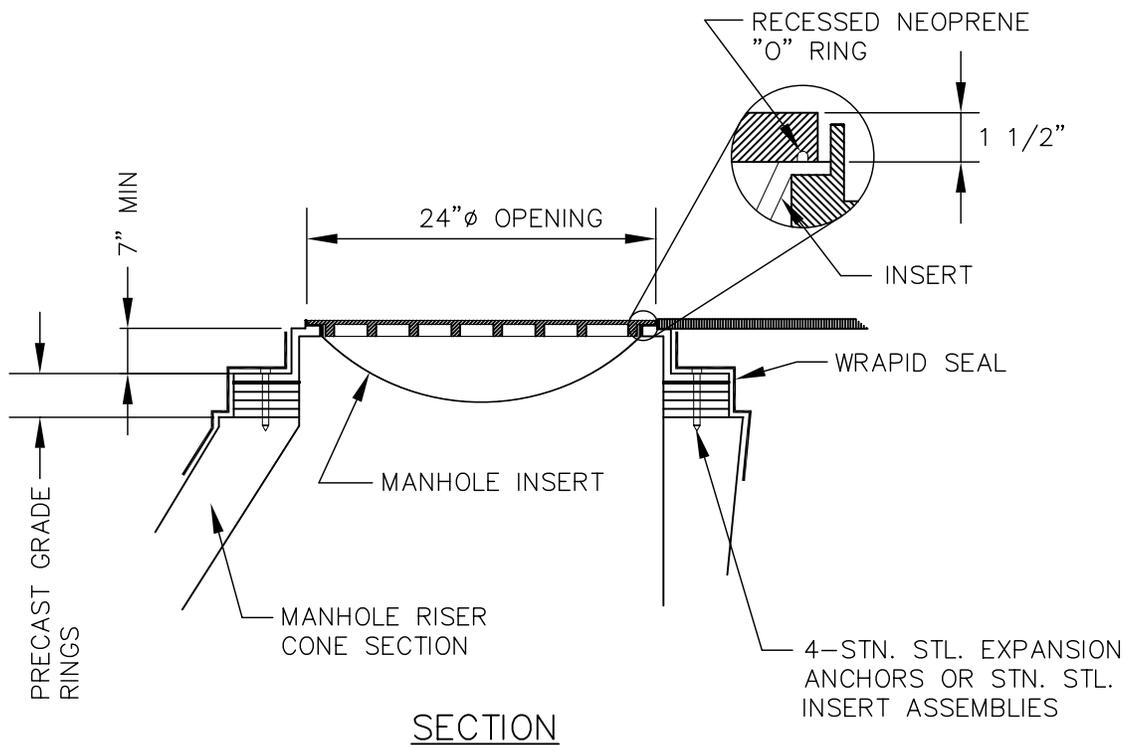
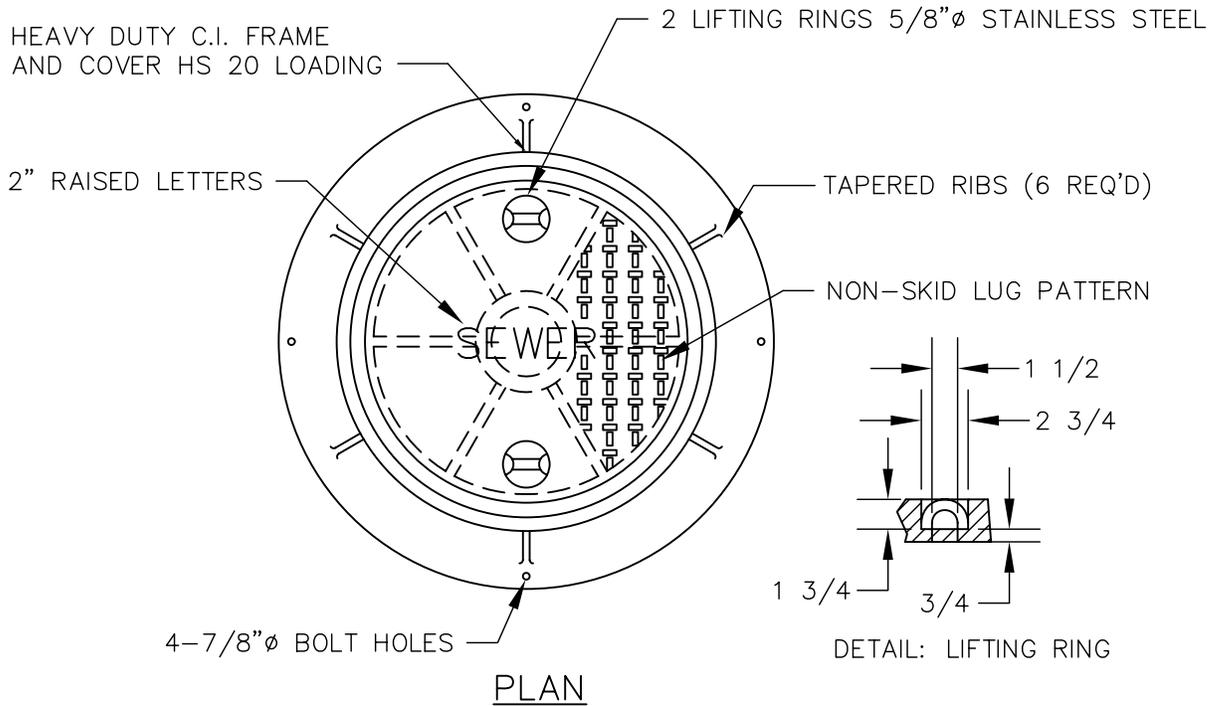


TOWNSHIP PAVEMENT RESTORATION NOTES:

1. RESTORE WITH SUPERPAVE (25mm) TO SURFACE AND ALLOW TO SETTLE FOR 90 DAYS. SUPERPAVE DEPTH OF 6 1/2" OR TO MATCH EXISTING PAVING, WHICHEVER IS GREATER.
2. MILL RESTORED AREA PLUS 1 FOOT TO EACH SIDE OF TRENCH TO 1 1/2" DEPTH.
3. PAVE MILLED AREA WITH 1 1/2" OF SUPERPAVE (9.5mm).
4. SEAL EDGES WITH PG64-22.

| | | | | | |
|--|--|---|-------------------------|---|--|
|  ENTECH | Entech Engineering, Inc. Engineering Architecture Construction | WARWICK TOWNSHIP MUNICIPAL AUTHORITY 315 CLAY ROAD, LITITZ, PA 17543 STANDARD DETAIL TRENCH RESTORATION DETAIL FOR EXISTING PAVED AREAS | | | |
| | Corporate Office: 4 S. Fourth Street Reading, PA 19602 ph: 610.373.6667 fx: 610.373.7537 Pottsville, PA ph: 570.628.5655 Mountaintop, PA ph: 570.868.0275 Lititz, PA ph: 717.626.6666 www.entecheng.com 1.800.825.1372 | DATE: APRIL 2009 | SCALE: N.T.S. | DRAWING NO. <div style="font-size: 2em; font-weight: bold; text-align: center;">S1</div> | |
| PREPARED BY BAM | CHECKED BY JDB | APPROVED BY SMC | REV. / DATE - - | PROJECT NO. 4185.26 | |



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Engineering Architecture Construction

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WARWICK TOWNSHIP MUNICIPAL AUTHORITY

315 CLAY ROAD, LITITZ, PA 17543

STANDARD DETAIL

STANDARD MANHOLE FRAME & COVER DETAIL WITH LIFTING RINGS

DATE:
APRIL 2009

SCALE:
N.T.S.

DRAWING NO.

REV. / DATE
- -

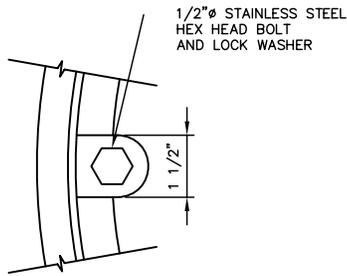
PROJECT NO.
4185.26

S10

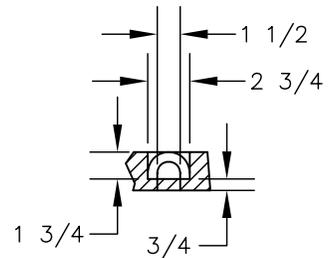
PREPARED BY
BAM

CHECKED BY
JDB

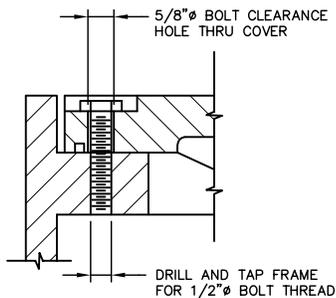
APPROVED BY
SMC



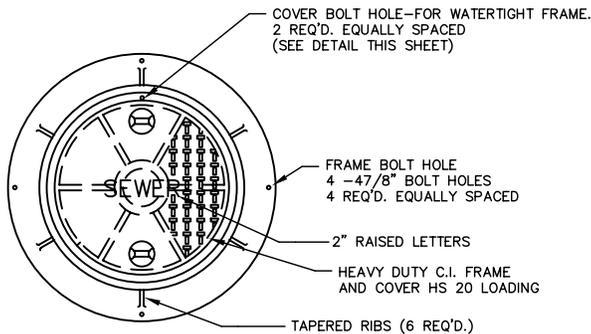
PLAN



DETAIL: LIFTING RING



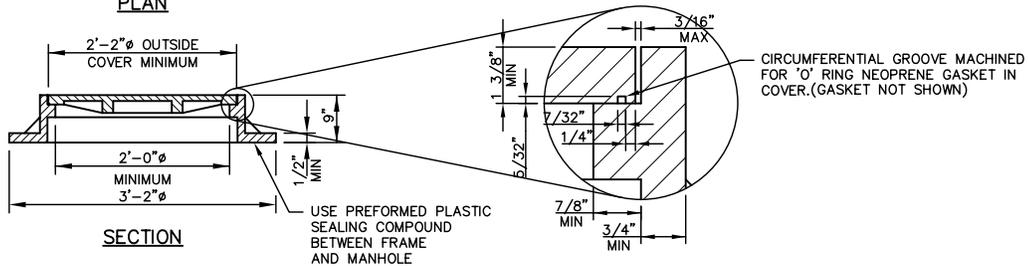
SECTION
COVER BOLT HOLE



PLAN

MANHOLE FRAME AND COVER NUTS

1. ALL MANHOLE FRAMES AND COVERS SHALL BE FOR HEAVY DUTY TRAFFIC, AASHTO HIGHWAY LOADING CLASS HS-20
2. APPLY LUBRICANT TO COVER BOLTS. USE 20-30 FT/LBS. MAXIMUM TORQUE.



SECTION



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WARWICK TOWNSHIP MUNICIPAL AUTHORITY

315 CLAY ROAD, LITITZ, PA 17543

STANDARD DETAIL

BOLT DOWN TYPE WATERTIGHT FRAME & COVER DETAIL

DATE:
APRIL 2009

SCALE:
N.T.S.

DRAWING NO.

REV. / DATE
- -

PROJECT NO.
4185.26

S11

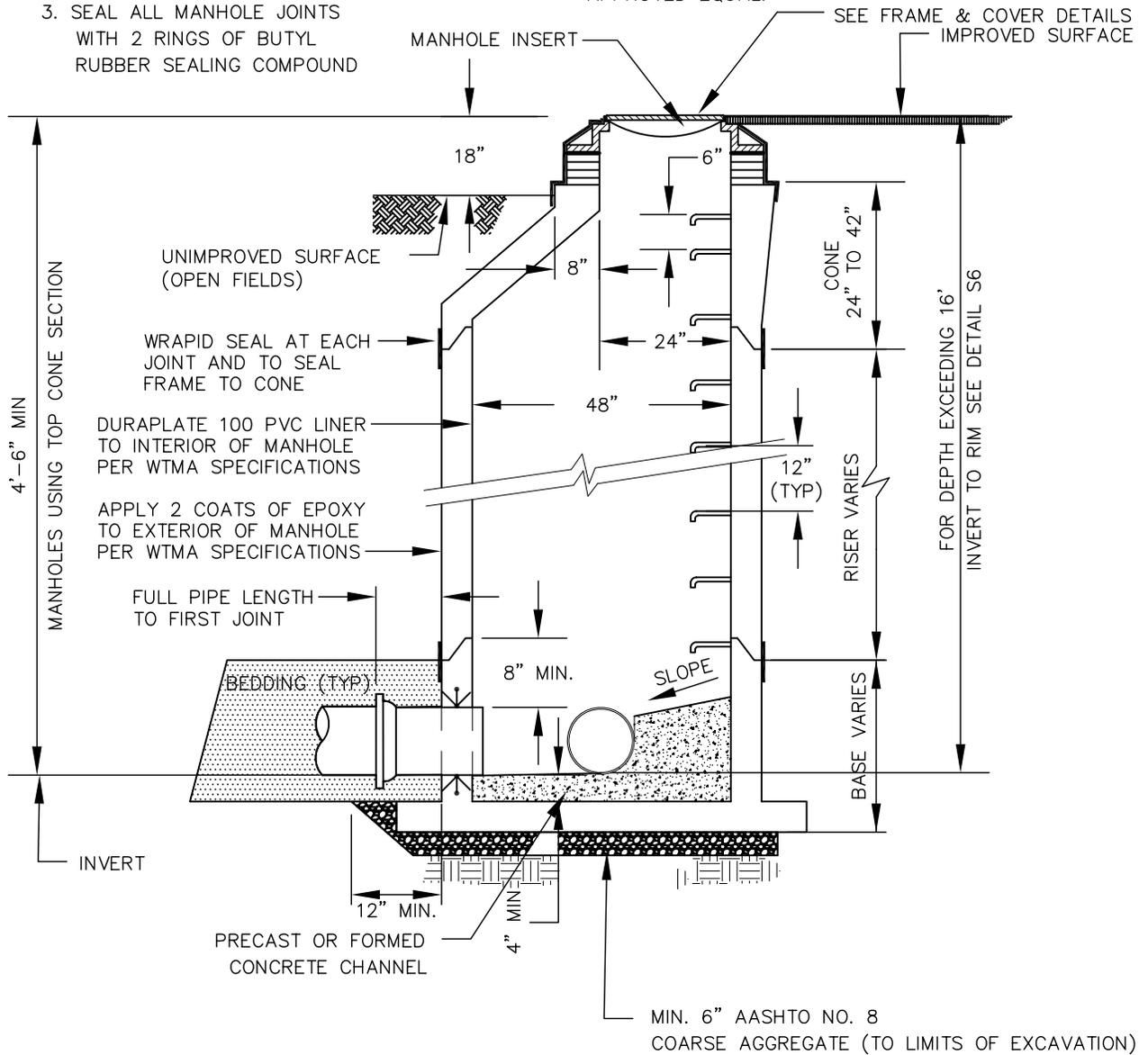
PREPARED BY
BAM

CHECKED BY
JDB

APPROVED BY
SMC

NOTES:

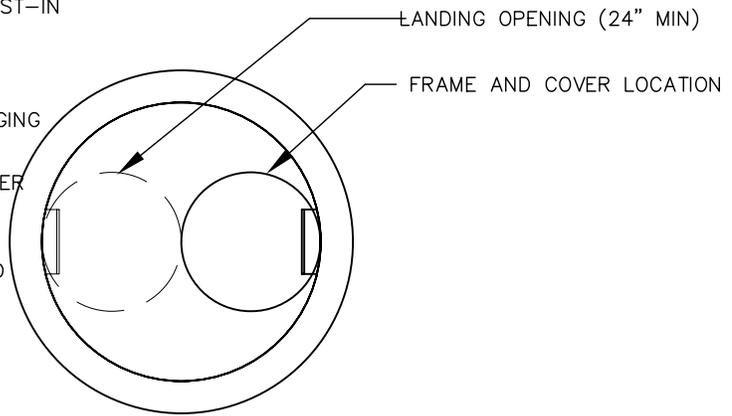
1. ADJUST TO GRADE WITH PRECAST GRADE RINGS
2. PRECAST CONCRETE TO CONFORM TO ASTM C-478
3. SEAL ALL MANHOLE JOINTS WITH 2 RINGS OF BUTYL RUBBER SEALING COMPOUND
4. SEAL ALL PIPE OPENINGS WITH CAST-IN RUBBER GASKETS
5. MANHOLE STEPS SHALL BE ALUMINUM OR COPOLYMER POLYPROPYLENE, PLASTIC COATED 1/2" DIA. GRADE 60 STEEL REINFORCED BY MA INDUSTRIES OR APPROVED EQUAL.



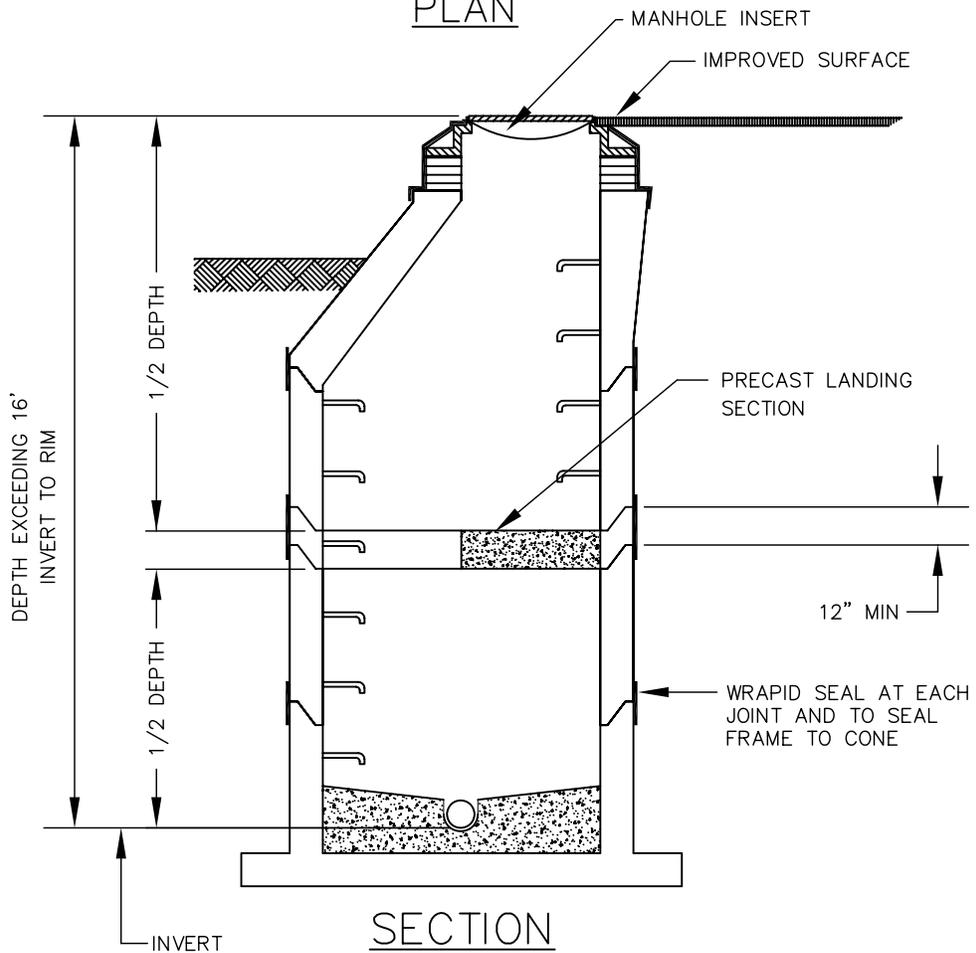
| | | | | | |
|--|--|--------------------------|--|----------------------------|-------------------------|
|  ENTECH | Entech Engineering, Inc. Engineering Architecture Construction Corporate Office: 4 S. Fourth Street Reading, PA 19602 ph: 610.373.6667 fx: 610.373.7537 Pottsville, PA ph: 570.628.5655 Mountaintop, PA ph: 570.868.0275 Lititz, PA ph: 717.626.6666 www.entecheng.com 1.800.825.1372 | | WARWICK TOWNSHIP MUNICIPAL AUTHORITY 315 CLAY ROAD, LITITZ, PA 17543 STANDARD DETAIL PRECAST SEWER MANHOLE DETAIL - 8" THRU 18" SEWERS | | |
| | PREPARED BY BAM | CHECKED BY JDB | APPROVED BY SMC | DATE: APRIL 2009 | SCALE: N.T.S. |
| | | | REV. / DATE - - | PROJECT NO. 4185.26 | |

NOTES

1. SEAL ALL PIPE OPENINGS WITH CAST-IN RUBBER GASKETS
2. MAINTAIN EXISTING SEWER SLOPE
3. INTERRUPT EXISTING FLOW USING BY-PASS PUMPING OR LINE PLUGGING AS REQUIRED BY AUTHORITY
4. MATCH CROWN OF PROPOSED SEWER WITH EXISTING OR SEE DROP MANHOLE REQUIREMENTS
5. SEE PRECAST MANHOLE (S12) AND FRAME AND COVER (S10 & S11) DETAILS FOR ADDITIONAL REQUIREMENTS

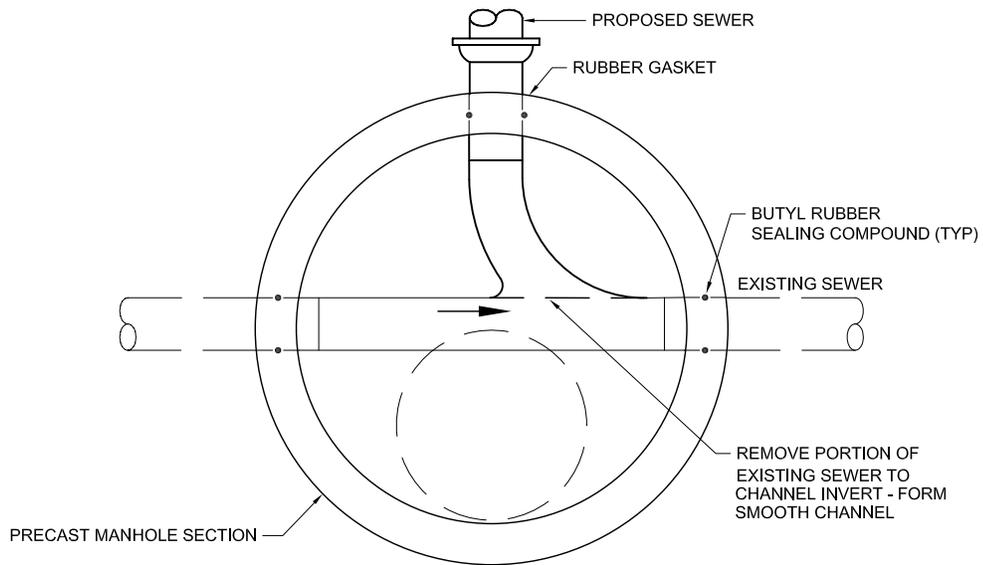


PLAN

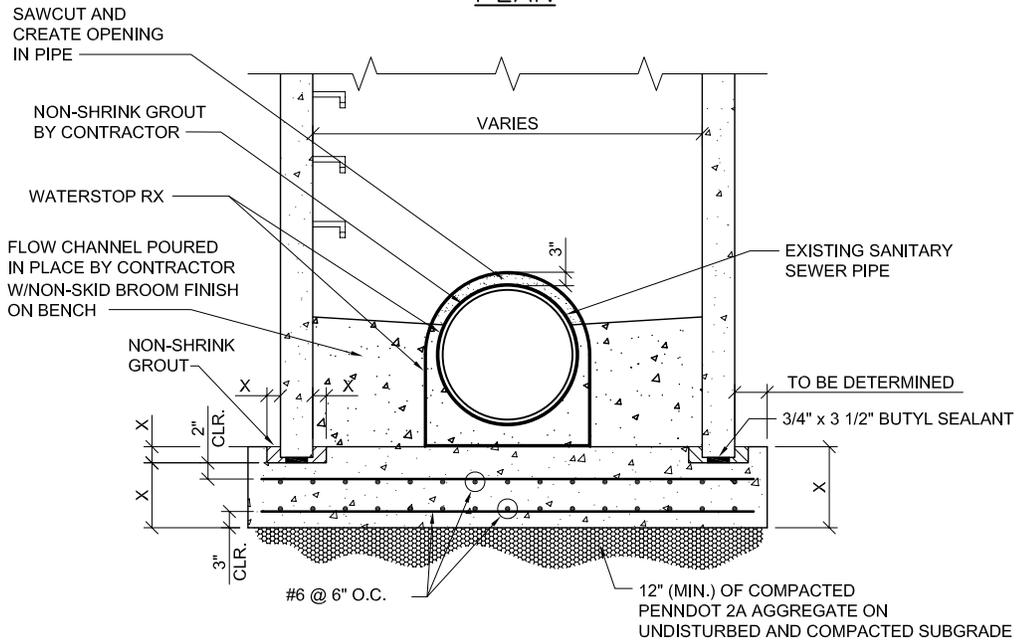


SECTION

| | | | | | |
|--|--|--|--|--|--|
|  ENTECH | Entech Engineering, Inc. Engineering Architecture Construction | | WARWICK TOWNSHIP MUNICIPAL AUTHORITY 315 CLAY ROAD, LITITZ, PA 17543 | | |
| | Corporate Office: 4 S. Fourth Street Reading, PA 19602 ph: 610.373.6667 fx: 610.373.7537 | | STANDARD DETAIL PRECAST DEEP MANHOLE DETAIL | | |
| Pottsville, PA ph: 570.628.5655 Mountaintop, PA ph: 570.868.0275 Lititz, PA ph: 717.626.6666 | | DATE: APRIL 2009 SCALE: N.T.S. DRAWING NO. | | | |
| www.entecheng.com 1.800.825.1372 | | REV. / DATE PROJECT NO. - - 4185.26 | | | |
| PREPARED BY BAM | CHECKED BY JDB | APPROVED BY SMC | S13 | | |



PLAN



X TO BE COMPLETE PER DESIGN REQUIREMENTS.

SECTION

NOTES:

1. CAST BASE SLAB WITH JOINT FORM FOR PRECAST MANHOLE SECTION.
2. REMOVE TOP SECTION OF EXISTING SEWER WITHIN BASE SECTION TO WITHIN 6 INCHES OF MANHOLE WALL AND FORM FLOW CHANNELS.
3. INTERRUPT EXISTING FLOW USING BY-PASS PUMPING OR LINE PLUGGING, AS REQUIRED BY AUTHORITY.
4. SEE PRECAST MANHOLE (S12) AND FRAME & COVER (S10 or S11) DETAILS FOR ADDITIONAL REQUIREMENTS.



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WARWICK TOWNSHIP MUNICIPAL AUTHORITY

315 CLAY ROAD, LITITZ, PA 17543

STANDARD DETAIL

MANHOLE ON EXISTING SEWER CAST IN PLACE BASE DETAIL

DATE:
APRIL 2009

SCALE:
N.T.S.

DRAWING NO.

REV. / DATE
- -

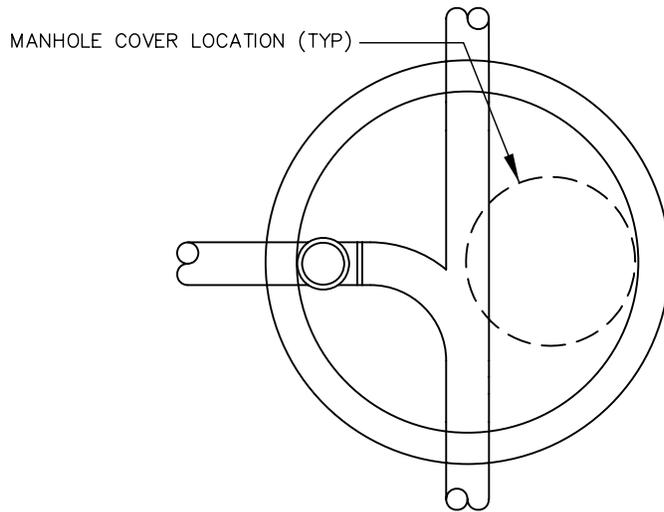
PROJECT NO.
4185.26

S14

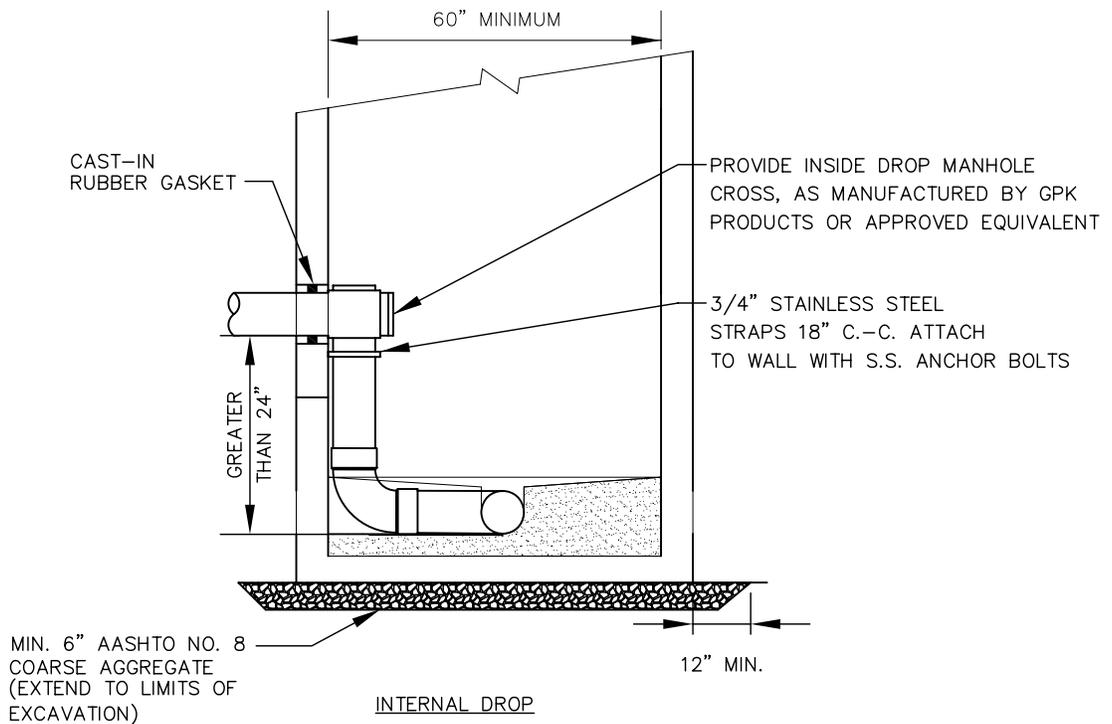
PREPARED BY
BAM

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JDB

APPROVED BY
SMC



SECTIONAL PLAN



SECTION

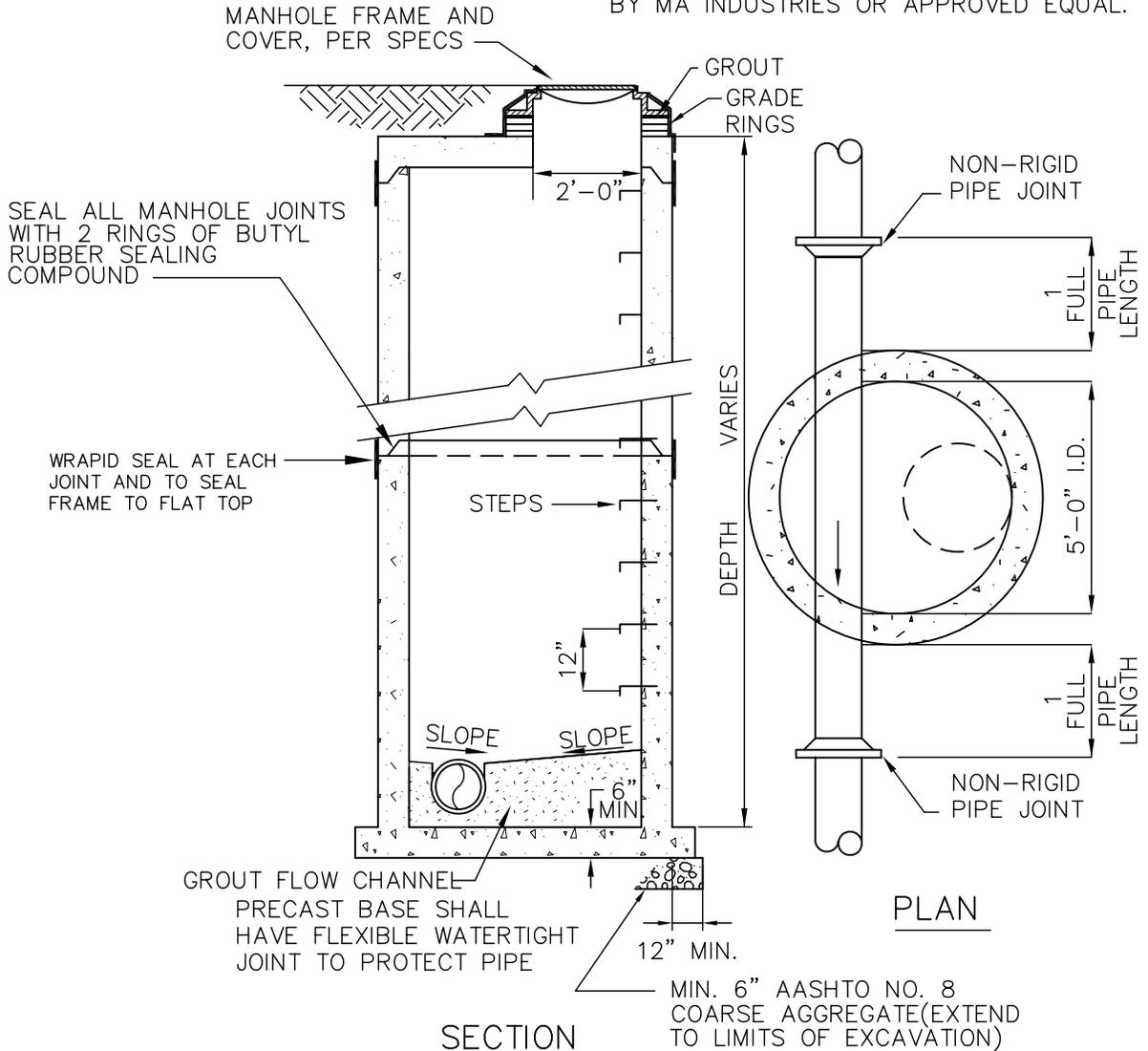
NOTES:

1. SEAL ALL PIPE OPENINGS WITH CAST-IN RUBBER GASKETS
2. SEE PRECAST MANHOLE AND FRAME & COVER DETAILS FOR ADDITIONAL REQUIREMENTS
3. PROVIDE FULL PIPE LENGTH FROM MANHOLE TO FIRST JOINT

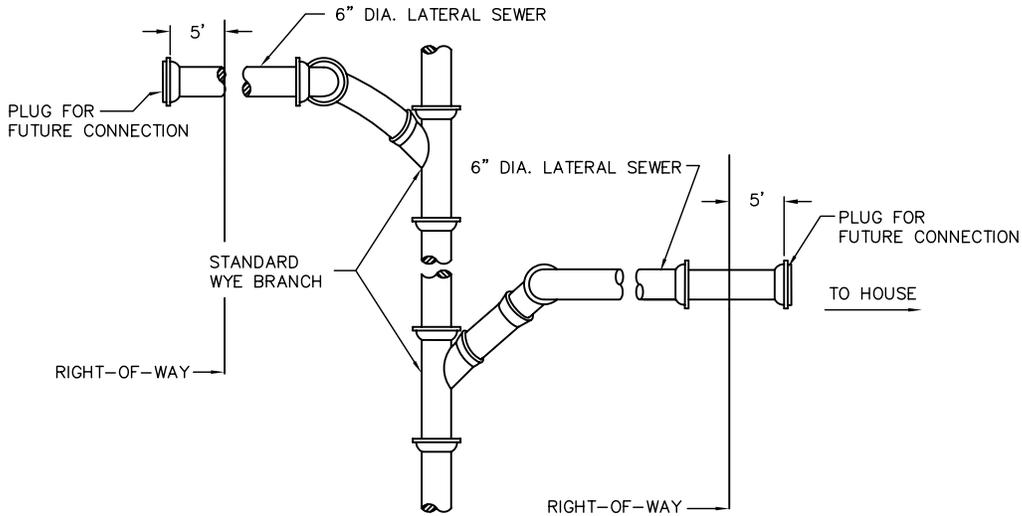
| | | | | | |
|--|--|--------------------------|---|-------------------------------|-------------------------|
|  ENTECH | Entech Engineering, Inc. Engineering Architecture Construction Corporate Office: 4 S. Fourth Street Reading, PA 19602 ph: 610.373.6667 fx: 610.373.7537 Pottsville, PA ph: 570.628.5655 Mountaintop, PA ph: 570.868.0275 Lititz, PA ph: 717.626.6666 www.entecheng.com 1.800.825.1372 | | WARWICK TOWNSHIP MUNICIPAL AUTHORITY 315 CLAY ROAD, LITITZ, PA 17543 STANDARD DETAIL PRECAST INTERNAL DROP MANHOLE DETAIL | | |
| | PREPARED BY BAM | CHECKED BY JDB | APPROVED BY SMC | DATE: APRIL 2009 | SCALE: N.T.S. |
| | | | REV. / DATE - - | PROJECT NO. 4185.26 | S15 |

NOTES:

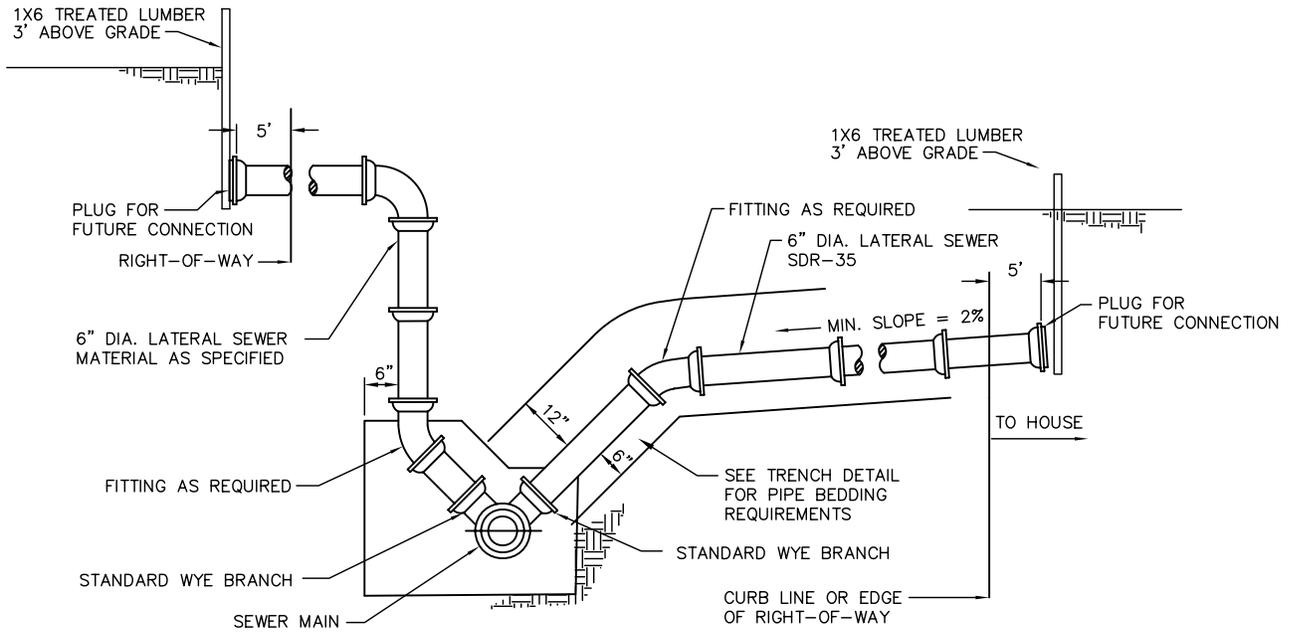
1. ADJUST TO GRADE WITH CONCRETE GRADING RINGS
2. PRECAST CONCRETE TO CONFORM TO ASTM C-478
3. MANHOLE BASE SHALL BE PROVIDED WITH PIPE OPENING CAST AS REQUIRED
4. MANHOLE BASE WITH FORMED CHANNELS ARE APPROVED
5. SEE PRECAST MANHOLE (S12) AND FRAME AND COVER DETAIL (S10 OR S11) FOR ADDITIONAL REQUIREMENTS.
6. BOLT MANHOLE FRAME TO MANHOLE USING 4 - 3/4" SS BOLTS. BOLTS SHALL BE IMBEDDED 3" MIN. INTO MANHOLE.
7. MANHOLE STEPS SHALL BE ALUMINUM OR COPOLYMER POLYPROPYLENE, PLASTIC COATED 1/2" DIA. GRADE 60 STEEL REINFORCED BY MA INDUSTRIES OR APPROVED EQUAL.



| | | | | | |
|--|--|---------------------------|--|-------------------------------|-------------|
|  ENTECH | Entech Engineering, Inc. Engineering Architecture Construction | | WARWICK TOWNSHIP MUNICIPAL AUTHORITY 315 CLAY ROAD, LITITZ, PA 17543 STANDARD DETAIL SANITARY SEWER SAMPLING MANHOLE | | |
| | Corporate Office: 4 S. Fourth Street Reading, PA 19602 ph: 610.373.6667 fx: 610.373.7537 Pottsville, PA ph: 570.628.5655 Mountaintop, PA ph: 570.868.0275 Lititz, PA ph: 717.626.6666 www.entecheng.com 1.800.825.1372 | | DATE: APRIL 2009 | SCALE: N.T.S. | DRAWING NO. |
| PREPARED BY BAM | CHECKED BY JDB | APPROVED BY SMC | REV. / DATE - - | PROJECT NO. 4185.26 | S16 |



PLAN



NOTE: EXTEND LATERAL TO 5 FEET BEYOND RIGHT-OF-WAY UNLESS A LESSER DISTANCE IS DIRECTED BY THE AUTHORITY

ELEVATION



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Engineering Architecture Construction

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Mountaintop, PA ph: 570.868.0275
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WARWICK TOWNSHIP MUNICIPAL AUTHORITY

315 CLAY ROAD, LITITZ, PA 17543

STANDARD DETAIL

LATERAL DETAIL

DATE:
APRIL 2009

SCALE:
N.T.S.

DRAWING NO.

REV. / DATE
- -

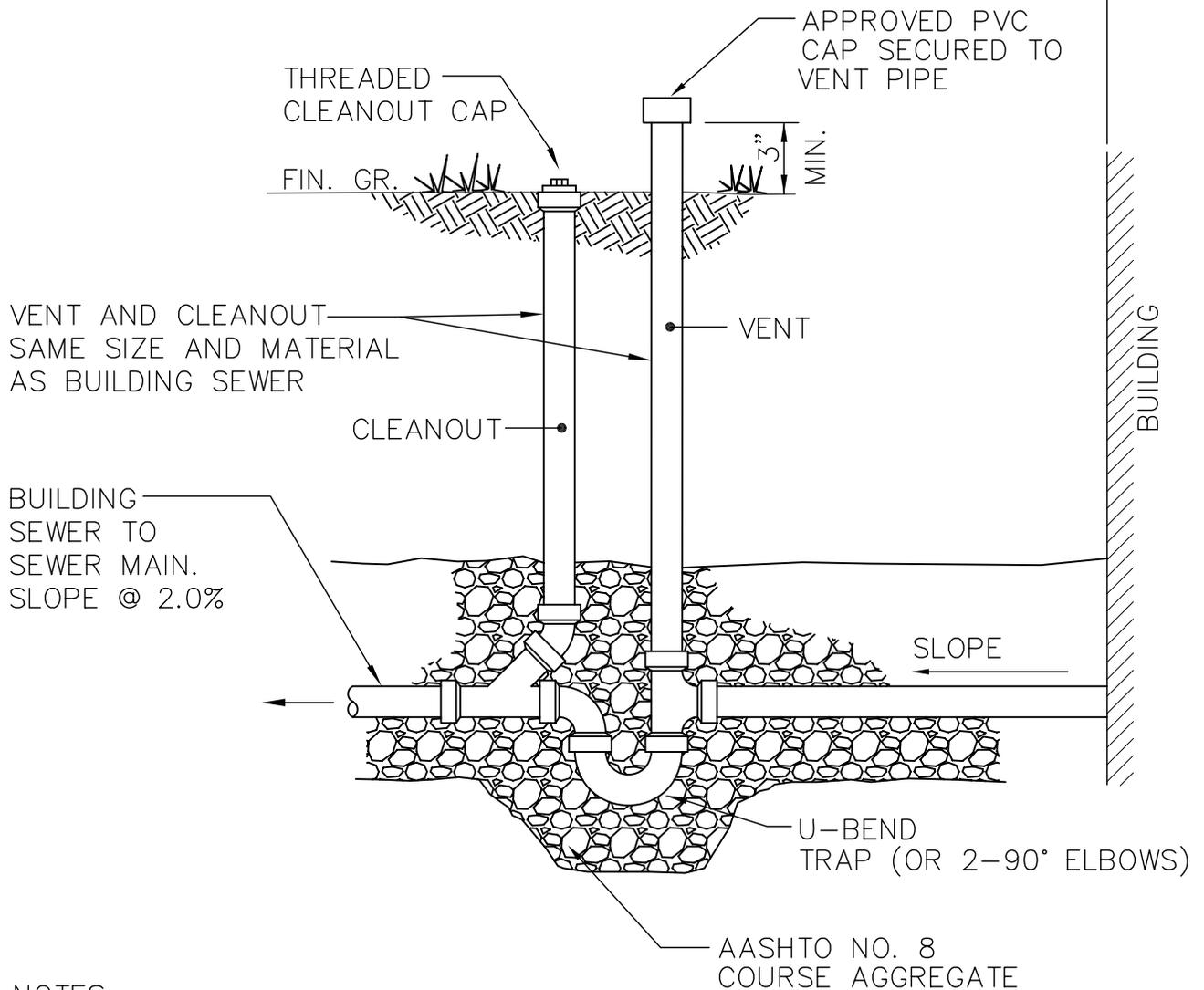
PROJECT NO.
4185.26

PREPARED BY
BAM

CHECKED BY
JDB

APPROVED BY
SMC

S17

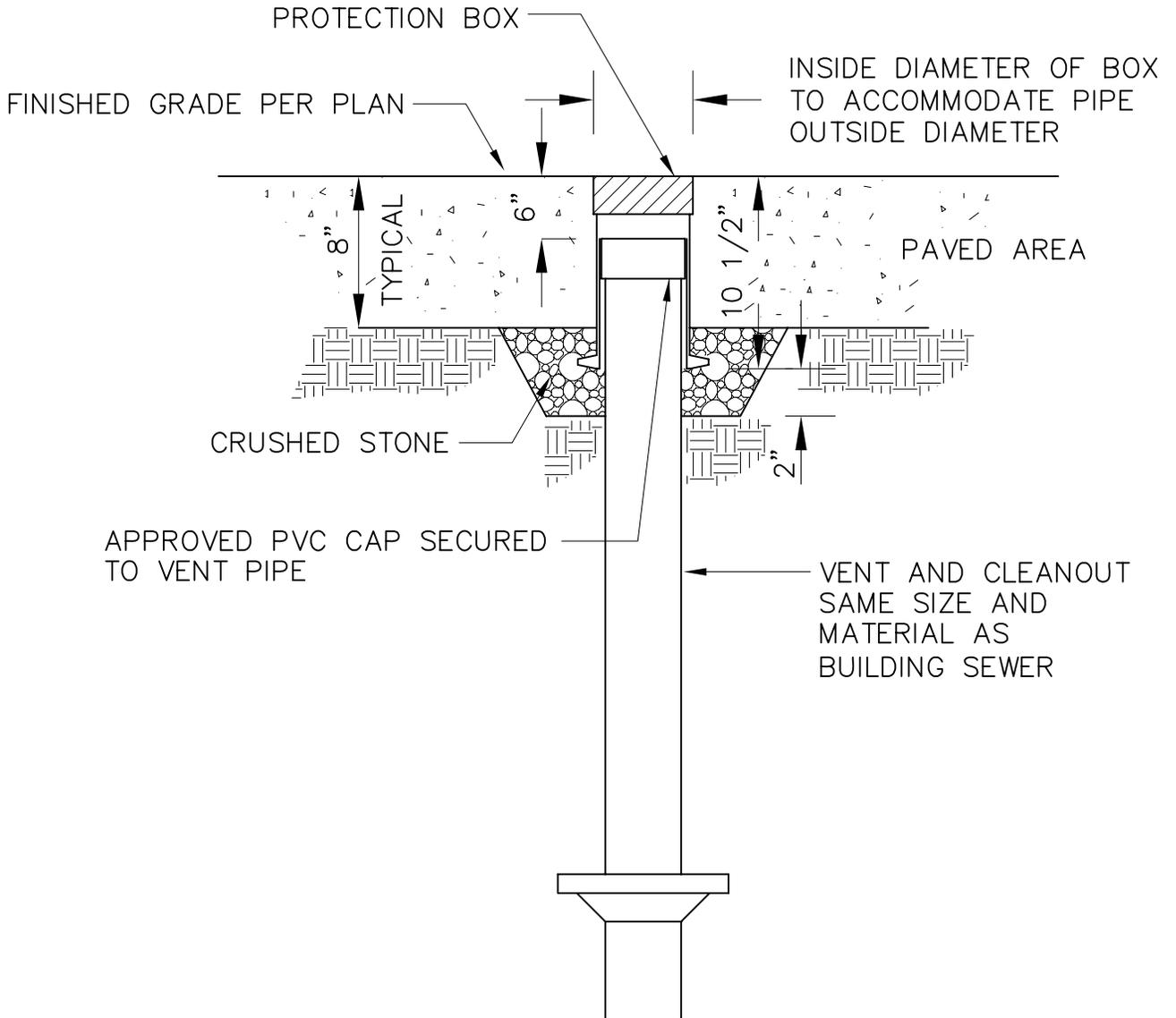


NOTES:

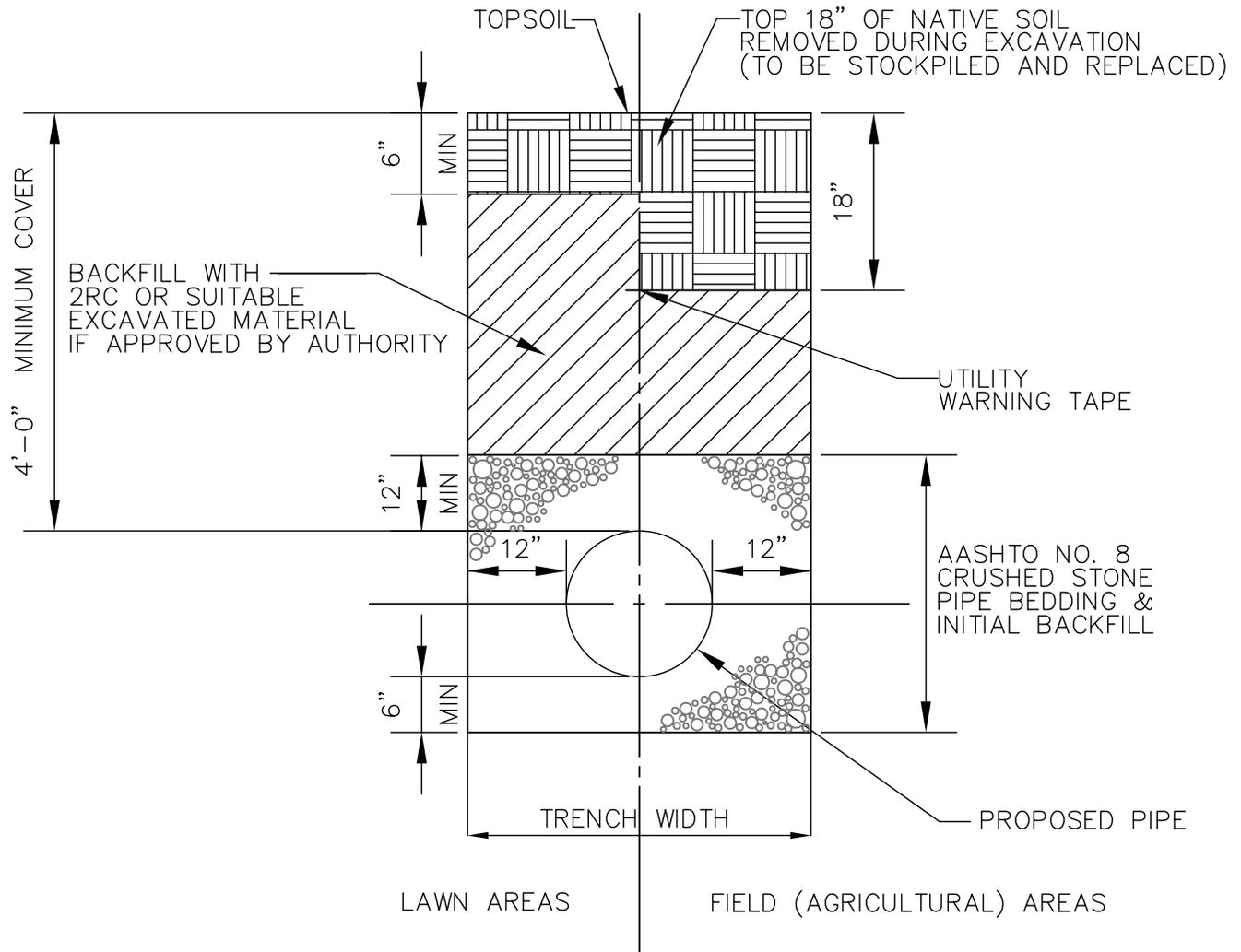
1. ALL FITTINGS USED FOR CLEANOUT, TRAP AND VENT SHALL BE SOLVENT WELD.
2. INSTALL PROTECTIVE BOX OVER VENT AND CLEANOUT IN ACCORDANCE WITH DETAIL S12 WHEN IN PAVED OR TRAFFIC AREAS.
3. TRAP ASSEMBLY AS PROVIDED BY HARRINGTON CORPORATION OR AS ASSEMBLED BY CONTRACTOR USING SIMILAR FITTINGS.

| | | | | | |
|--|--|---------------------------|--|------------------------|-------------|
|  ENTECH | Entech Engineering, Inc. Engineering Architecture Construction | | WARWICK TOWNSHIP MUNICIPAL AUTHORITY 315 CLAY ROAD, LITITZ, PA 17543 | | |
| | Corporate Office: 4 S. Fourth Street Reading, PA 19602 ph: 610.373.6667 fx: 610.373.7537 | | STANDARD DETAIL TRAP AND VENT DETAIL | | |
| Pottsville, PA ph: 570.628.5655 Mountaintop, PA ph: 570.868.0275 Lititz, PA ph: 717.626.6666 | | DATE: APRIL 2009 | | SCALE: N.T.S. | DRAWING NO. |
| www.entecheng.com 1.800.825.1372 | | REV. / DATE - - | | PROJECT NO. 4185.26 | |
| PREPARED BY BAM | CHECKED BY JDB | APPROVED BY SMC | S18 | | |

- NOTES: 1. PROTECTION BOX TO BE SET FLUSH WITH PAVING SURFACE
2. PROTECTION BOX AND COVER TO BE SUITABLE FOR TRAFFIC LOADING



| | | | | | |
|---|--|-------------|--|-------------|-------------|
|  | Entech Engineering, Inc. Engineering Architecture Construction | | WARWICK TOWNSHIP MUNICIPAL AUTHORITY 315 CLAY ROAD, LITITZ, PA 17543 | | |
| | Corporate Office: 4 S. Fourth Street Reading, PA 19602 ph: 610.373.6667 fx: 610.373.7537 | | STANDARD DETAIL TRAP AND VENT PROTECTION BOX DETAIL | | |
| ENTECH | Pottsville, PA ph: 570.628.5655 Mountaintop, PA ph: 570.868.0275 Lititz, PA ph: 717.626.6666 | | DATE: | SCALE: | DRAWING NO. |
| | www.entecheng.com 1.800.825.1372 | | APRIL 2009 | N.T.S. | S19 |
| PREPARED BY | CHECKED BY | APPROVED BY | REV. / DATE | PROJECT NO. | |
| BAM | JDB | SMC | - - | 4185.26 | |



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WARWICK TOWNSHIP MUNICIPAL AUTHORITY

315 CLAY ROAD, LITITZ, PA 17543

STANDARD DETAIL

TRENCH RESTORATION LAWN / FIELD AREAS DETAIL

DATE:
APRIL 2009

SCALE:
N.T.S.

DRAWING NO.

REV. / DATE
- -

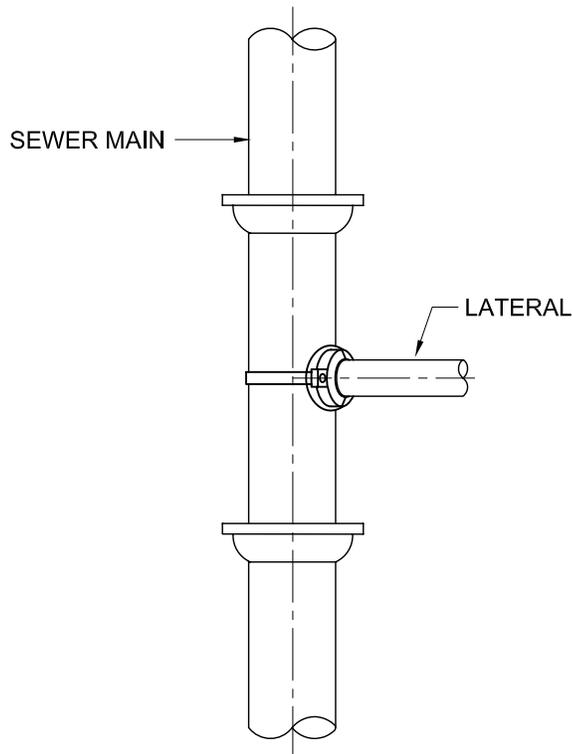
PROJECT NO.
4185.26

S2

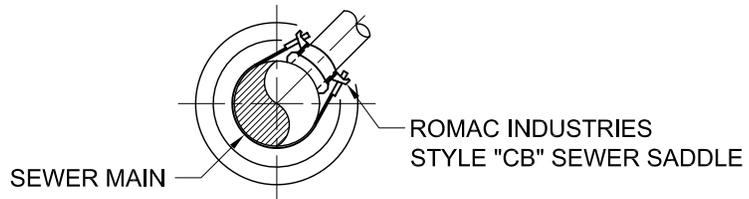
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BAM

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JDB

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PLAN



ELEVATION



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WARWICK TOWNSHIP MUNICIPAL AUTHORITY

315 CLAY ROAD, LITITZ, PA 17543

STANDARD DETAIL

BREAK-IN LATERAL CONNECTION DETAIL

DATE:
APRIL 2009

SCALE:
N.T.S.

DRAWING NO.

REV. / DATE
- -

PROJECT NO.
4185.26

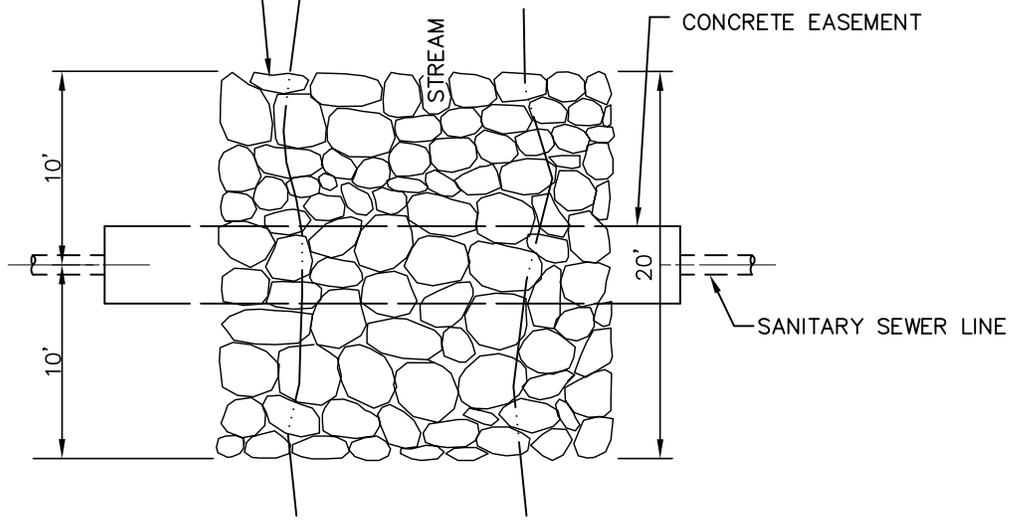
PREPARED BY
BAM

CHECKED BY
JDB

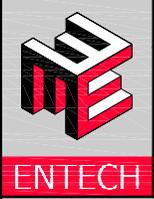
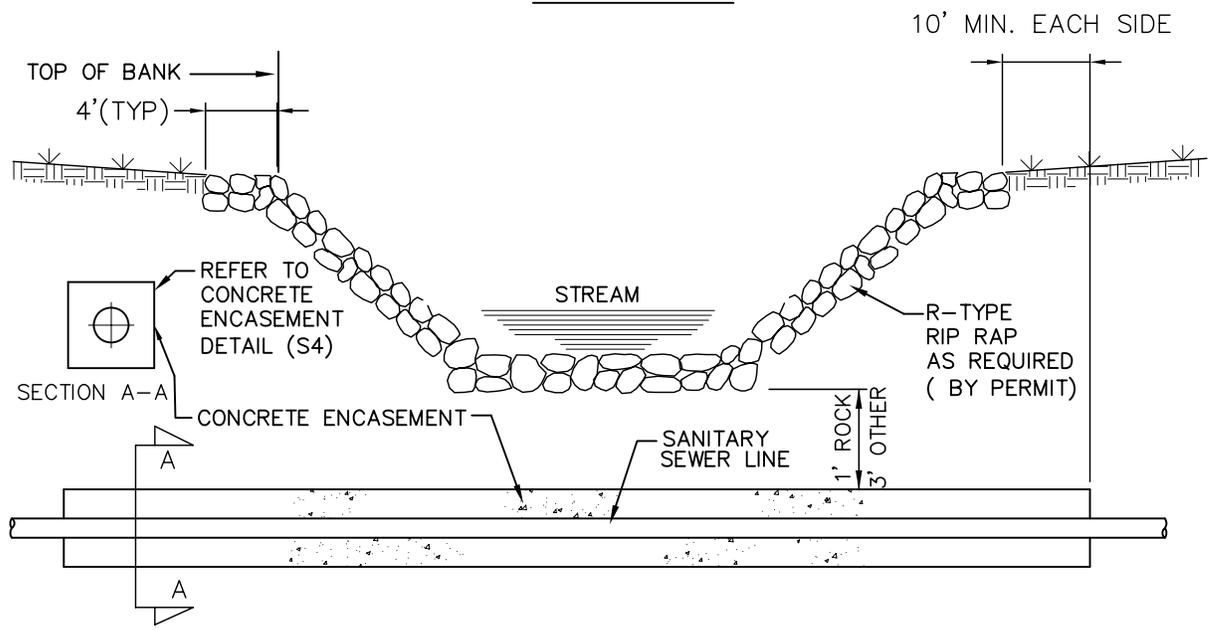
APPROVED BY
SMC

S20

R-TYPE RIP-RAP
AS REQUIRED (BY PERMIT)



PLAN VIEW



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Mountaintop, PA ph: 570.868.0275
Lititz, PA ph: 717.626.6666

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WARWICK TOWNSHIP MUNICIPAL AUTHORITY

315 CLAY ROAD, LITITZ, PA 17543

STANDARD DETAIL

SANITARY SEWER STREAM CROSSING DETAIL

PREPARED BY
BAM

CHECKED BY
JDB

APPROVED BY
SMC

DATE:
APRIL 2009

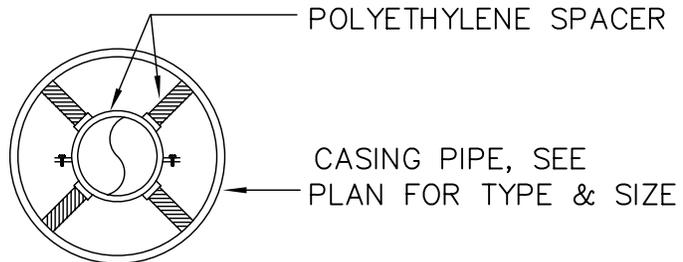
REV. / DATE
- -

SCALE:
N.T.S.

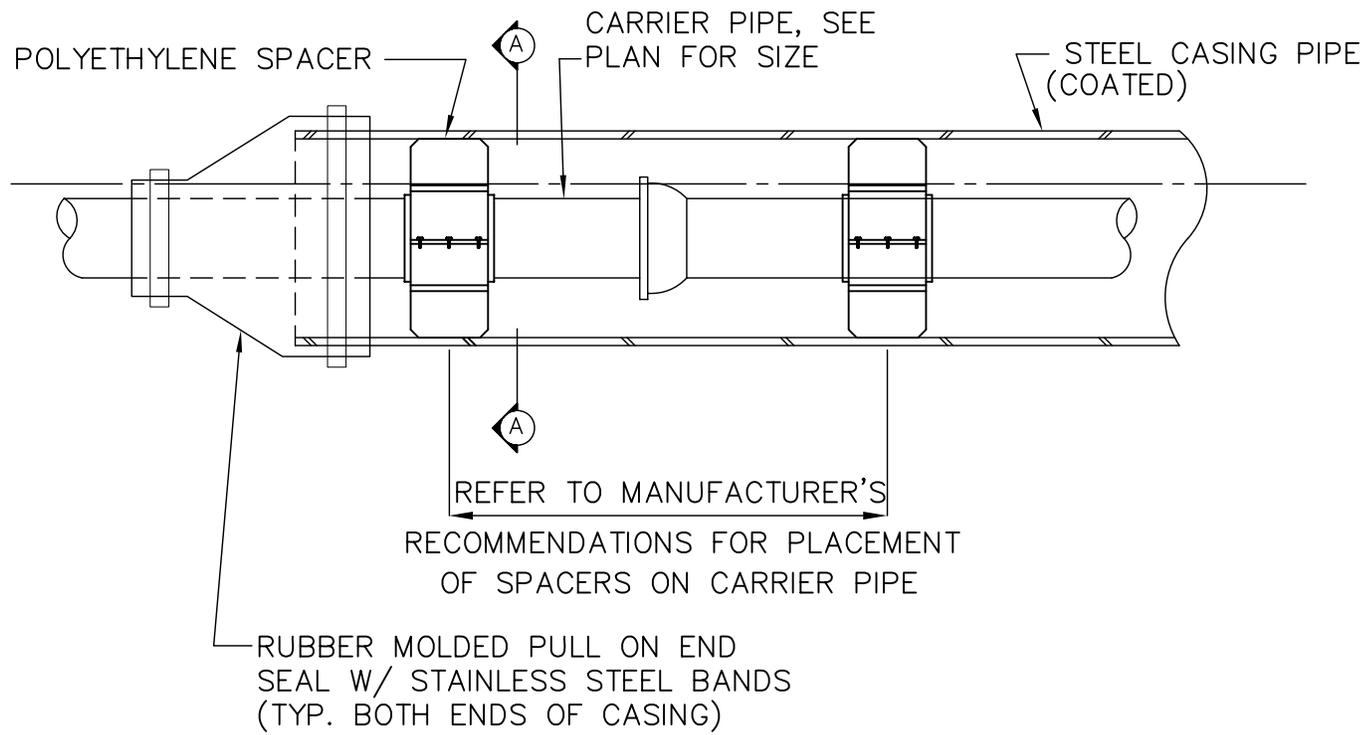
PROJECT NO.
4185.26

DRAWING NO.

S21



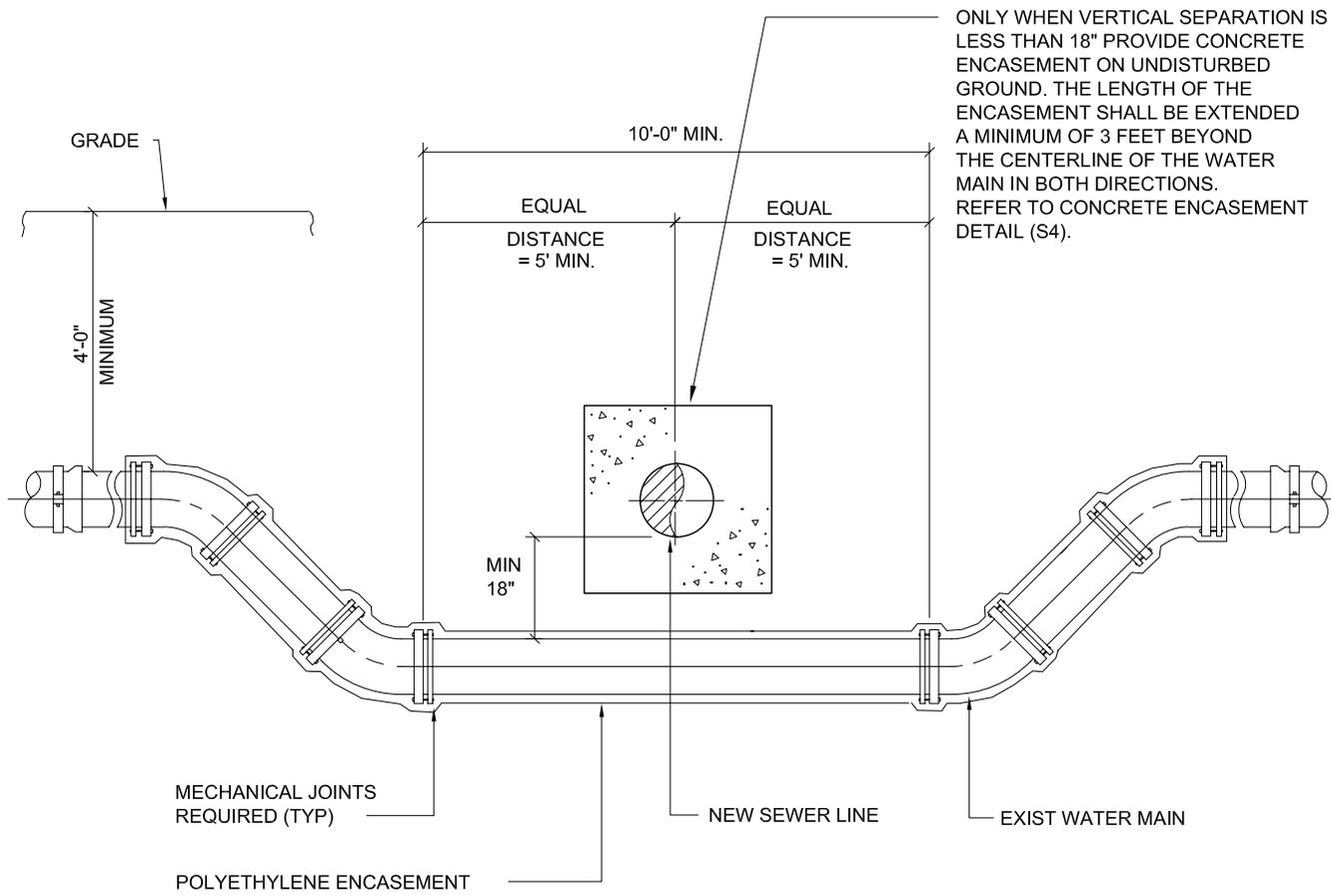
SECTION A-A



CASING NOTES:

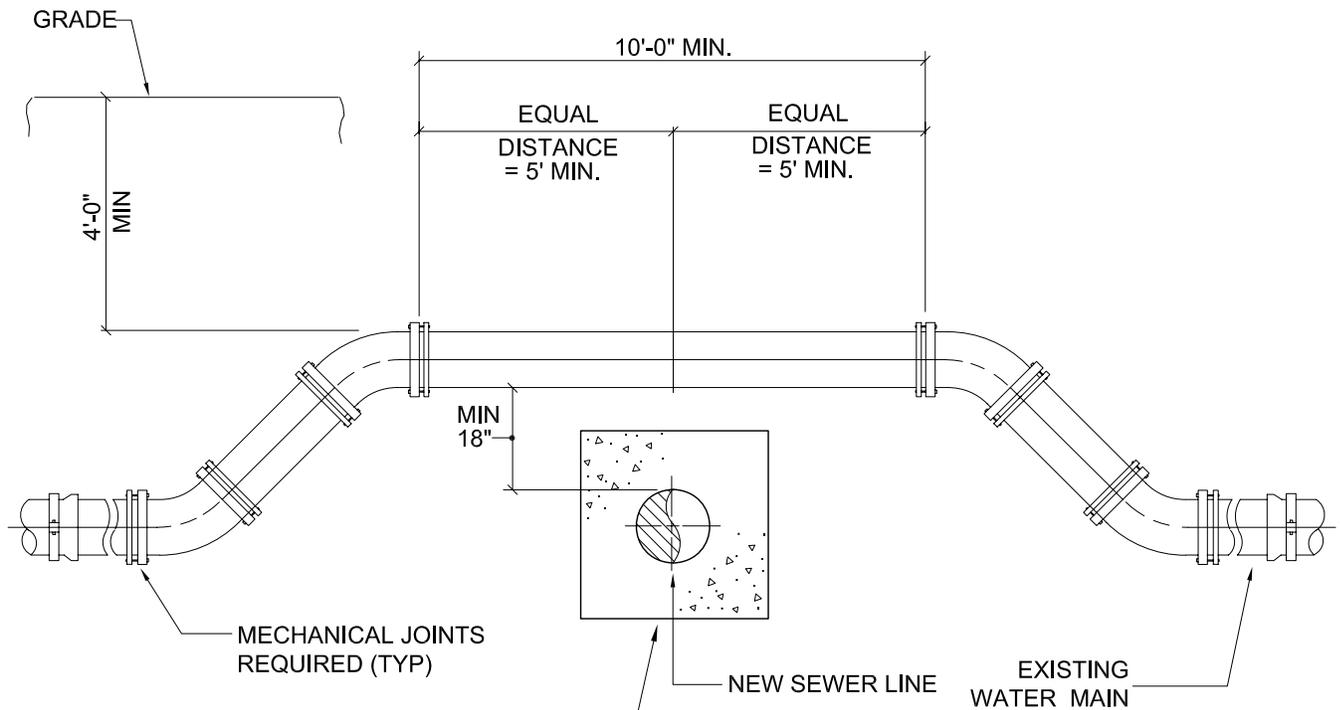
1. DESIGN ENGINEER IS RESPONSIBLE FOR PROPER SIZING OF THE CASING PIPE TO HOUSE CARRIER PIPE AND TO WITHSTAND LOADING DEMANDS.

| | | | | | |
|--|--|--------------------------|--|-------------------------------|-------------------------|
|  ENTECH | Entech Engineering, Inc. Engineering Architecture Construction Corporate Office: 4 S. Fourth Street Reading, PA 19602 ph: 610.373.6667 fx: 610.373.7537 Pottsville, PA ph: 570.628.5655 Mountaintop, PA ph: 570.868.0275 Lititz, PA ph: 717.626.6666 www.entecheng.com 1.800.825.1372 | | WARWICK TOWNSHIP MUNICIPAL AUTHORITY 315 CLAY ROAD, LITITZ, PA 17543 STANDARD DETAIL GRAVITY AND FORCE MAIN PIPE CASING DETAIL | | |
| | PREPARED BY BAM | CHECKED BY JDB | APPROVED BY SMC | DATE: APRIL 2009 | SCALE: N.T.S. |
| | | | REV. / DATE - - | PROJECT NO. 4185.26 | |



NOTE: ALL CONCRETE SHALL HAVE MINIMUM COMPRESSIVE STRENGTH OF 3000 PSI AT THE END OF 28 DAYS.

| | | | | | |
|---|--|---------------------------|---|-------------------------------|-------------|
|  | Entech Engineering, Inc. Engineering Architecture Construction | | WARWICK TOWNSHIP MUNICIPAL AUTHORITY 315 CLAY ROAD, LITITZ, PA 17543 STANDARD DETAIL SEWER CROSSING OVER EXISTING WATER MAIN DETAIL | | |
| | Corporate Office: 4 S. Fourth Street Reading, PA 19602 ph: 610.373.6667 fx: 610.373.7537 Pottsville, PA ph: 570.628.5655 Mountaintop, PA ph: 570.868.0275 Lititz, PA ph: 717.626.6666 www.entecheng.com 1.800.825.1372 | | DATE: APRIL 2009 | SCALE: N.T.S. | DRAWING NO. |
| PREPARED BY BAM | CHECKED BY JDB | APPROVED BY SMC | REV. / DATE - - | PROJECT NO. 4185.26 | S23 |



ONLY WHEN VERTICAL SEPARATION IS LESS THAN 18" PROVIDE CONCRETE ENCASEMENT ON UNDISTURBED GROUND. THE LENGTH OF THE ENCASEMENT SHALL BE EXTENDED A MINIMUM OF 3 FEET BEYOND THE CENTERLINE OF THE WATER MAIN IN BOTH DIRECTIONS. REFER TO CONCRETE ENCASEMENT DETAIL (S4).

NOTE: ALL CONCRETE SHALL HAVE MINIMUM COMPRESSIVE STRENGTH OF 3000 PSI AT THE END OF 28 DAYS.



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WARWICK TOWNSHIP MUNICIPAL AUTHORITY

315 CLAY ROAD, LITITZ, PA 17543

STANDARD DETAIL

SEWER CROSSING UNDER EXISTING WATER MAIN DETAIL

DATE:
APRIL 2009

SCALE:
N.T.S.

DRAWING NO.

REV. / DATE
- -

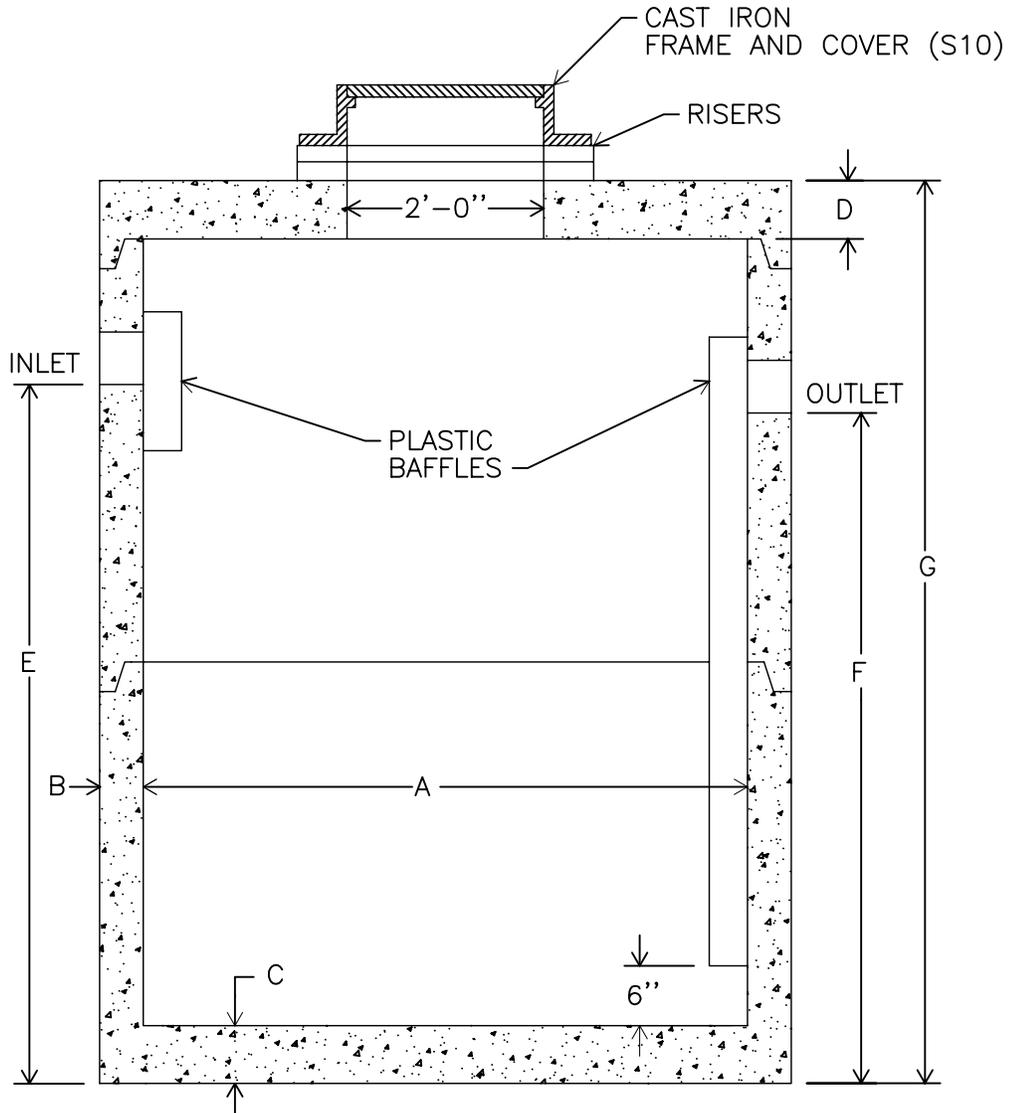
PROJECT NO.
4185.26

S24

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BAM

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JDB

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SMC



| CAPACITY | A | B | C | D | E | F | G |
|------------|------------|----|----|----|-------|-------|-------|
| 500 GALLON | 5'-0" DIA. | 6" | 8" | 8" | 4'-5" | 4'-2" | 6'-3" |

NOTE:

- INTERNAL GREASE TRAPS ARE PROHIBITED BY WTMA.



Entech Engineering, Inc.
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WARWICK TOWNSHIP MUNICIPAL AUTHORITY

315 CLAY ROAD, LITITZ, PA 17543

STANDARD DETAIL

GREASE TRAP DETAIL

DATE:
APRIL 2009

SCALE:
N.T.S.

DRAWING NO.

REV. / DATE
- -

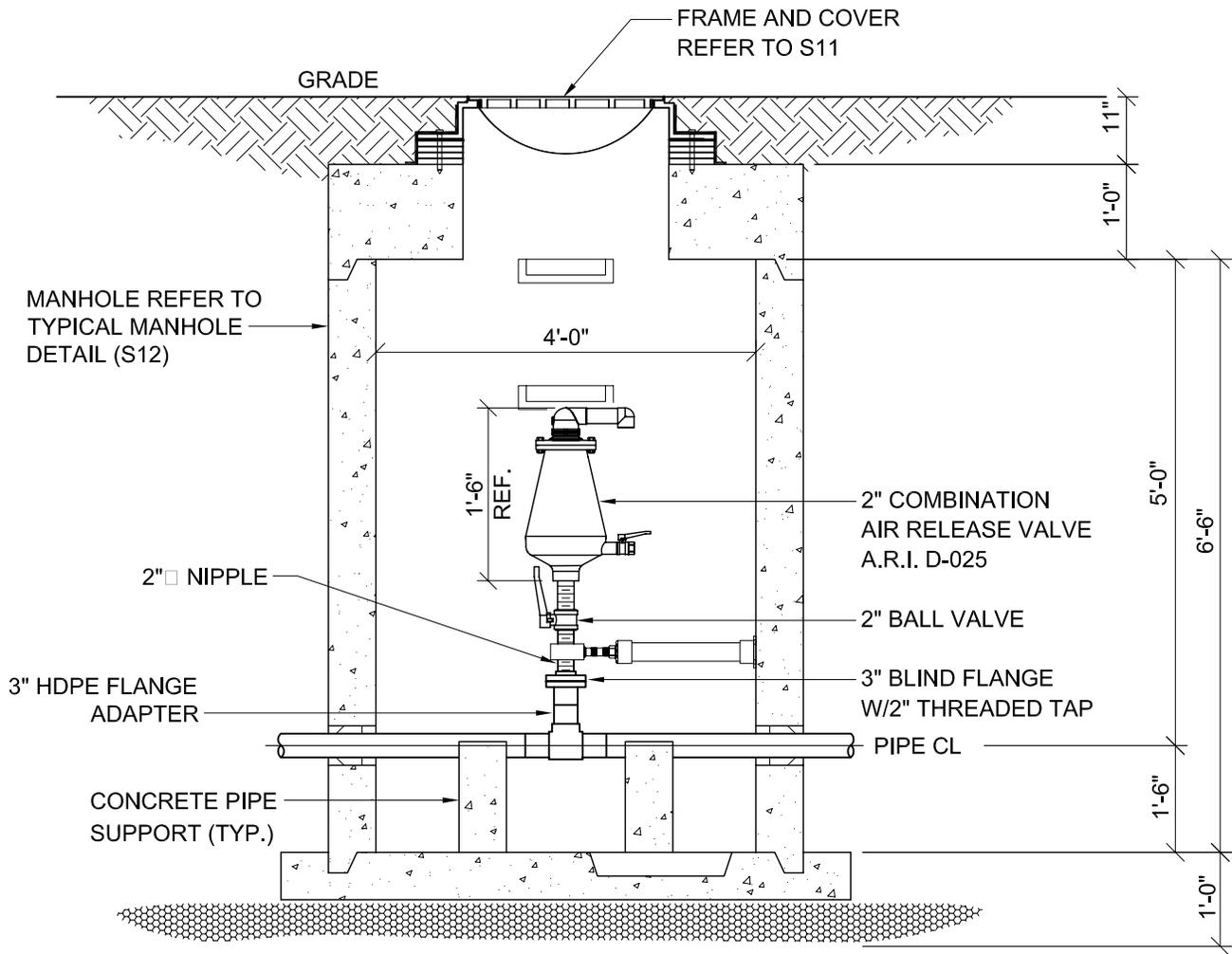
PROJECT NO.
4185.26

S25

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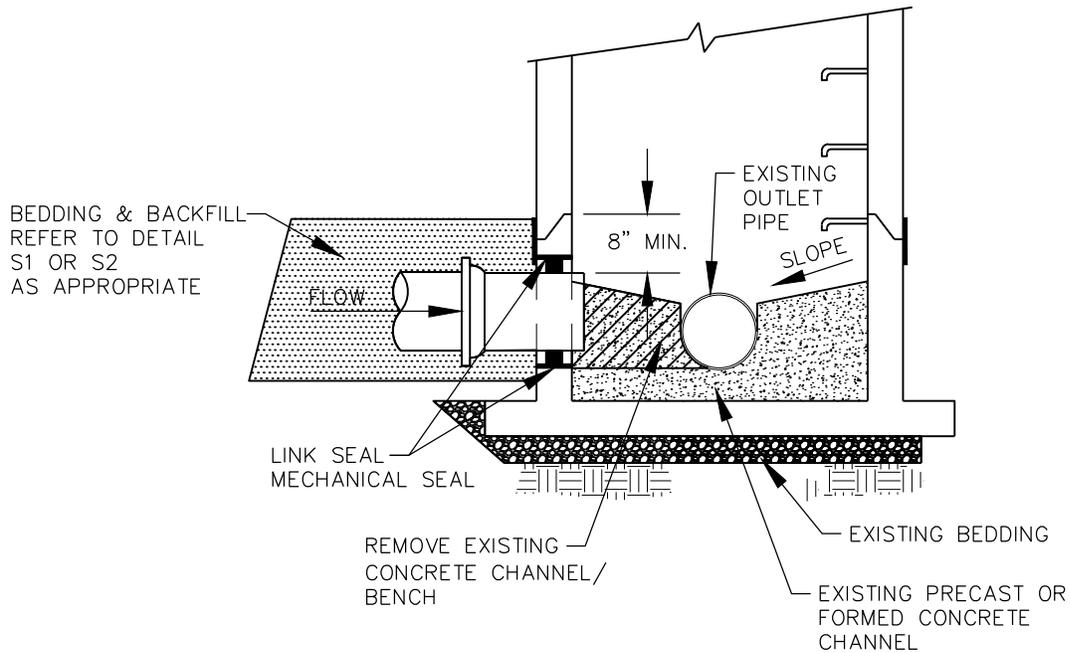
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SMC



| | | | | | |
|---|--|---------------------------|--|-------------------------------|-------------|
|  | Entech Engineering, Inc. Engineering Architecture Construction | | WARWICK TOWNSHIP MUNICIPAL AUTHORITY 315 CLAY ROAD, LITITZ, PA 17543 STANDARD DETAIL AIR RELEASE VALVE MANHOLE | | |
| | Corporate Office: 4 S. Fourth Street Reading, PA 19602 ph: 610.373.6667 fx: 610.373.7537 Pottsville, PA ph: 570.628.5655 Mountaintop, PA ph: 570.868.0275 Lititz, PA ph: 717.626.6666 www.entecheng.com 1.800.825.1372 | | DATE: APRIL 2009 | SCALE: N.T.S. | DRAWING NO. |
| PREPARED BY BAM | CHECKED BY JDB | APPROVED BY SMC | REV. / DATE - - | PROJECT NO. 4185.26 | S26 |

NOTES:

1. REMOVE EXISTING CONCRETE CHANNEL & BENCH TO ACCOMMODATE THE NEW PIPE PENETRATION.
2. CORE DRILL MANHOLE TO DIAMETER RECOMMENDED BY LINK SEAL MANUFACTURER FOR NEW PIPE PENETRATION.
3. INLET PIPE INVERTS SHALL BE A MINIMUM OF 0.10 FEET HIGHER THAN OUTLET PIPE INVERT.
4. INSTALL LINK SEAL & SEWER MAIN PER MANUFACTURER INSTRUCTIONS.
5. REFORM CONCRETE CHANNEL TO PROVIDE SMOOTH FLOW TO MANHOLE OUTLET.
6. SEAL INTERIOR PIPE PENETRATION WITH NON SHRINK GROUT.
7. A FULL PIPE LENGTH SHALL BE INSTALLED FROM THE MANHOLE CONNECTION TO THE FIRST PIPE JOINT.



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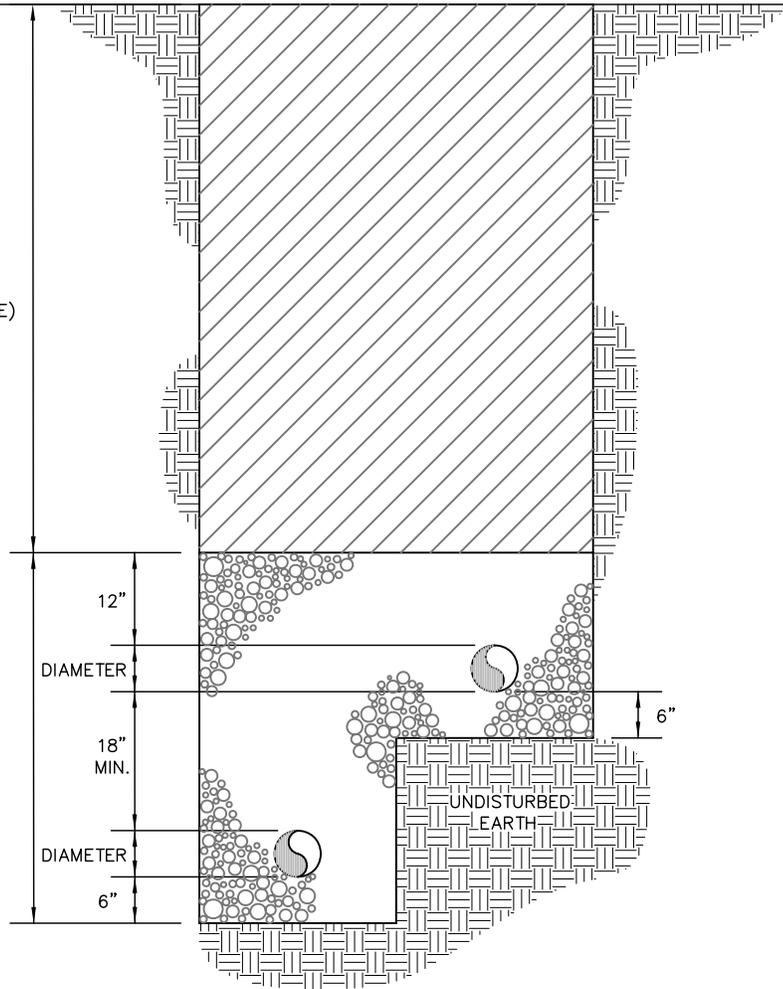
WARWICK TOWNSHIP MUNICIPAL AUTHORITY
 315 CLAY ROAD, LITITZ, PA 17543
STANDARD DETAIL
EXISTING MANHOLE PENETRATION DETAIL

| | | |
|----------------------|------------------------|---------------------------|
| DATE: JULY 2012 | SCALE: N.T.S. | DRAWING NO. S27 |
| REV. / DATE - / - | PROJECT NO. 4185.26 | |

| | | |
|--------------------|-------------------|--------------------|
| PREPARED BY GEM | CHECKED BY JDB | APPROVED BY SER |
|--------------------|-------------------|--------------------|

BACKFILL AND SURFACING AS REQUIRED BY S1 OR S2 (AS APPROPRIATE)

ASSHTO NO.8 CRUSHED STONE PIPE BEDDING AND INITIAL BACKFILL



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WARWICK TOWNSHIP MUNICIPAL AUTHORITY

315 CLAY ROAD, LITITZ, PA 17543

STANDARD DETAIL

COMBINED WATER / SEWER TRENCH

DATE:
APRIL 2009

SCALE:
N.T.S.

DRAWING NO.

S3

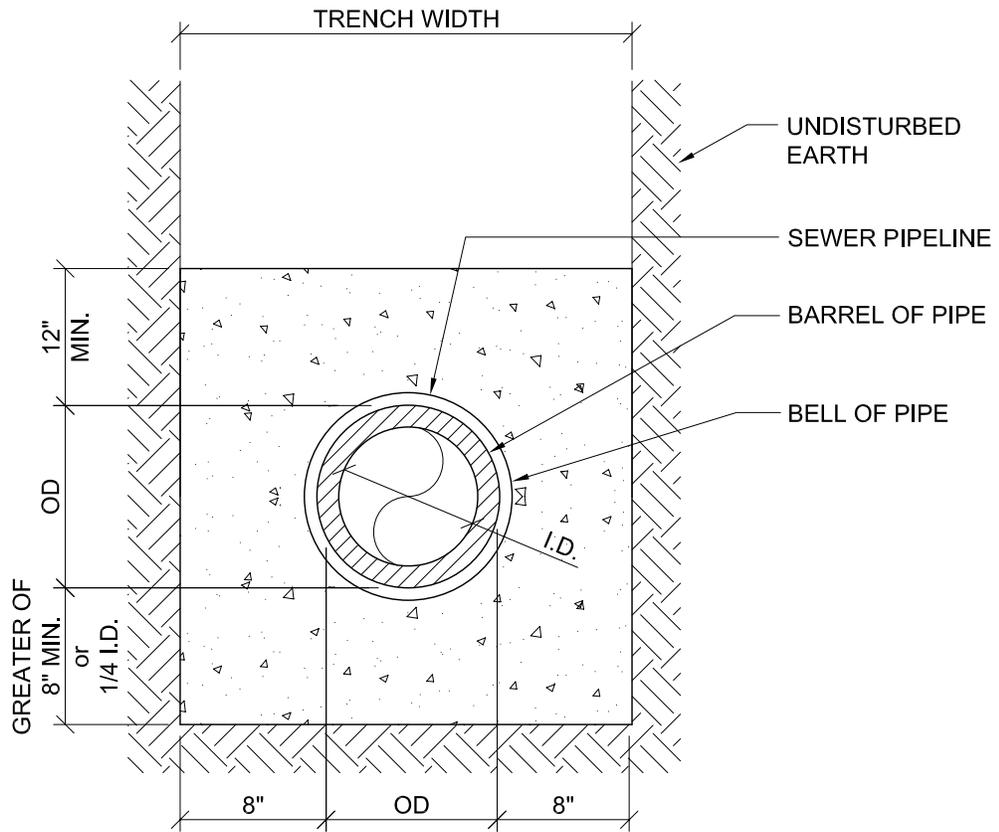
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NOTE: ALL CONCRETE SHALL HAVE MINIMUM COMPRESSIVE STRENGTH OF 3000 PSI AT THE END OF 28 DAYS.



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WARWICK TOWNSHIP MUNICIPAL AUTHORITY

315 CLAY ROAD, LITITZ, PA 17543

STANDARD DETAIL

CONCRETE ENCASEMENT DETAIL

DATE:
APRIL 2009

SCALE:
N.T.S.

DRAWING NO.

S4

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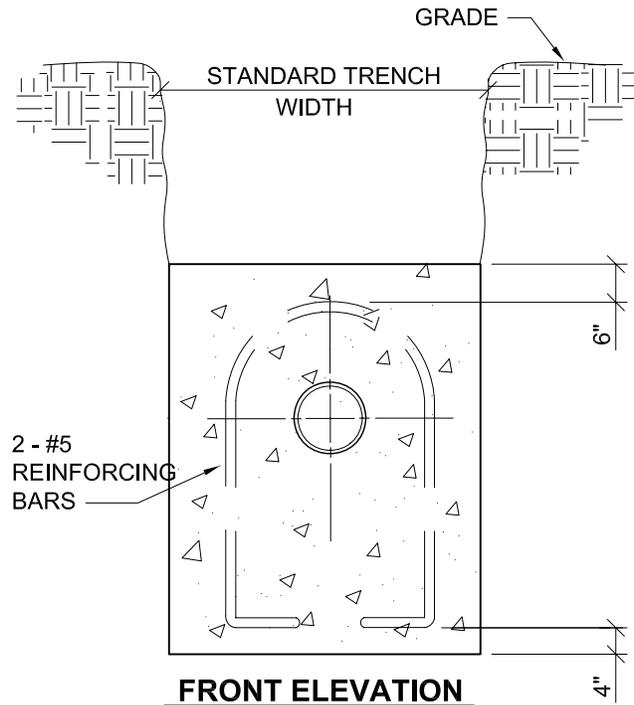
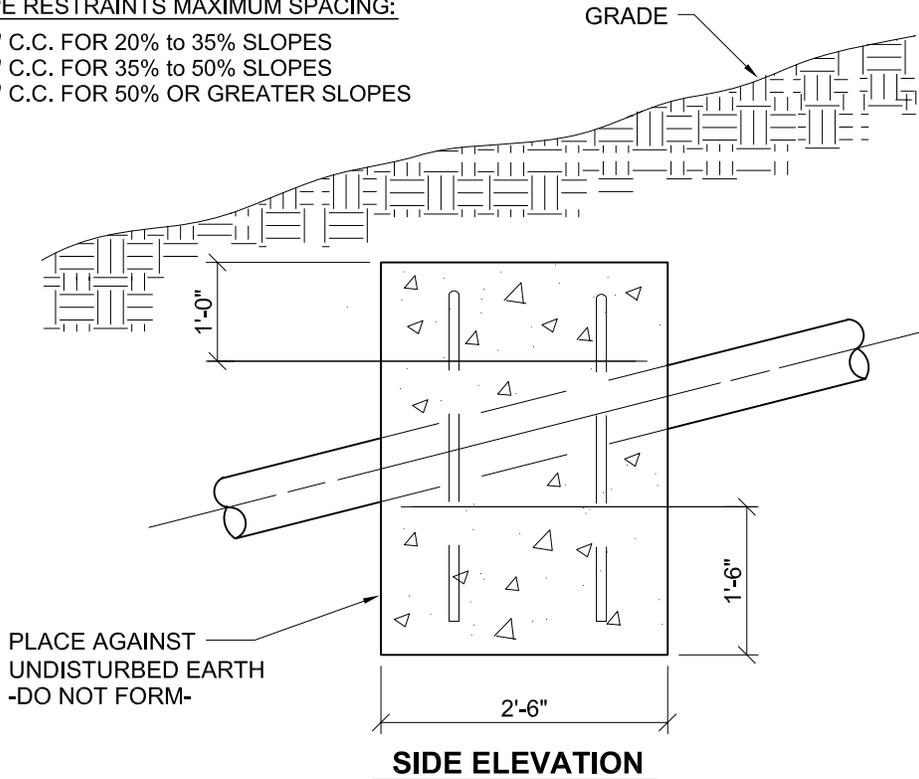
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- -

PROJECT NO.
4185.26

PIPE RESTRAINTS MAXIMUM SPACING:

- 36' C.C. FOR 20% TO 35% SLOPES
- 24' C.C. FOR 35% TO 50% SLOPES
- 16' C.C. FOR 50% OR GREATER SLOPES



| | | | | | |
|--|--|--|--|--|--|
|  ENTECH | Entech Engineering, Inc. Engineering Architecture Construction | | WARWICK TOWNSHIP MUNICIPAL AUTHORITY 315 CLAY ROAD, LITITZ, PA 17543 | | |
| | Corporate Office: 4 S. Fourth Street Reading, PA 19602 ph: 610.373.6667 fx: 610.373.7537 | | STANDARD DETAIL CONCRETE SLOPE COLLAR ANCHOR DETAIL | | |
| Pottsville, PA ph: 570.628.5655 Mountaintop, PA ph: 570.868.0275 Lititz, PA ph: 717.626.6666 | | DATE: APRIL 2009 SCALE: N.T.S. DRAWING NO. | | | |
| www.entecheng.com 1.800.825.1372 | | REV. / DATE PROJECT NO. - - 4185.26 | | | |
| PREPARED BY BAM | CHECKED BY JDB | APPROVED BY SMC | S5 | | |

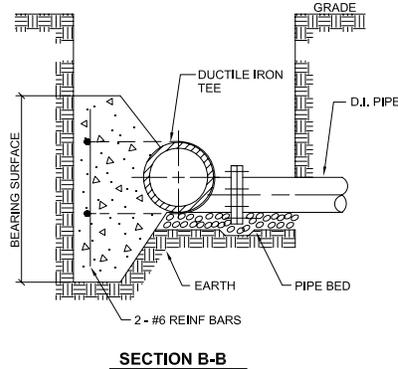
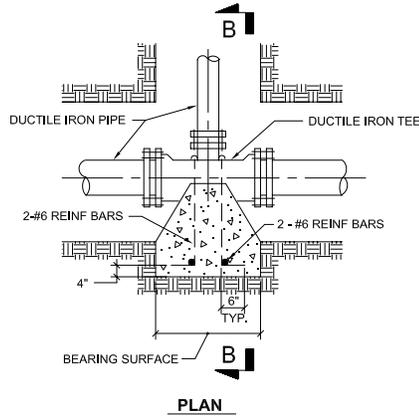
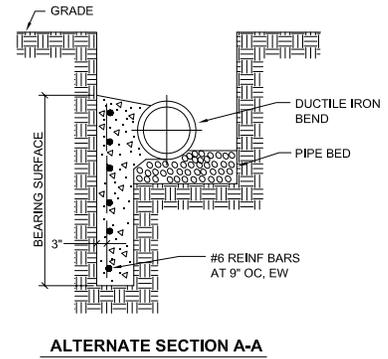
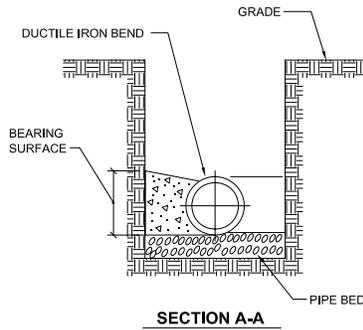
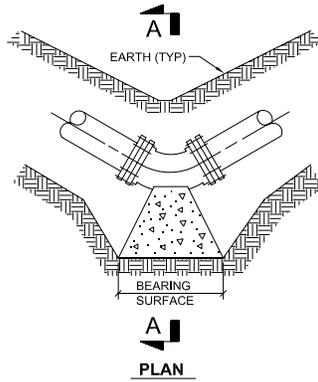
| HORIZONTAL BENDS | | | | | | | | |
|----------------------|---|-------|-----|-----|-----|-------|-----------|---------|
| NOMINAL PIPE DIA. | LENGTH OF PIPE RESTRAINT REQUIRED PER FITTING IN FEET | | | | | | | |
| | 11.25° | 22.5° | 45° | 90° | TEE | CROSS | CAP/VALVE | REDUCER |
| 4 | 1 | 3 | 5 | 13 | 11 | 11 | 14 | -- |
| 6 | 2 | 4 | 8 | 18 | 17 | 17 | 19 | 10 |
| 8 | 2 | 5 | 10 | 24 | 23 | 23 | 25 | 11 |
| 10 | 3 | 6 | 12 | 29 | 28 | 28 | 31 | 11 |
| 12 | 3 | 7 | 14 | 35 | 34 | 34 | 37 | 11 |
| 16 | 4 | 9 | 19 | 45 | 46 | 46 | 49 | 21 |

| VERTICAL BENDS | | | | | | | | |
|----------------------|---|-------|-----|-----|--------------------------|-------|-----|-----|
| NOMINAL PIPE DIA. | LENGTH OF PIPE RESTRAINT REQUIRED PER FITTING IN FEET | | | | | | | |
| | VERTICAL UP BEND ANGLE | | | | VERTICAL DOWN BEND ANGLE | | | |
| | 11.25° | 22.5° | 45° | 90° | 11.25° | 22.5° | 45° | 90° |
| 4 | 1 | 3 | 5 | 13 | 3 | 5 | 11 | 27 |
| 6 | 2 | 4 | 8 | 18 | 4 | 8 | 16 | 39 |
| 8 | 2 | 5 | 10 | 24 | 5 | 10 | 21 | 51 |
| 10 | 3 | 6 | 12 | 29 | 6 | 12 | 26 | 62 |
| 12 | 3 | 7 | 14 | 35 | 7 | 15 | 31 | 74 |
| 16 | 4 | 9 | 19 | 45 | 10 | 19 | 41 | 98 |

NOTES:

1. LENGTHS ARE BASED ON THE DUCTILE IRON PIPE RESEARCH ASSOCIATION PIPE RESTRAINT CALCULATOR VERSION 3.3 (05/09/2003), ASSUMING THE FOLLOWING: TRENCH - TYPE 5, SOIL - CLAY 1, BURY DEPTH 4', PRESSURE 150 PSI, AND SAFETY FACTOR 1.5
2. LENGTHS ARE PROVIDED FOR DUCTILE IRON PIPE WITHOUT POLYETHYLENE WRAP. POLYETHYLENE WRAP WILL REQUIRE ADDITIONAL RESTRAINT LENGTH TO BE DETERMINED ON AN AS NEEDED BASIS BY WTMA ENGINEER.
3. REDUCER LENGTHS ARE GIVEN FROM THE INDICATED SIZE TO THE NEXT SMALLER SIZE. REDUCER RESTRAINT LENGTHS SHOULD BE ADDED IF GREATER REDUCTION IS REQUIRED (I.E. 16" TO 8" = 21+11+11 = 43 FEET)

| | | | | | |
|---|--|---------------------------|--|------------------------|-----------|
|  | Entech Engineering, Inc. Engineering Architecture Construction | | WARWICK TOWNSHIP MUNICIPAL AUTHORITY 315 CLAY ROAD, LITITZ, PA 17543 STANDARD DETAIL RESTRAINED PIPE LENGTH SCHEDULE | | |
| | Corporate Office: 4 S. Fourth Street Reading, PA 19602 ph: 610.373.6667 fx: 610.373.7537 | | | | |
| ENTECH | Pottsville, PA ph: 570.628.5655 Mountaintop, PA ph: 570.868.0275 Lititz, PA ph: 717.626.6666 www.entecheng.com 1.800.825.1372 | | REV. / DATE - - | PROJECT NO. 4185.26 | S6 |
| PREPARED BY BAM | CHECKED BY JDB | APPROVED BY SMC | | | |



THRUST BLOCKING SCHEDULE OF DIMENSIONS

MINIMUM SQUARE FEET OF BEARING SURFACE REQUIRED FOR HORIZONTAL THRUST BLOCKING AND VERTICAL THRUSTS DOWNWARD
* BASED UPON 150 PSI PRESSURE *

| PIPE SIZES → | 4", 6" AND 8" | | | | 10" AND 12" | | | |
|--|---------------------------|---------|------|-------|---------------------------|---------|-------|-------|
| | DEGREE BEND OR DEFLECTION | | | | DEGREE BEND OR DEFLECTION | | | |
| TYPE OF BEARING MATERIAL AND ALLOWABLE LOADS | 11 1/4° | 22 1/2° | 45° | 90° | 11 1/4° | 22 1/2° | 45° | 90° |
| SAND 1 TON/SQ FT SOFT CLAY 1 TON/SQ FT | 1.50 | 3.00 | 6.00 | 12.00 | 3.00 | 6.00 | 12.00 | 24.50 |
| SAND & GRAVEL 2 TON/SQ FT | 1.00 | 1.50 | 3.00 | 6.00 | 1.50 | 3.00 | 6.00 | 12.00 |
| CLAY 3 TON/SQ FT | 1.00 | 1.00 | 2.00 | 4.00 | 1.00 | 2.00 | 4.00 | 8.00 |
| SOFT ROCK 5 TON/SQ FT | 1.00 | 1.00 | 1.00 | 2.50 | 1.00 | 1.00 | 2.50 | 5.00 |
| ROCK 20 TON/SQ FT | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |

MINIMUM SQUARE FEET OF BEARING SURFACE REQUIRED FOR HORIZONTAL THRUST BLOCKING AND VERTICAL THRUSTS DOWNWARD
* BASED UPON 150 PSI PRESSURE *

| PIPE SIZES → | 16" | | | |
|--|---------------------------|---------|-------|-------|
| | DEGREE BEND OR DEFLECTION | | | |
| TYPE OF BEARING MATERIAL AND ALLOWABLE LOADS | 11 1/4° | 22 1/2° | 45° | 90° |
| SAND 1 TON/SQ FT SOFT CLAY 1 TON/SQ FT | 5.50 | 11.00 | 21.50 | 43.00 |
| SAND & GRAVEL 2 TON/SQ FT | 2.50 | 5.50 | 11.00 | 21.50 |
| CLAY 3 TON/SQ FT | 2.00 | 3.50 | 7.00 | 14.00 |
| SOFT ROCK 5 TON/SQ FT | 1.00 | 2.00 | 4.50 | 8.50 |
| ROCK 20 TON/SQ FT | 1.00 | 1.00 | 1.00 | 2.00 |

NOTES:

1. ALL CONCRETE SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 3000 PSI AT THE END OF 28 DAYS.
2. ALL REINFORCING STEEL SHALL BE GRADE 60 DEFORMED BARS.
3. INSTALL CONCRETE THRUST BLOCKS AT EACH ELBOW, TEE AND CAPPED OR VALVED END FITTINGS LOCATED IN THE HORIZONTAL PLANE.
4. PAINT ALL EXPOSED STEEL WITH TWO COATS OF ASPHALT PAINT.
5. NO COUPLING OR JOINTS SHALL BE COVERED WITH CONCRETE.
6. ALL-THREADS WITH PIPE STRAPS MAY BE USED IN PLACE OF REINFORCING BARS.
7. ALL THRUST BLOCKS SHOWN ARE INTENDED AS A GUIDE AND SHALL WITHSTAND THE REQUIRED PRESSURE.
8. RETAINER GLANDS REQUIRED ON ALL MECHANICAL JOINT FITTINGS.
9. CERTAIN SITUATIONS MAY WARRANT THE USE OF TIE RODS, AUTHORIZED BY THE AUTHORITY ONLY.
10. PIPING SHALL BE WRAPPED WITH POLYETHYLENE PRIOR TO PLACEMENT OF CONCRETE.
11. FOR SOIL BEARING VALVES LESS THAN 1 TON / SQ. FT., CONSULT WITH AUTHORITY ENGINEER FOR RECOMMENDATION.



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WARWICK TOWNSHIP MUNICIPAL AUTHORITY

315 CLAY ROAD, LITITZ, PA 17543

STANDARD DETAIL

HORIZONTAL THRUST BLOCKING DETAIL

ENTECH

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APPROVED BY
SMC

DATE:
APRIL 2009

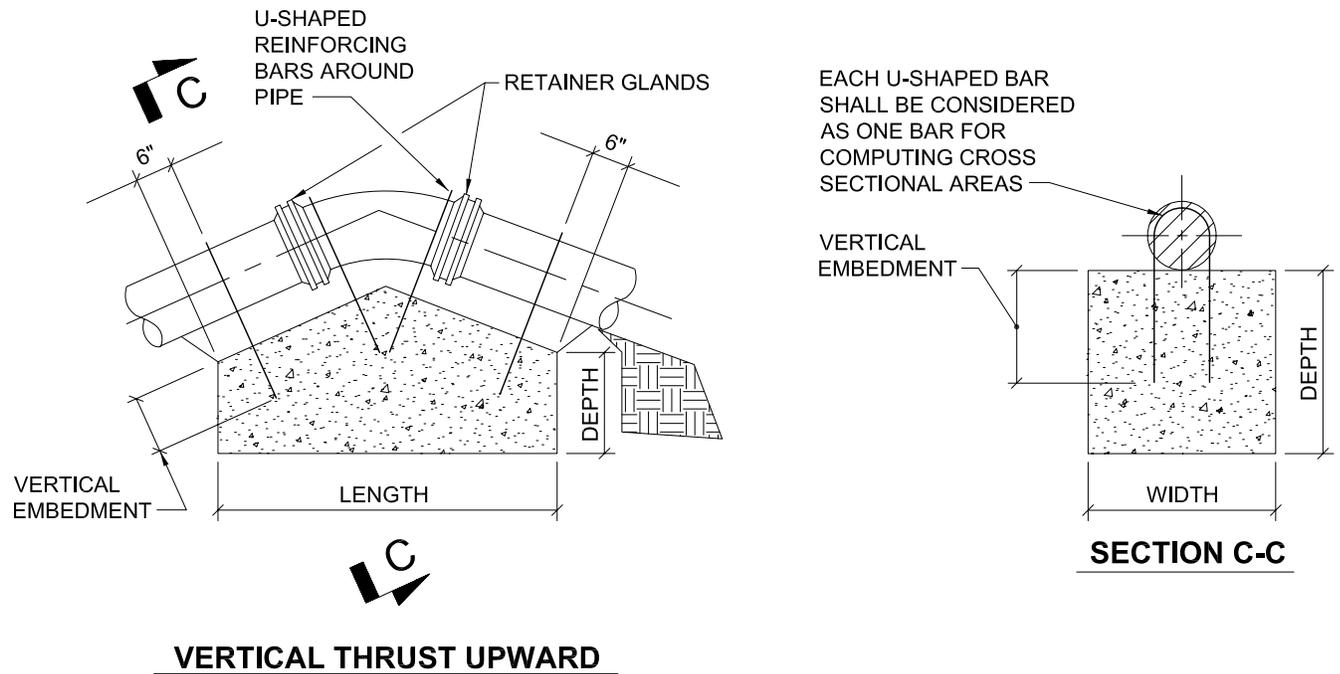
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PROJECT NO.
4185.26

S7



VERTICAL THRUST BLOCKING UPWARD THRUSTS SCHEDULE OF DIMENSIONS

* BASED UPON 150 PSI PRESSURE *

| PIPE SIZE | 4", 6" AND 8" | | | 10" AND 12" | | | 16" | | |
|---------------------------|---------------|---------|------|-------------|---------|------|---------|---------|-------|
| | 11 1/4° | 22 1/2° | 45° | 11 1/4° | 22 1/2° | 45° | 11 1/4° | 22 1/2° | 45° |
| DEGREE BEND OR DEFLECTION | 11 1/4° | 22 1/2° | 45° | 11 1/4° | 22 1/2° | 45° | 11 1/4° | 22 1/2° | 45° |
| LENGTH | 3.00 | 4.00 | 6.00 | 4.50 | 6.00 | 8.00 | 6.00 | 8.00 | 11.00 |
| WIDTH | 3.00 | 3.00 | 3.00 | 3.00 | 3.00 | 4.00 | 3.50 | 3.50 | 5.00 |
| DEPTH | 2.00 | 3.00 | 4.00 | 3.00 | 4.50 | 5.00 | 3.50 | 5.00 | 5.00 |
| SQ. IN. REINFORCING | 0.17 | 0.33 | 0.65 | 0.37 | 0.74 | 1.46 | 0.66 | 1.32 | 2.60 |

| | | | | | | | |
|--|------|------|------|------|------|------|------|
| BAR NO. | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
| CROSS-SECTION IN. ² PER BAR | 0.31 | 0.44 | 0.60 | 0.79 | 1.00 | 1.27 | 1.56 |
| VERTICAL EMBEDMENT | 15" | 19" | 26" | 35" | 44" | 56" | 68" |



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WARWICK TOWNSHIP MUNICIPAL AUTHORITY

315 CLAY ROAD, LITITZ, PA 17543

STANDARD DETAIL

VERTICAL THRUST BLOCKING DETAIL

DATE:
APRIL 2009

SCALE:
N.T.S.

DRAWING NO.

S8

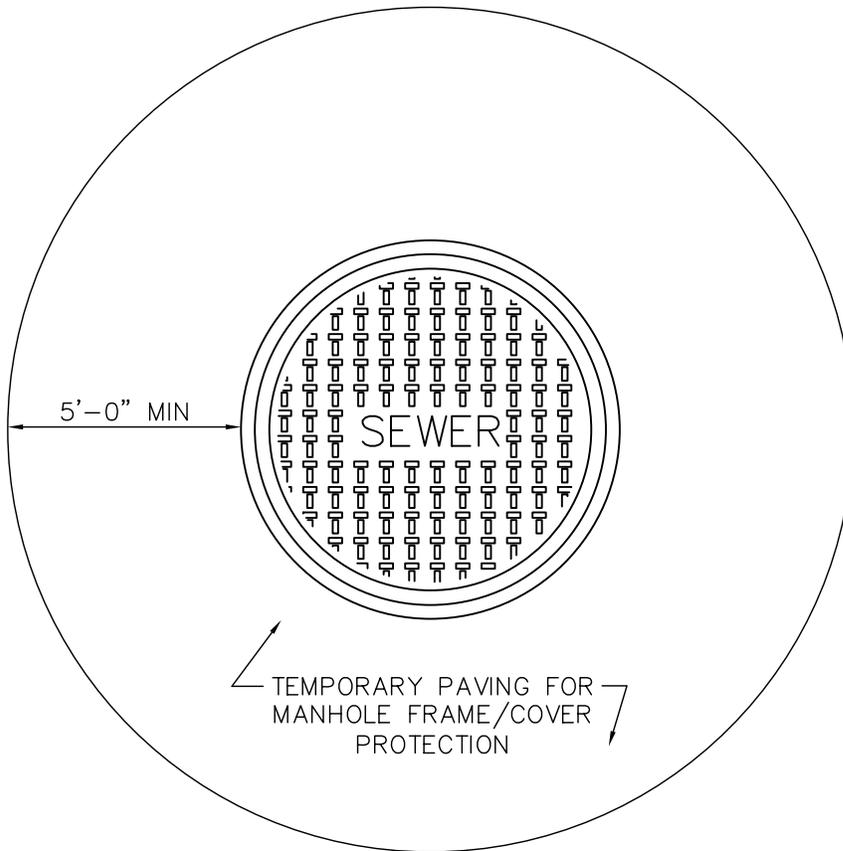
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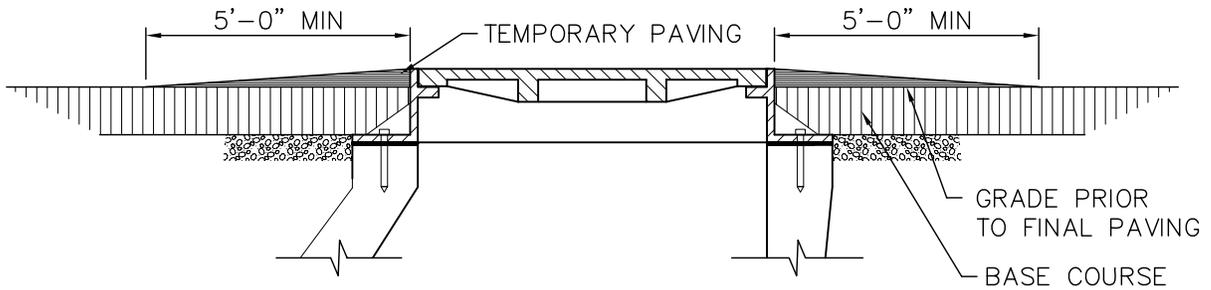
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PROJECT NO.
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TEMPORARY PAVING FOR
MANHOLE FRAME/COVER
PROTECTION

PLAN



SECTION



ENTECH

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WARWICK TOWNSHIP MUNICIPAL AUTHORITY

315 CLAY ROAD, LITITZ, PA 17543

STANDARD DETAIL

MANHOLE FRAME / COVER PROTECTION DETAIL - (TEMPORARY PAVING)

DATE:
APRIL 2009

SCALE:
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