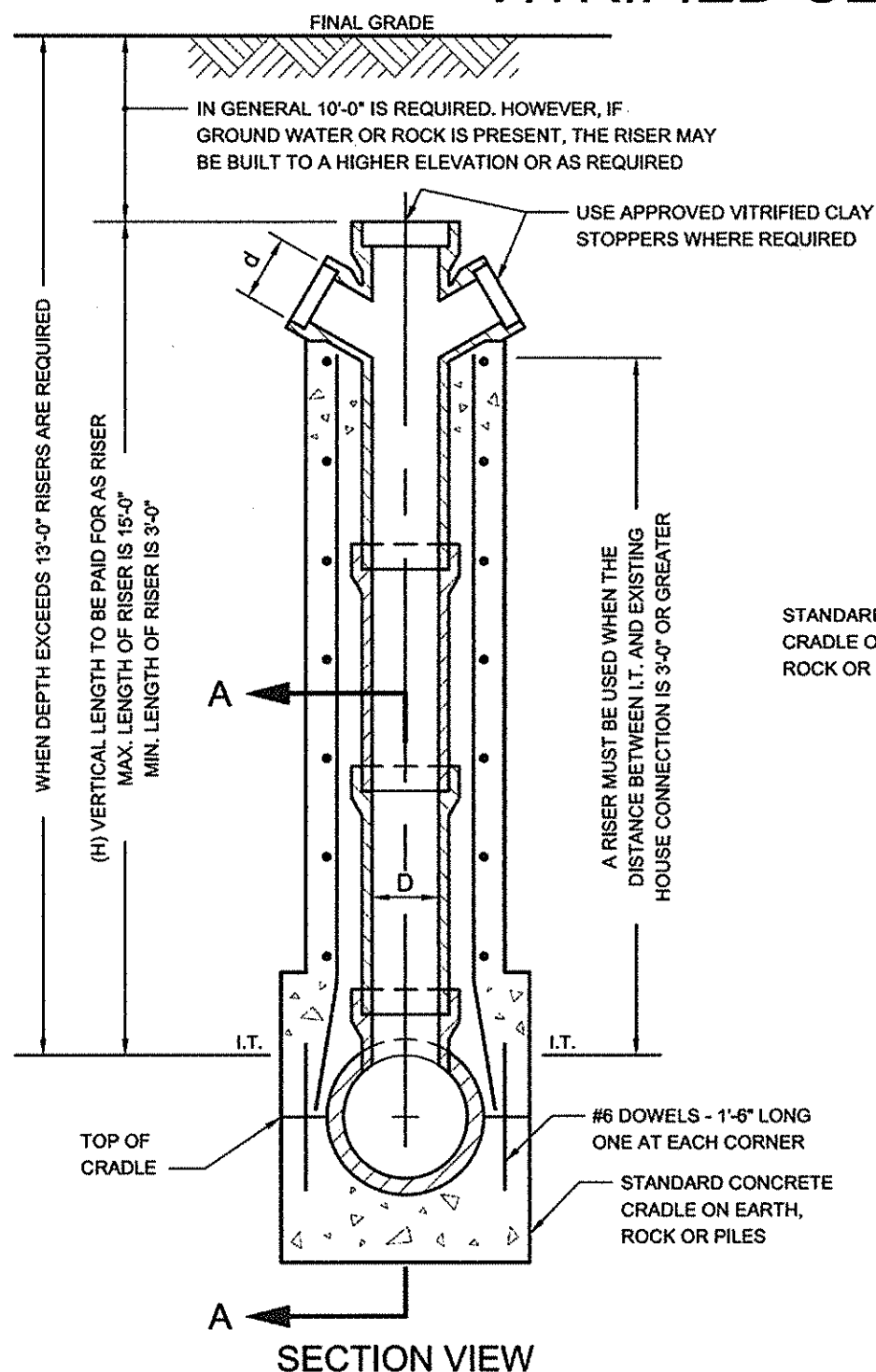
Thomas Wayne
EXECUTIVE DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION

P.E.

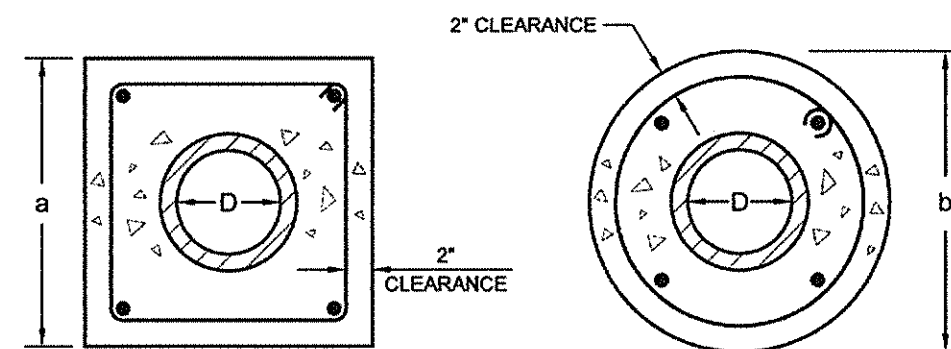
8/14/18
DATE

CITY OF NEW YORK
DEPARTMENT OF ENVIRONMENTAL PROTECTION

STANDARD FOR RISER ON 10" DIA. TO 18" DIA. VITRIFIED CLAY PIPE SEWERS ON CONCRETE CRADLE



SECTION A-A



SQUARE

CIRCULAR

SHAPE OF ENCASEMENT TO BE OPTIONAL

SECTION B-B

NOTES:

- (1) ALL PIPES AND FITTINGS SHALL BE EXTRA STRENGTH FULL DIAMETER VITRIFIED CLAY.
- (2) THE COST OF ADDITIONAL CONCRETE, STEEL REINFORCEMENT BARS AND VITRIFIED CLAY RISER PIPE AND FITTINGS REQUIRED SHALL BE INCLUDED IN THE PRICE BID FOR RISERS.
- (3) KEYED CONSTRUCTION JOINTS ARE REQUIRED BETWEEN ANY SUCCESSIVE POURS.
- (4) USE STANDARD "Y" OR "DOUBLE Y" FITTING AS REQUIRED.
- (5) CONCRETE IS TO BE CLASS 40. REBARS-GRADE 60.

| D | d | a | b |
|-----|----|-----|-----|
| 8" | 6" | 22" | 23" |
| 10" | 8" | 24" | 25" |

Gandep S. Saini

ASSOCIATE COMMISSIONER, DESIGN
DEPARTMENT OF DESIGN AND CONSTRUCTION

P.E.

8/14/18

DATE

Thomas Wayne

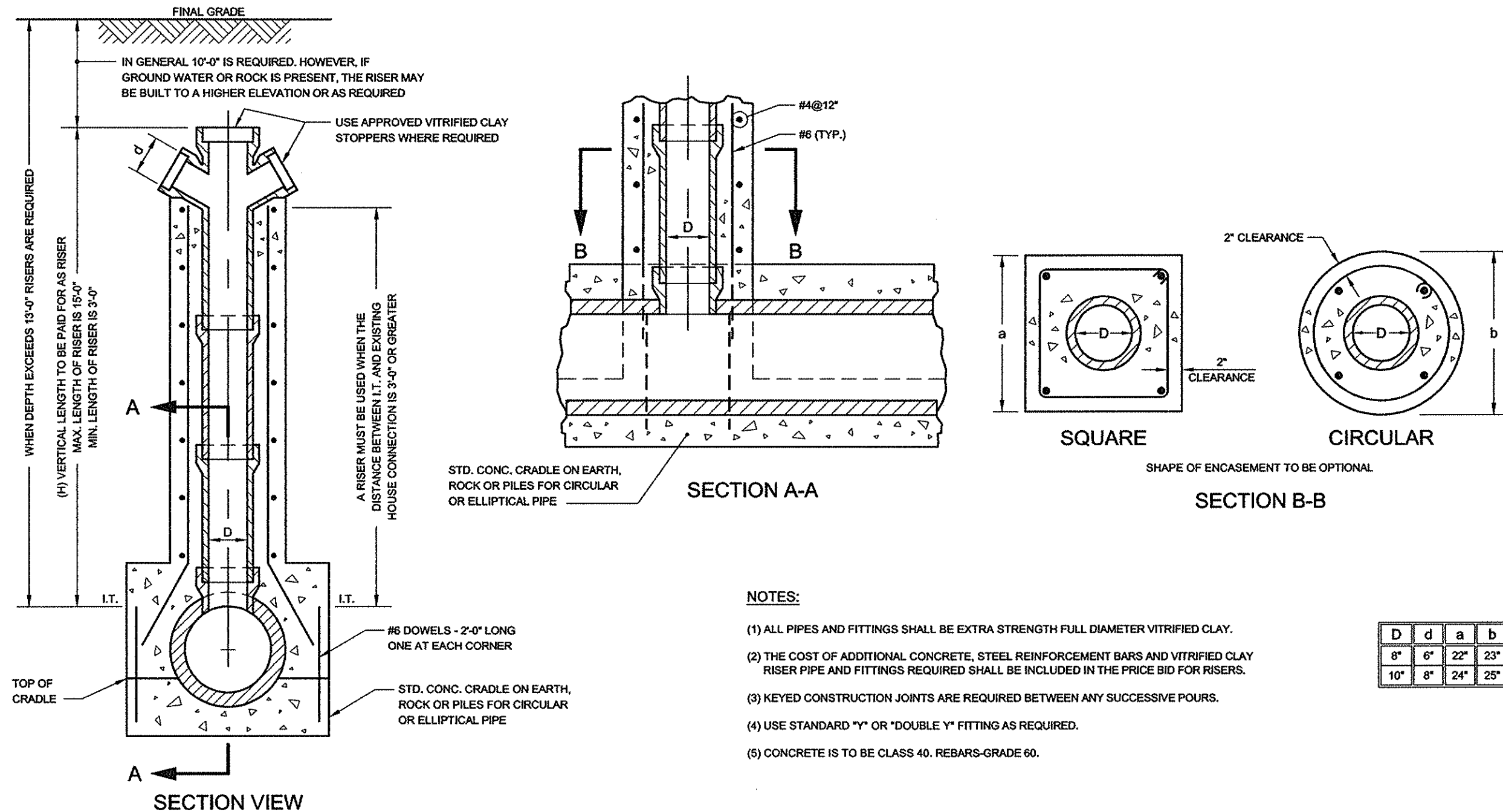
EXECUTIVE DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION

P.E.

8/14/18

DATE

STANDARD FOR RISER ON PRECAST REINFORCED CONCRETE PIPE SEWERS ON CONCRETE CRADLE



Gardip S. Saini
ASSOCIATE COMMISSIONER, DESIGN
DEPARTMENT OF DESIGN AND CONSTRUCTION

P.E.

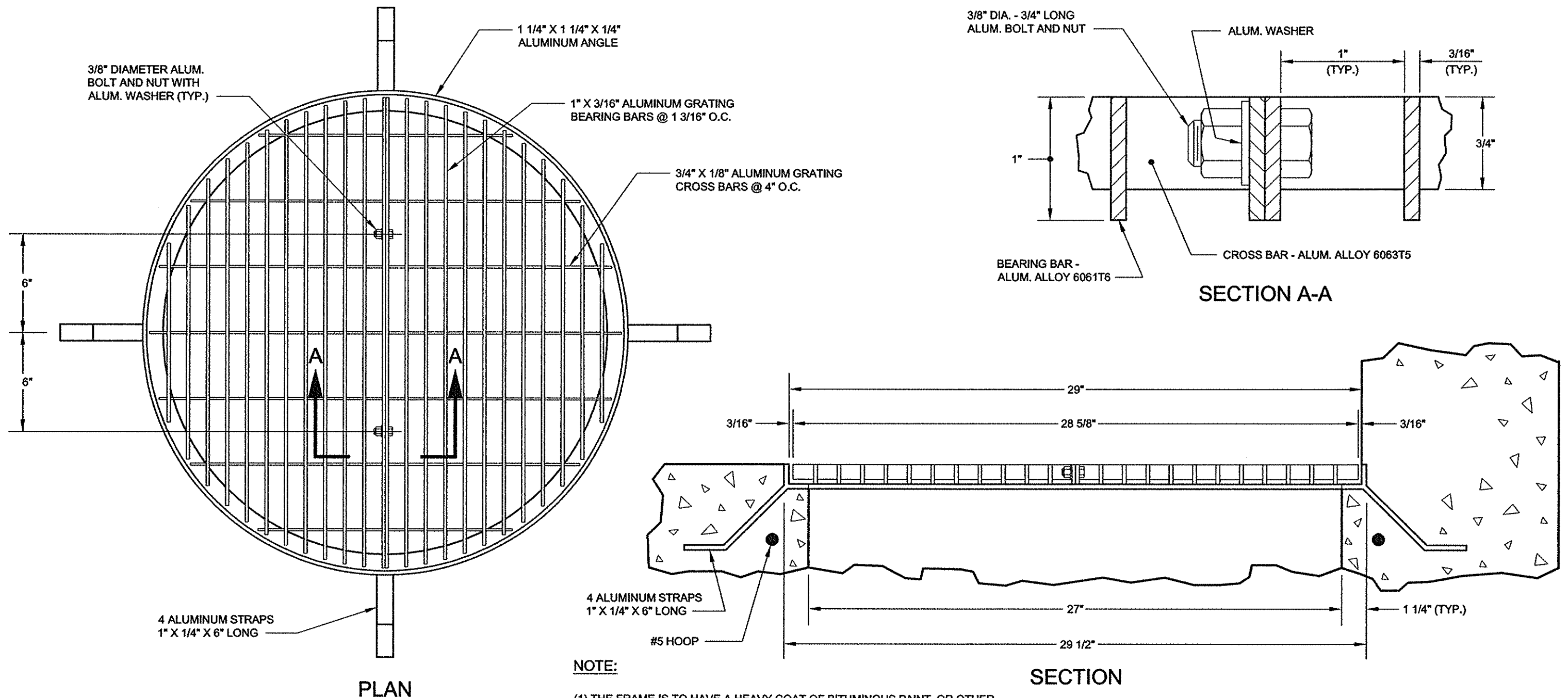
8/14/18
DATE

Thomas Wayne
EXECUTIVE DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION

P.E.

8/14/18
DATE

STANDARD FOR 27" DIAMETER ALUMINUM FLOOR GRATING



NOTE:

- (1) THE FRAME IS TO HAVE A HEAVY COAT OF BITUMINOUS PAINT, OR OTHER APPROVED INSULATING MATERIAL.
- (2) TYPE "A" OR TYPE "B" ALUMINUM GRATINGS MAY BE USED. HOWEVER, ONE TYPE OF GRATING SHALL BE USED EXCLUSIVELY THROUGHOUT ANY PROJECT.

Gurdip S. Saini
ASSOCIATE COMMISSIONER, DESIGN
DEPARTMENT OF DESIGN AND CONSTRUCTION

P.E.

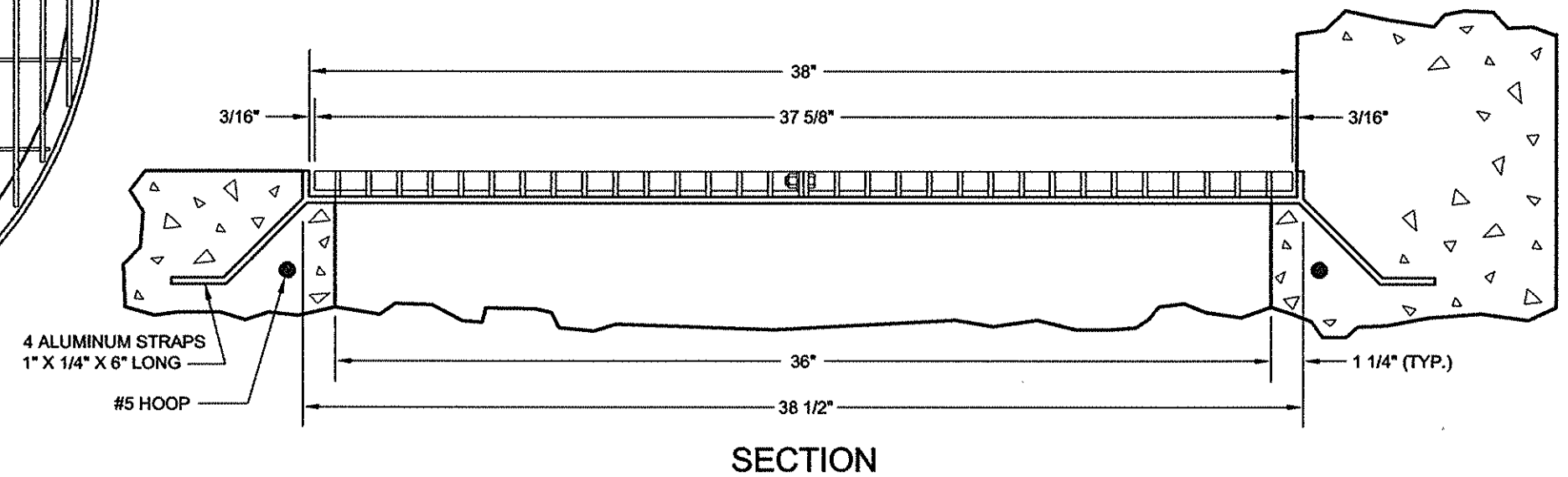
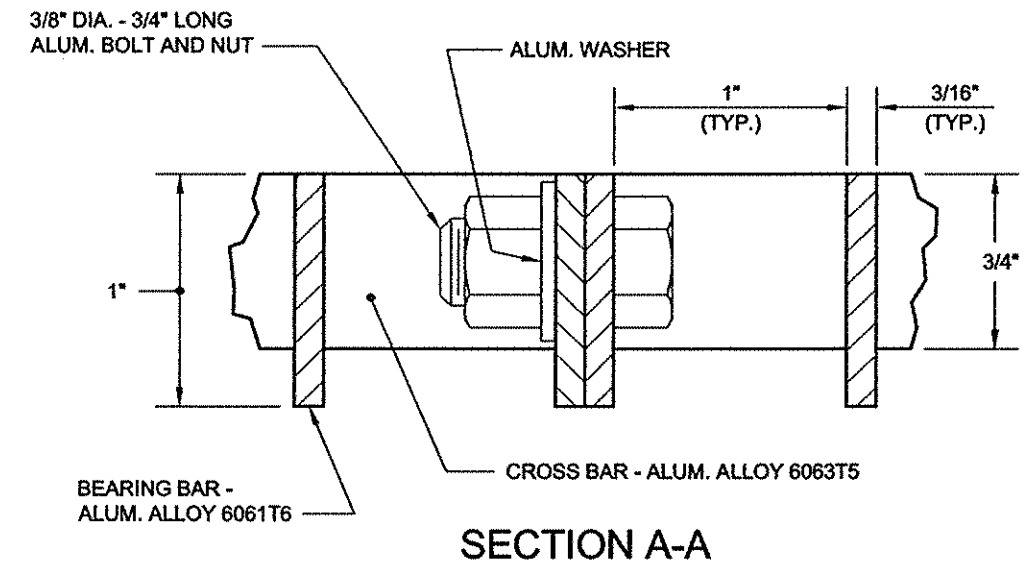
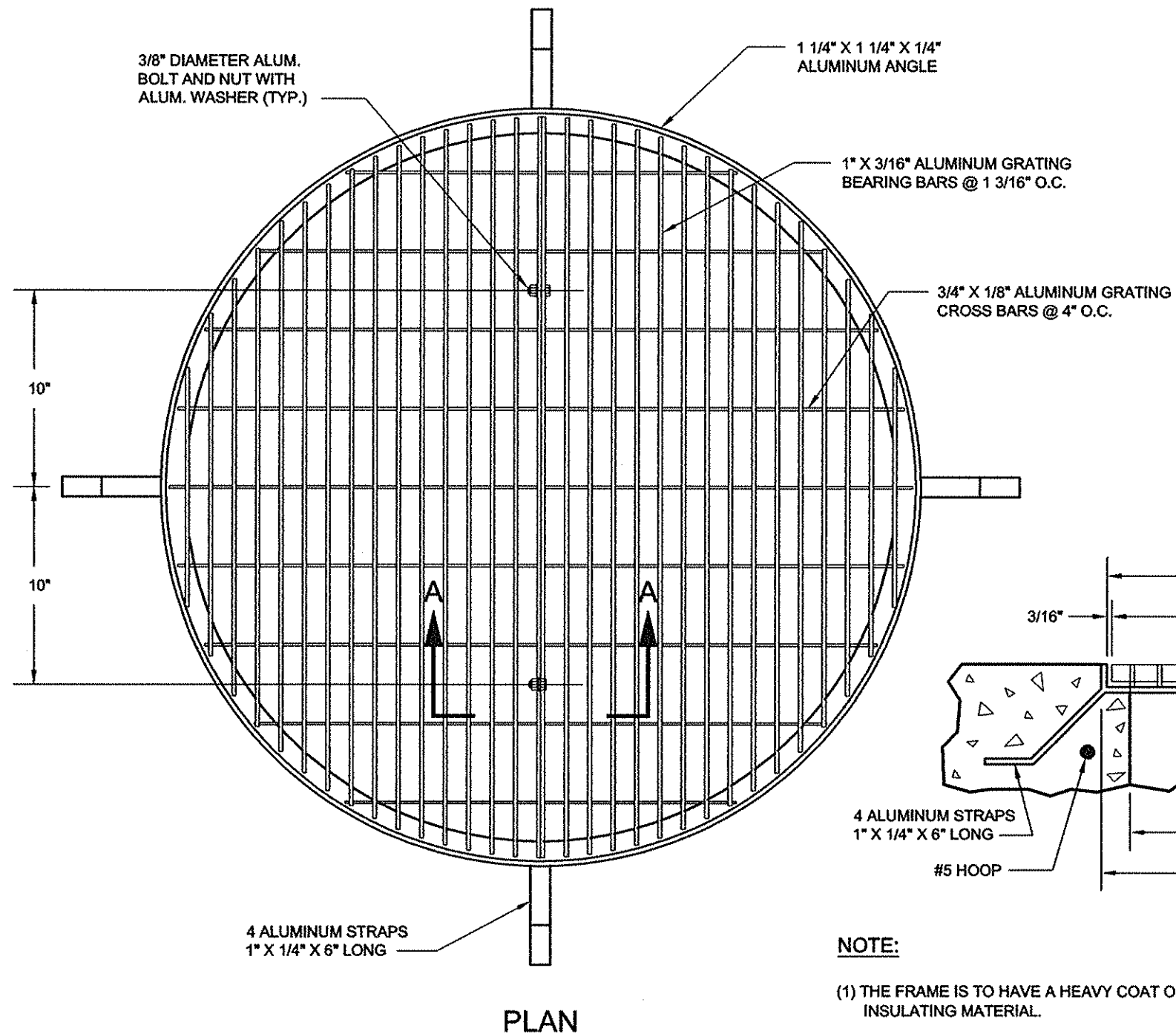
8/14/18
DATE

Thomas Wynne
EXECUTIVE DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION

P.E.

8/14/18
DATE

STANDARD FOR 36" DIAMETER ALUMINUM FLOOR GRATING



NOTE:

- (1) THE FRAME IS TO HAVE A HEAVY COAT OF BITUMINOUS PAINT, OR OTHER APPROVED INSULATING MATERIAL.
- (2) TYPE "A" OR TYPE "B" ALUMINUM GRATINGS MAY BE USED. HOWEVER, ONE TYPE OF GRATING SHALL BE USED EXCLUSIVELY THROUGHOUT ANY PROJECT.

Euridy S. Saini
ASSOCIATE COMMISSIONER, DESIGN
DEPARTMENT OF DESIGN AND CONSTRUCTION

P.E.

8/14/18
DATE

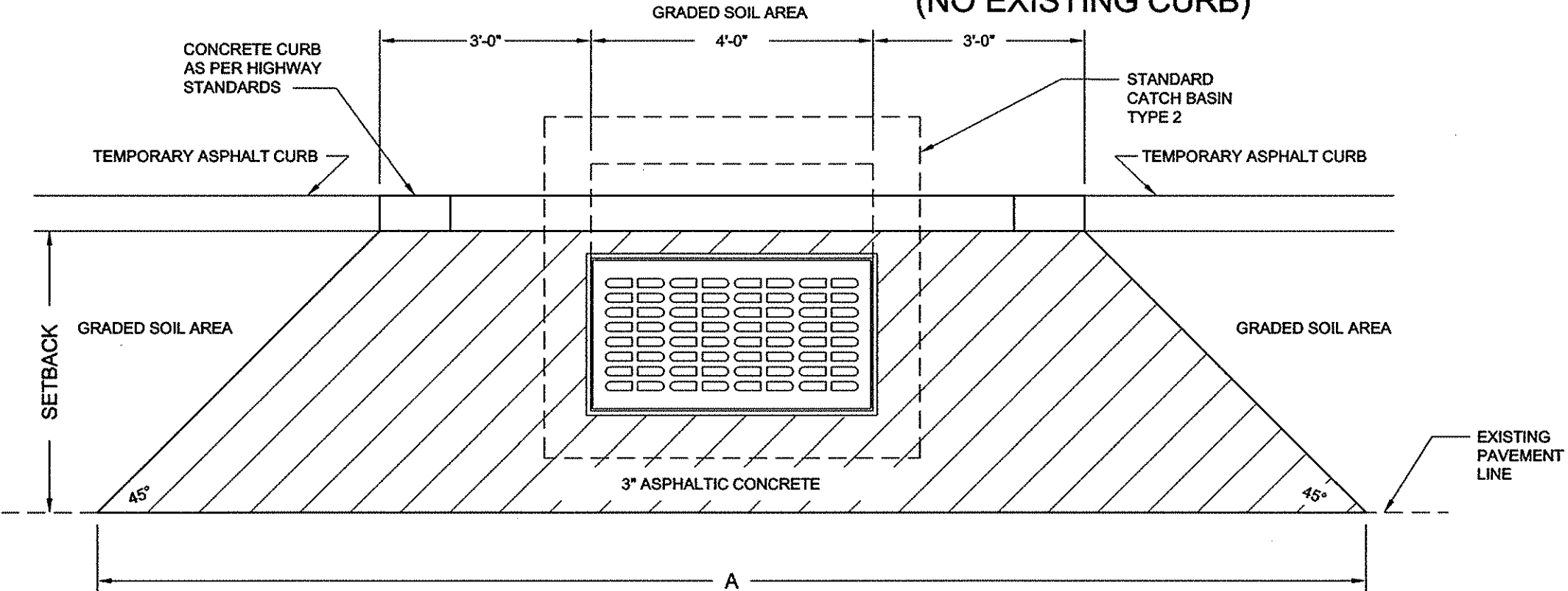
Thomas Wayne
EXECUTIVE DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION

P.E.

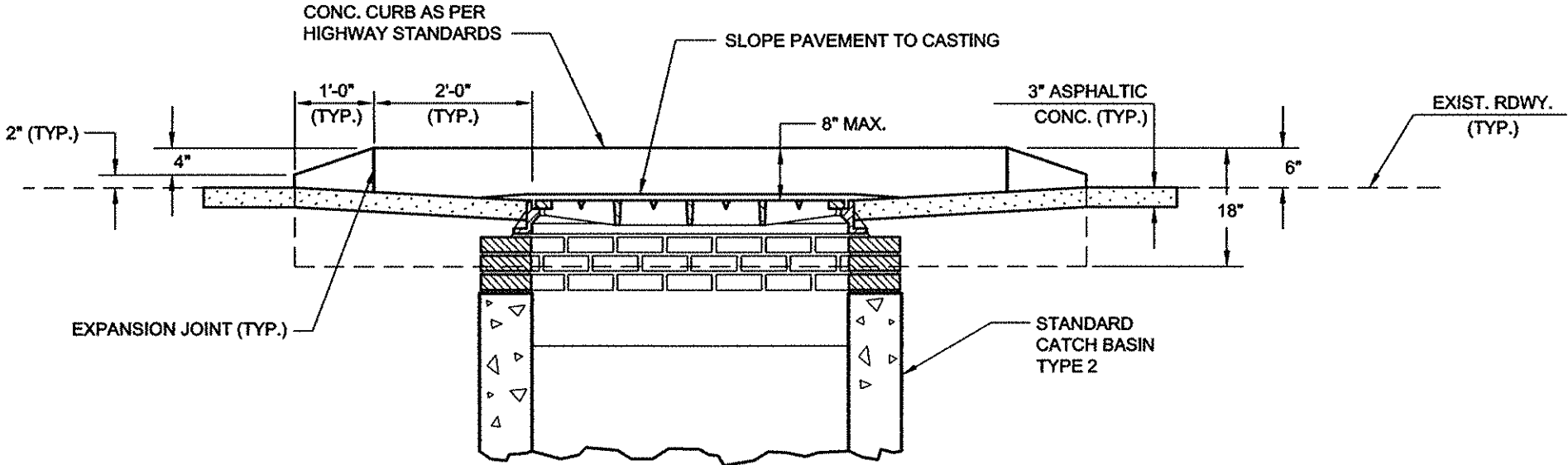
8/14/18
DATE

CITY OF NEW YORK
DEPARTMENT OF ENVIRONMENTAL PROTECTION

STANDARD FOR CONSTRUCTION OF CATCH BASIN
(NO EXISTING CURB)



PLAN



SECTION

| SETBACK | A | ASPH. CONC. SQ. YDS. |
|---------|--------|----------------------|
| 3'-0" | 16'-0" | 3.283 |
| 4'-0" | 18'-0" | 5.172 |
| 5'-0" | 20'-0" | 7.283 |
| 6'-0" | 22'-0" | 9.617 |
| 7'-0" | 24'-0" | 12.172 |
| 8'-0" | 26'-0" | 14.950 |
| 9'-0" | 28'-0" | 17.950 |
| 10'-0" | 30'-0" | 21.172 |

REVISED DECEMBER 2017: P. LEUNG
W. PATALANO/P. MOY

Gurdeep S. Saini
P.E.
ASSOCIATE COMMISSIONER, DESIGN
DEPARTMENT OF DESIGN AND CONSTRUCTION

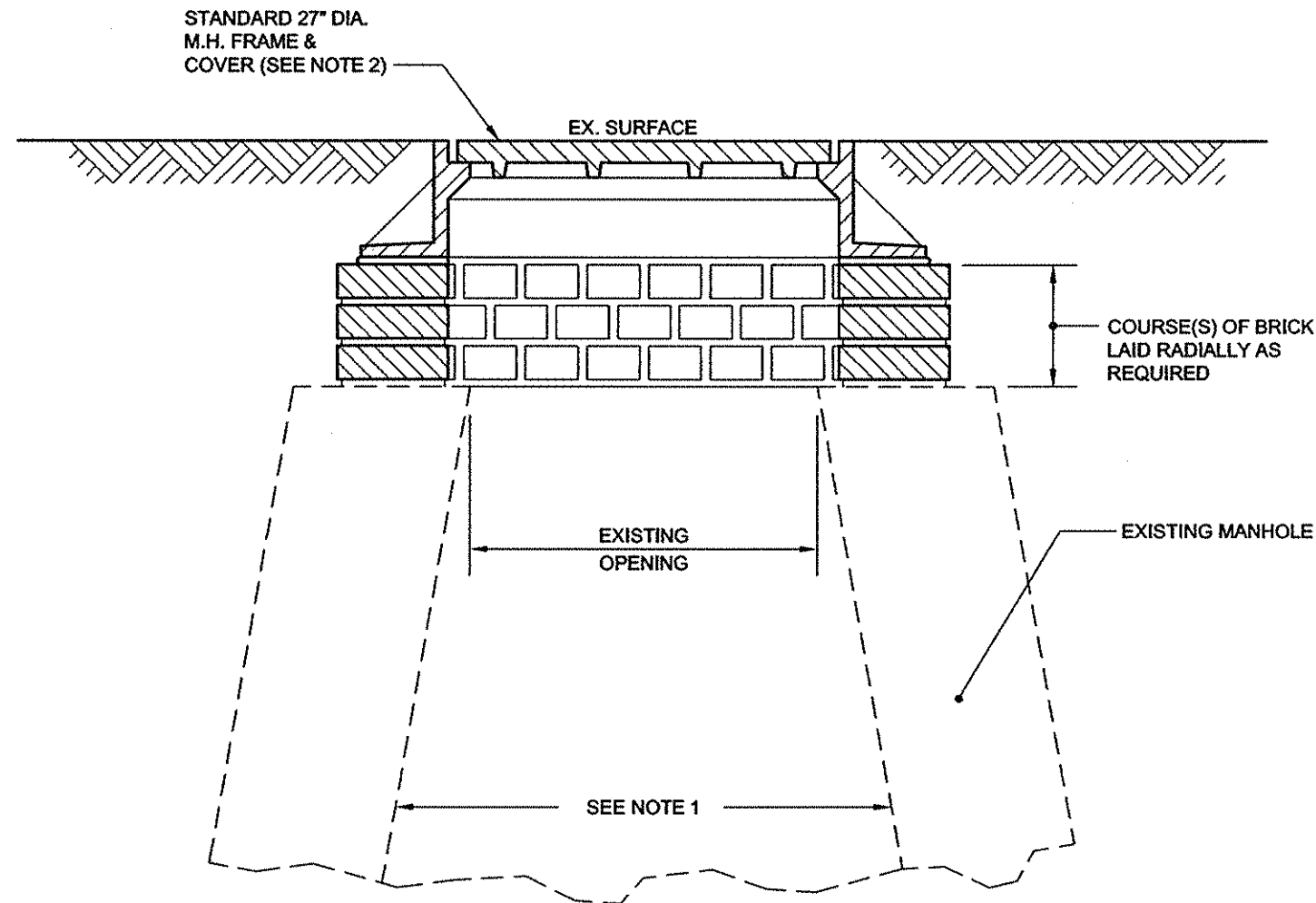
8/14/18
DATE

Thomas Wayne
P.E.
EXECUTIVE DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION

8/14/18
DATE

CITY OF NEW YORK
DEPARTMENT OF ENVIRONMENTAL PROTECTION

STANDARD FOR RECONSTRUCTION OF EXISTING MANHOLE AND REPLACEMENT OF EXISTING M.H. FRAME AND COVER



NOTES:

- (1) AT ALL LOCATIONS SHOWN ON THE PLANS, SPECIFIED IN THE CONTRACT DOCUMENTS OR ORDERED BY THE ENGINEER REQUIRING THE RECONSTRUCTION OF EXISTING MANHOLES, THE FOLLOWING WORK SHALL BE PERFORMED:

(A) ON GUNITED SEWERS:

FROM THE INNER TOP OF THE LARGEST SEWER TO THE BOTTOM OF THE CASTING, ALL LOOSE AND MISSING BRICK, MASONRY OR CONCRETE SHALL BE REPAIRED AND/OR REMOVED AS DIRECTED BY THE ENGINEER AND ALL DEBRIS, EXCESS MORTAR, ETC. SHALL BE REMOVED SO THAT THE FACES OF THE MANHOLE WALLS ARE LEFT SMOOTH AND CLEAN. IF ANY STEP(S) IS DAMAGED OR UNSAFE, ALL THE STEPS IN THE MANHOLE CHIMNEY SHALL BE REMOVED AND NOT REPLACED. FINALLY, THE WHOLE AREA SHALL BE PARGED OR FLASHED (RECEIVE A ONE HALF (1/2) INCH MINIMUM FINISHING COAT OF MORTAR WITH A FLOAT FINISH).

(B) ON LINED SEWERS:

FROM THE INVERT OF THE MANHOLE TO THE BOTTOM OF THE CASTING, ALL LOOSE AND MISSING BRICK, MASONRY OR CONCRETE SHALL BE REPAIRED AND/OR REMOVED AS DIRECTED BY THE ENGINEER AND ALL DEBRIS, EXCESS MORTAR, ETC. SHALL BE REMOVED SO THAT THE FACES OF THE MANHOLE WALLS AND THE INVERT ARE LEFT SMOOTH AND CLEAN. IF ANY STEP(S) IS DAMAGED OR UNSAFE, ALL STEPS IN THE MANHOLE CHIMNEY SHALL BE REMOVED AND NOT REPLACED. FINALLY, THE WHOLE AREA SHALL BE PARGED OR FLASHED (RECEIVE A ONE HALF (1/2) INCH MINIMUM FINISHING COAT OF MORTAR WITH A FLOAT FINISH). (THE INVERT DISH SHALL RECEIVE A PROPORTIONATELY THICKER FINISH COAT SO AS TO PROVIDE A SMOOTH TRANSITION FROM EXISTING SEWER TO THE INSIDE SURFACE OF THE LINER.)

- (2) AT ALL LOCATIONS SHOWN ON THE PLANS, SPECIFIED IN THE CONTRACT DOCUMENTS OR ORDERED BY THE ENGINEER REQUIRING THE REPLACEMENT OF EXISTING MANHOLE FRAMES AND COVERS, THE CONTRACTOR SHALL REMOVE EXISTING MANHOLE FRAMES AND COVERS WHICH ARE TWENTY-FOUR (24) INCHES IN DIAMETER OR OTHERWISE DAMAGED, DEFECTIVE OR NONSTANDARD AND REPLACE THEM WITH NEW STANDARD TWENTY-SEVEN (27) INCH CAST IRON MANHOLE FRAMES AND COVERS.

Gurdeep S. Saini

P.E.

ASSOCIATE COMMISSIONER, DESIGN
DEPARTMENT OF DESIGN AND CONSTRUCTION

8/14/18

DATE

Thomas Wynne

P.E.

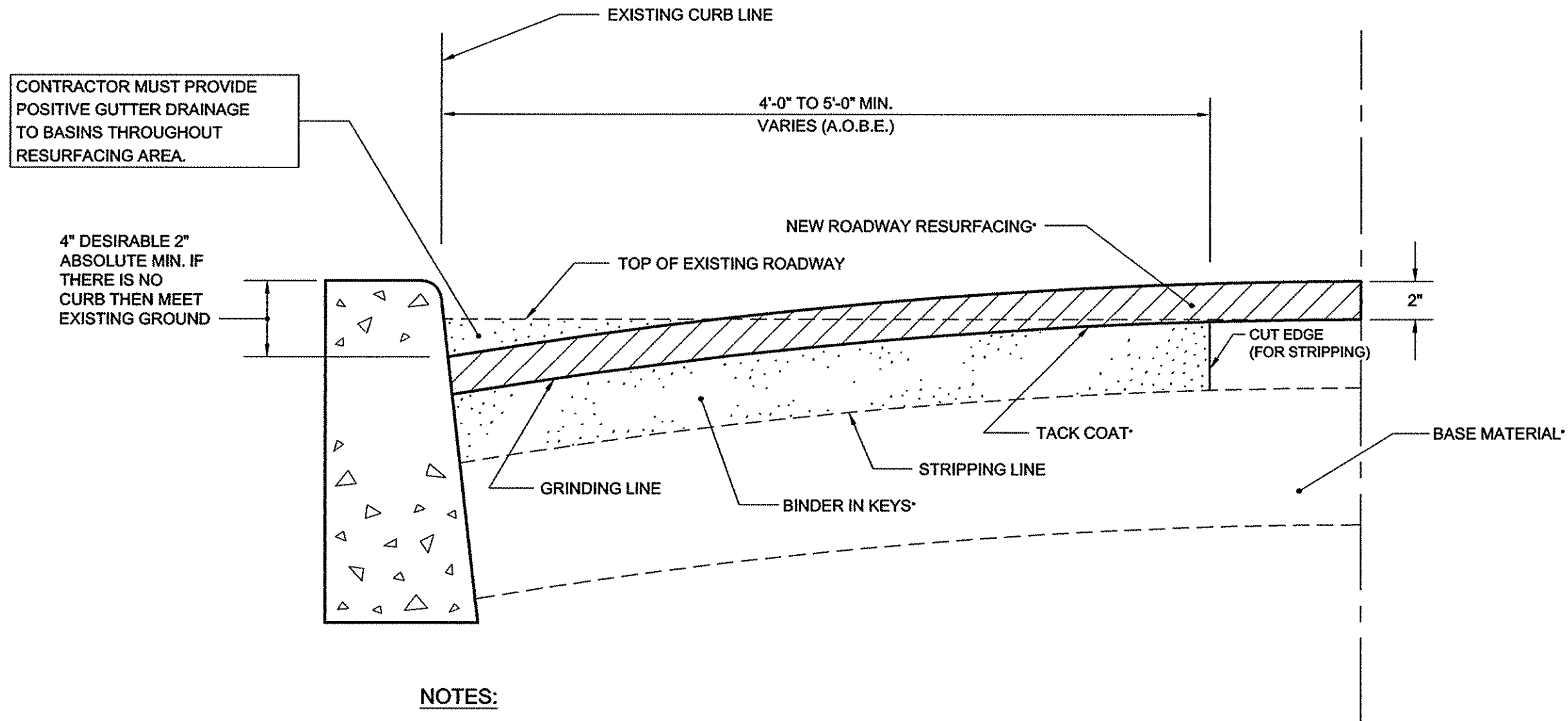
EXECUTIVE DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION

8/14/18

DATE

CITY OF NEW YORK
DEPARTMENT OF ENVIRONMENTAL PROTECTION

STANDARD FOR ROADWAY RESURFACING (PAVEMENT KEY - TYPE B)



NOTES:

- (1) CONTRACTOR MAY AT HIS OPTION EITHER STRIP OR GRIND THE AREA TO THE REQUIRED DEPTH.
- (2) ALL CITY OWNED CASTINGS TO BE ADJUSTED TO MATCH NEW ROADWAY.
- (3) PAVEMENT KEY IS TYPE B.
- (4) (A.O.B.E.) - AS ORDERED BY ENGINEER.
- (5) * - REFER TO DEPARTMENT OF TRANSPORTATION STANDARD HIGHWAY SPECIFICATIONS.
- (6) ALL ASSOCIATED COSTS TO BE INCLUDED IN UNIT PRICES BID FOR THE APPROPRIATE ROADWAY RESTORATION ITEMS.

Sandeep S. Saini

P.E.

ASSOCIATE COMMISSIONER, DESIGN
DEPARTMENT OF DESIGN AND CONSTRUCTION

8/14/18

DATE

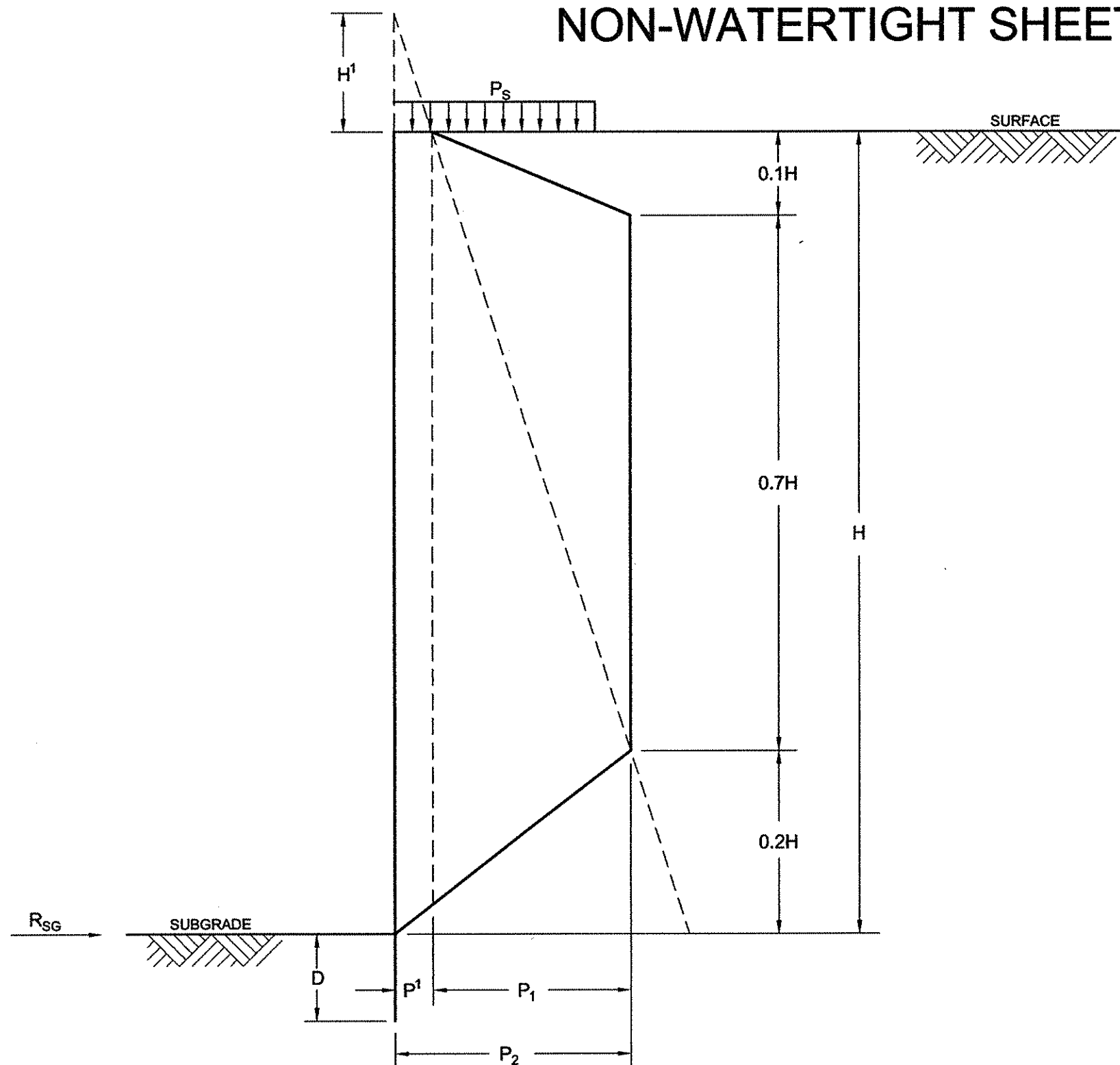
Thomas Wayne

P.E.

EXECUTIVE DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION

8/14/18

DATE

STANDARD FOR MINIMUM LOAD DIAGRAM FOR
NON-WATERTIGHT SHEETING DESIGN

DESIGN CRITERIA:

 γ = UNIT WEIGHT OF SOIL γ_w = UNIT WEIGHT OF WATER γ_s = UNIT WEIGHT OF SUBMERGED SOIL ϕ = ANGLE OF INTERNAL FRICTION OF SOIL $K_{ra} = \frac{(1-\sin\phi)}{(1+\sin\phi)}$ FOR ACTIVE EARTH PRESSURE $K_{rp} = \frac{(1+\sin\phi)}{(1-\sin\phi)}$ FOR PASSIVE EARTH PRESSURE H^1 = 3 FEET MINIMUM $P_s = \gamma \times H^1$ = SURCHARGE-MIN. 300 PSF $P^1 = K_{ra} \times P_s$ $P_1 = (0.8K_{ra}) \times \gamma \times H$ $P_2 = P^1 + P_1$

$$D = \sqrt{\frac{2R_{SG}}{\gamma (K_{rp} - K_{ra})}}$$

NOTES:

- (1) THIS CRITERIA IS FOR BRACED SHEETING ONLY.
- (2) FOR ALL DESIGN CRITERIA SUCH AS FACTOR OF SAFETY AND TOE PENETRATION LIMITS, SEE THE LATEST NYC DEP STANDARD SEWER AND WATER MAIN SPECIFICATIONS UNDER SECTION "SHEETING AND BRACING".

Sandeep S. Saini
ASSOCIATE COMMISSIONER, DESIGN
DEPARTMENT OF DESIGN AND CONSTRUCTION

P.E.

8/14/18
DATE

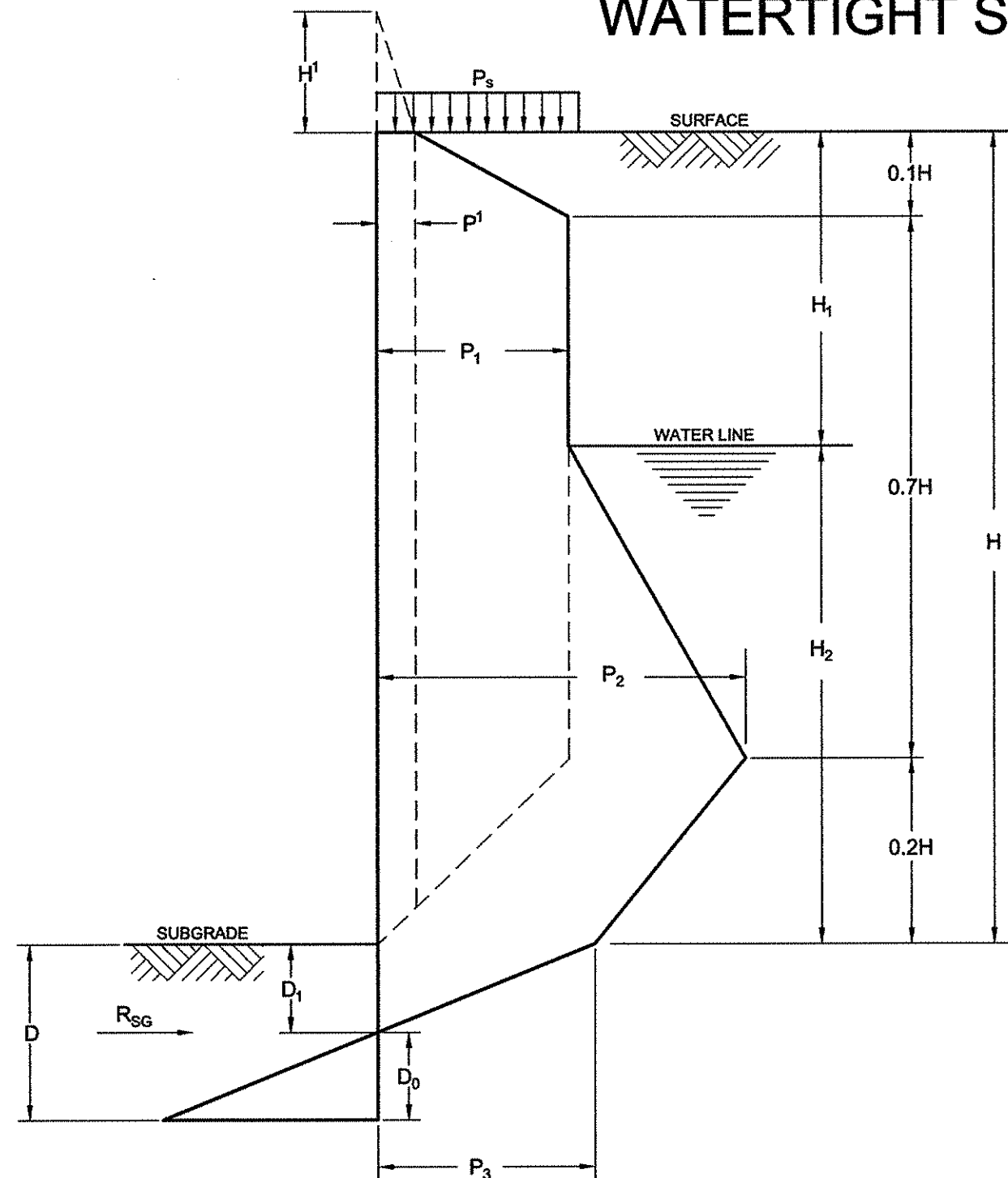
Thomas Wynne
EXECUTIVE DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION

P.E.

8/14/18
DATE

CITY OF NEW YORK
DEPARTMENT OF ENVIRONMENTAL PROTECTION

STANDARD FOR MINIMUM LOAD DIAGRAM FOR WATERTIGHT SHEETING DESIGN



DESIGN CRITERIA:

γ = UNIT WEIGHT OF SOIL

γ_w = UNIT WEIGHT OF WATER

γ_s = UNIT WEIGHT OF SUBMERGED SOIL

ϕ = ANGLE OF INTERNAL FRICTION OF SOIL

$K_{ra} = \frac{(1-\sin\phi)}{(1+\sin\phi)}$ FOR ACTIVE EARTH PRESSURE

$K_{rp} = \frac{(1+\sin\phi)}{(1-\sin\phi)}$ FOR PASSIVE EARTH PRESSURE

$H' = 3$ FEET MINIMUM

$P_s = \gamma \times H' =$ SURCHARGE-MIN. 300 PSF

$P^1 = K_{ra} \times P_s$

$P_1 = P^1 + (0.8K_{ra}) \times (\gamma H_1 + \gamma_s H_2)$

$P_2 = P_1 + \gamma_w (H_2 - 0.2H)$

$P_3 = \gamma_w \times H_2$

$D_1 = \frac{P_3}{\gamma_s (K_{rp} - K_{ra})}$

$D_0 = \sqrt{\frac{2R_{sg}}{\gamma_s (K_{rp} - K_{ra})}}$

$D = D_1 + D_0$

NOTES:

(1) THIS CRITERIA IS FOR BRACED SHEETING ONLY.

(2) FOR ALL DESIGN CRITERIA SUCH AS FACTOR OF SAFETY AND TOE PENETRATION LIMITS, SEE THE LATEST NYC DEP STANDARD SEWER AND WATER MAIN SPECIFICATIONS UNDER SECTION "SHEETING AND BRACING".

Sandeep S. Saini
ASSOCIATE COMMISSIONER, DESIGN
DEPARTMENT OF DESIGN AND CONSTRUCTION

P.E.

8/14/18
DATE

Thomas Wyne
EXECUTIVE DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION

P.E.

8/14/18
DATE