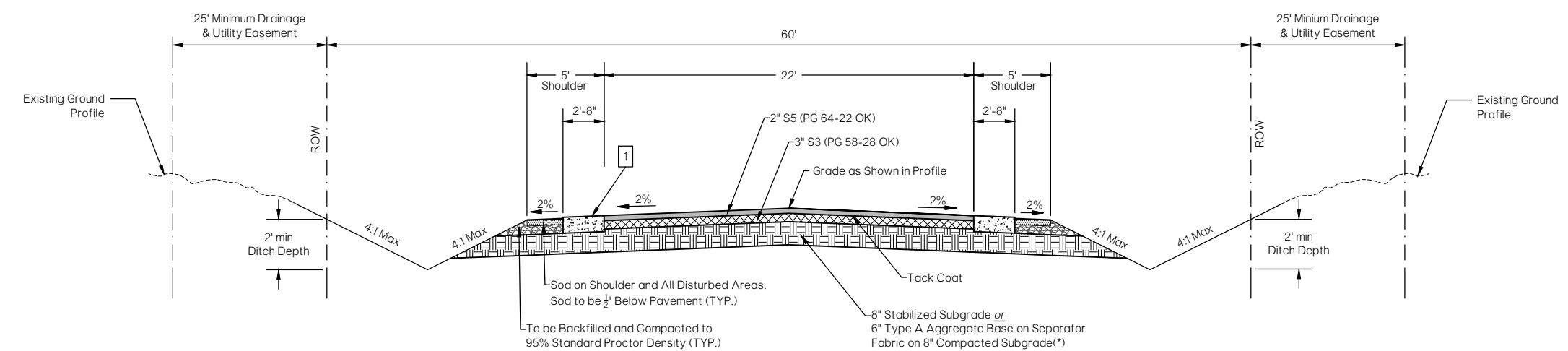


APPROVED BY: \_\_\_\_\_ DATE: \_\_\_\_\_  
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CITY ENGINEER  
DRAWN: OKC-PW-SRB  
DATE: 3/2/2023

**STANDARD TYPICAL SECTIONS  
ASPHALTIC PAVING**

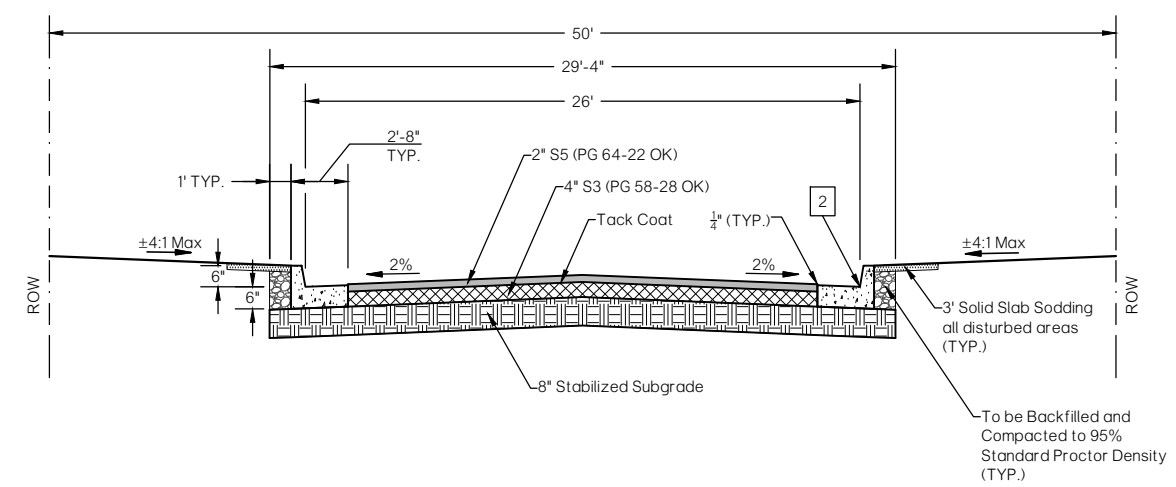
Detail Number  
D-100A



TYPICAL SECTION  
LOCAL RESIDENTIAL RURAL ROADWAY  
R-A and R-A2 Zoning Districts  
• 100 •

(\*) Aggregate Base shall extend to edge of ditch and planed on Separator Fabric for Bases.

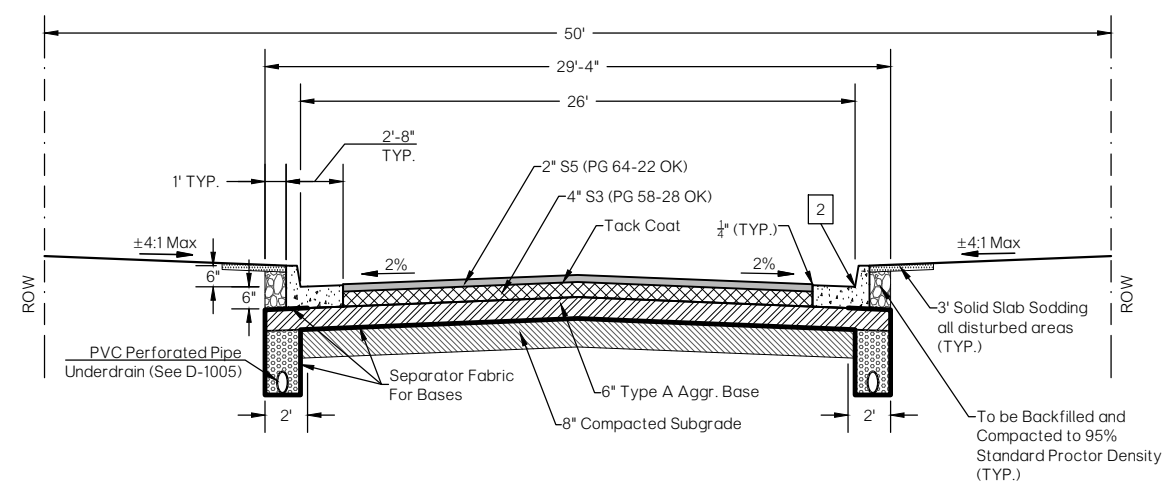
| LEGEND |  |
|--------|--|
|        | S5 (PG 64-22 OK)                             |
|        | S3 (PG 58-28 OK)                             |
|        | P.C. Concrete                                |
|        | Stabilized Subgrade or Type A Aggregate Base |
|        | Type A Aggregate Base (95% SPD Compaction)   |
|        | Compacted Subgrade                           |
|        | Backfill                                     |
|        | Sodding                                      |
|        | Cement Treated Base or S3 (PG 58-28 OK)      |
|        | Leveling Course                              |



TYPICAL SECTION  
26' HOT MIX ASPHALT PAVING  
(STABILIZED SUBGRADE)  
LOCAL RESIDENTIAL  
• 101 •

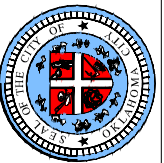
- 1 Ribbon Curb (See Detail D-200C)
- 2 Concrete Curb and Gutter Type 1, 2 or 3 (See Detail D-200C)

RESIDENTIAL ASPHALT NOTE:  
1. S3 BASE COURSES SHALL USE BINDER GRADE PG 58-28 OK WITH A MAXIMUM OF 15% RECLAIMED ASPHALT PAVEMENT (RAP).  
2. S5 SURFACE COURSE SHALL USE BINDER GRADE PG 64-22 OK WITH A VIRGIN MIX (NO RAP).  
3. DESIGN MIXES, INCLUDING ACCEPTABLE TEST RESULTS, INDICATING A FINAL PERFORMANCE GRADE OF PG 64-22 OK MAY BE REQUIRED PRIOR TO APPROVAL OF A MIX FOR USE IN THE CITY OF OKLAHOMA CITY.



NOTE: Edge Drain Location to be Determined by the Engineer. Refer to Pavement Edge Drain Sheet for Details. (See Detail Number D-1005.)

TYPICAL SECTION  
26' HOT MIX ASPHALT PAVING  
(AGGREGATE BASE)  
LOCAL RESIDENTIAL  
• 102 •



APPROVED BY: \_\_\_\_\_ DATE: \_\_\_\_\_

ERIC J. WENGER, P.E.  
CITY ENGINEER

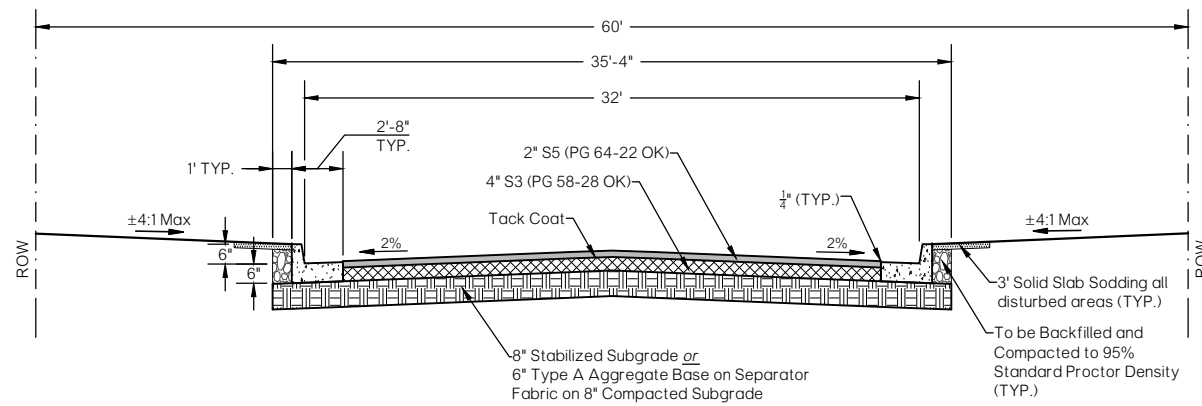
DRAWN: OKC-PW-SRB

DATE: 3/2/2023

**STANDARD TYPICAL SECTIONS  
ASPHALTIC PAVING**

Detail Number

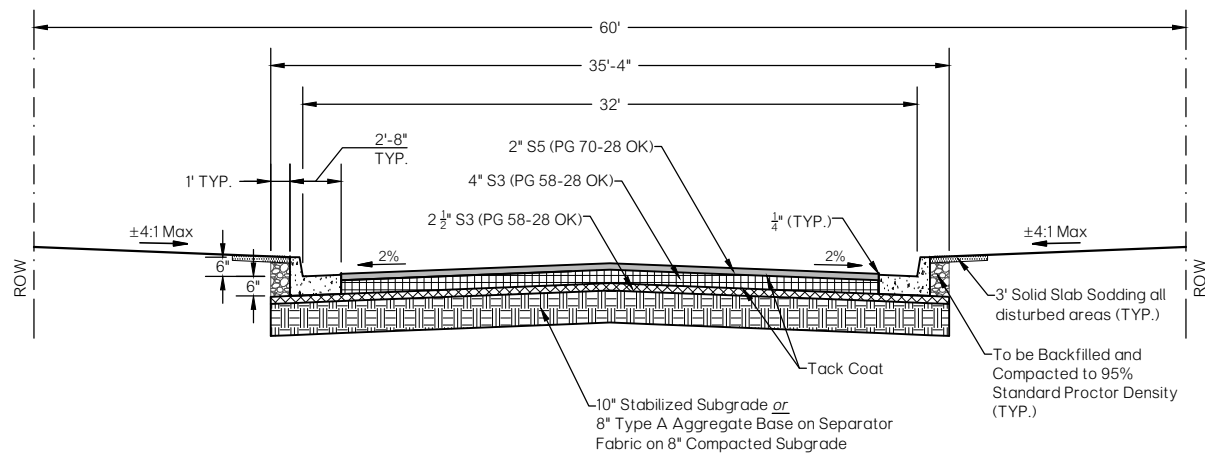
D-100B



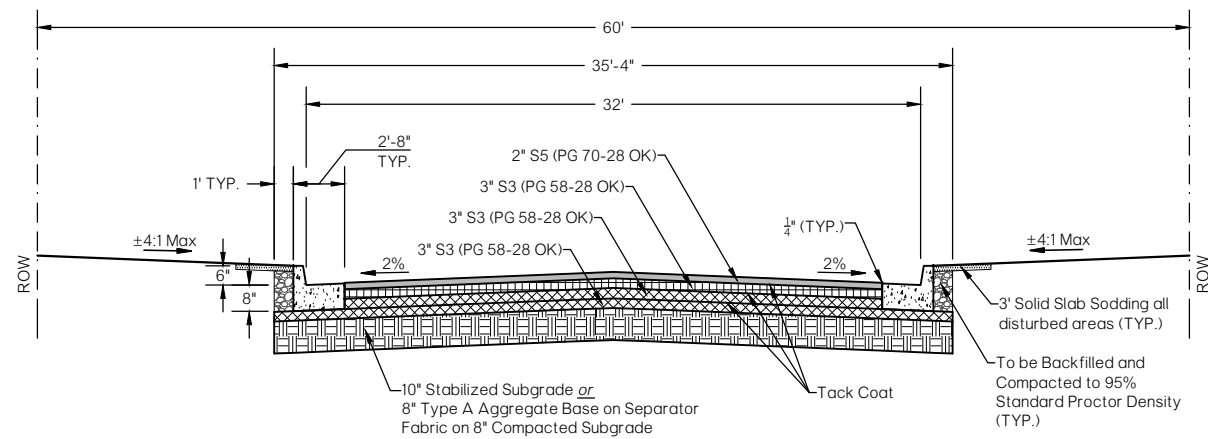
TYPICAL SECTION  
32' HOT MIX ASPHALT PAVING  
RESIDENTIAL COLLECTOR  
• 110 •

| LEGEND |  |
|--------|--|
|        | S5 (PG 70-28 OK) or S5 (PG 64-22 OK)         |
|        | S3 (PG 64-22 OK) or S3 (PG 58-28 OK)         |
|        | S3 (PG 58-28 OK)                             |
|        | P.C. Concrete                                |
|        | Stabilized Subgrade or Type A Aggregate Base |
|        | Type A Aggregate Base (95% SPD Compaction)   |
|        | Compacted Subgrade                           |
|        | Backfill                                     |
|        | Sodding                                      |
|        | Cement Treated Base or S3 (PG 58-28 OK)      |
|        | Leveling Course                              |

RESIDENTIAL TYPICAL NOTE:  
1. S3 BASE COURSES AND S5 SURFACE COURSES SHALL USE BINDER GRADE PG 58-28 OK WITH A MAXIMUM OF 15% RECLAIMED ASPHALT PAVEMENT (RAP).  
2. S5 SURFACE COURSE SHALL USE BINDER GRADE PG 64-22 OK WITH A VIRGIN MIX (NO RAP).  
3. COURSE DESIGN MIXES, INCLUDING ACCEPTABLE TEST RESULTS, INDICATING A FINAL PERFORMANCE GRADE OF PG 64-22 OK MAY BE REQUIRED PRIOR TO APPROVAL OF A MIX FOR USE IN THE CITY OF OKLAHOMA CITY.

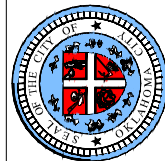


TYPICAL SECTION  
32' HOT MIX ASPHALT PAVING  
COMMERCIAL  
• 111 •



TYPICAL SECTION  
32' HOT MIX ASPHALT PAVING  
INDUSTRIAL  
• 112 •

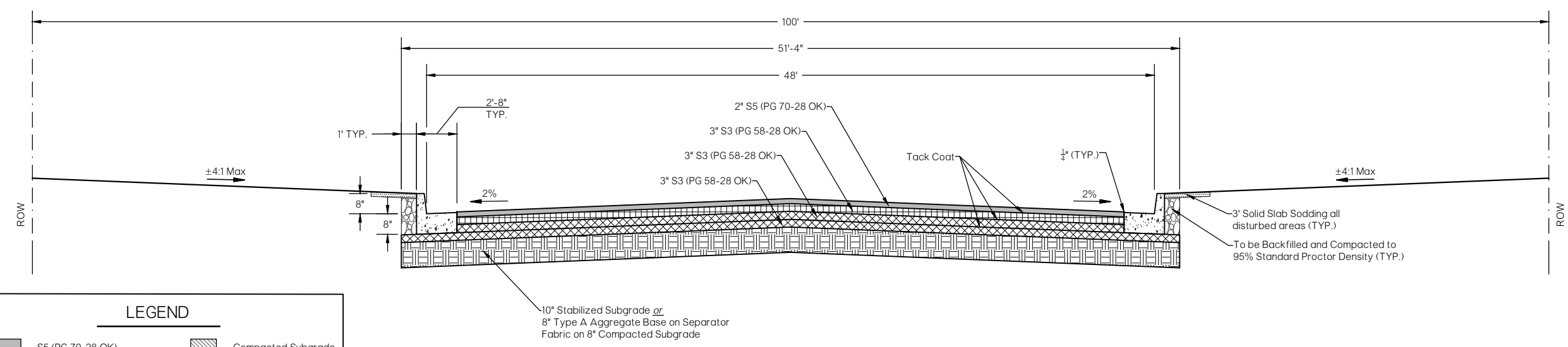
COMMERCIAL/INDUSTRIAL TYPICAL NOTE:  
1. S3 BASE COURSES SHALL USE BINDER GRADE PG 58-28 OK WITH A MAXIMUM OF 15% RECLAIMED ASPHALT PAVEMENT (RAP).  
2. S5 SURFACE COURSE SHALL USE BINDER GRADE PG 70-28 OK WITH A VIRGIN MIX (NO RAP).  
3. COURSE DESIGN MIXES, INCLUDING ACCEPTABLE TEST RESULTS, INDICATING A FINAL PERFORMANCE GRADE OF PG 64-22 OK MAY BE REQUIRED PRIOR TO APPROVAL OF A MIX FOR USE IN THE CITY OF OKLAHOMA CITY.



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CITY ENGINEER  
DRAWN: OKC-PW-SRB  
DATE: 3/2/2023

**STANDARD TYPICAL SECTIONS  
ASPHALTIC PAVING**

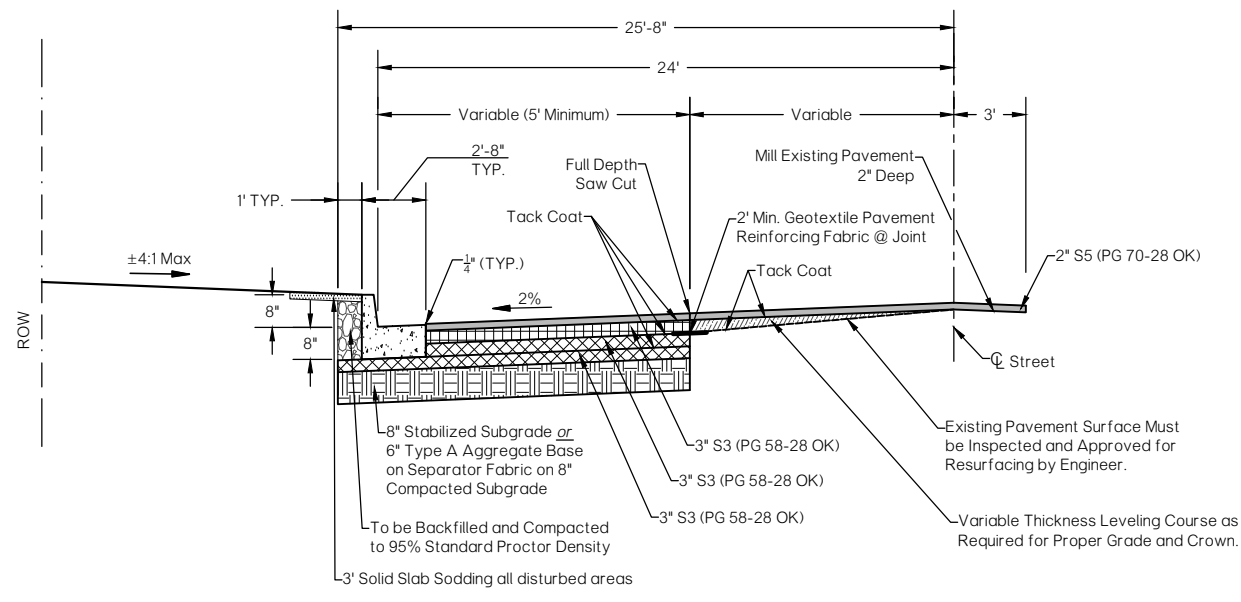
Detail Number  
D-100C



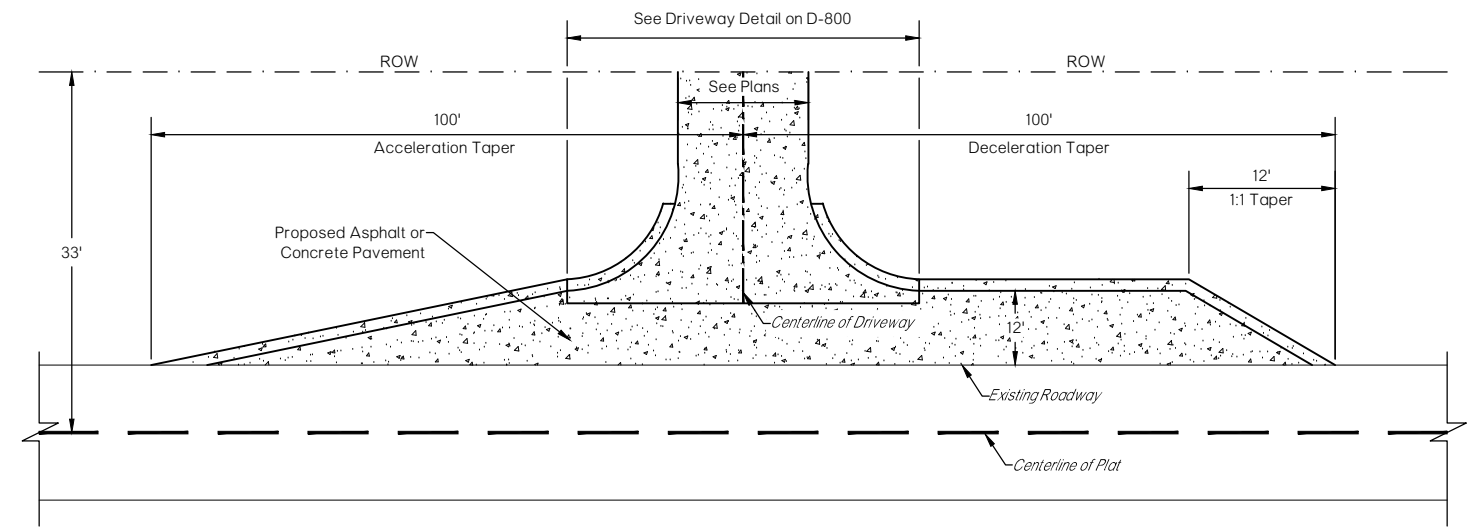
**TYPICAL SECTION  
48' HOT MIX ASPHALT PAVING  
ARTERIAL  
• 120 •**

**LEGEND**

|  |  |  |   |
|--|--|--|---|
|  | S5 (PG 70-28 OK)                             |  | Compacted Subgrade                      |
|  | S3 (PG 64-22 OK) or S3 (PG 58-28 OK)         |  | Backfill                                |
|  | S3 (PG 58-28 OK)                             |  | Sodding                                 |
|  | P.C. Concrete                                |  | Cement Treated Base or S3 (PG 58-28 OK) |
|  | Stabilized Subgrade or Type A Aggregate Base |  | Leveling Course                         |
|  | Type A Aggregate Base (95% SPD Compaction)   |  |   |



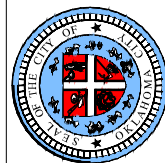
**TYPICAL SECTION  
VARIABLE WIDENING HOT MIX ASPHALT PAVING  
• 130 •**



**TYPICAL SECTION  
RURAL 2-LANE DRIVEWAY ACCESS  
• 140 •**

**ARTERIAL/WIDENING TYPICAL NOTE:**

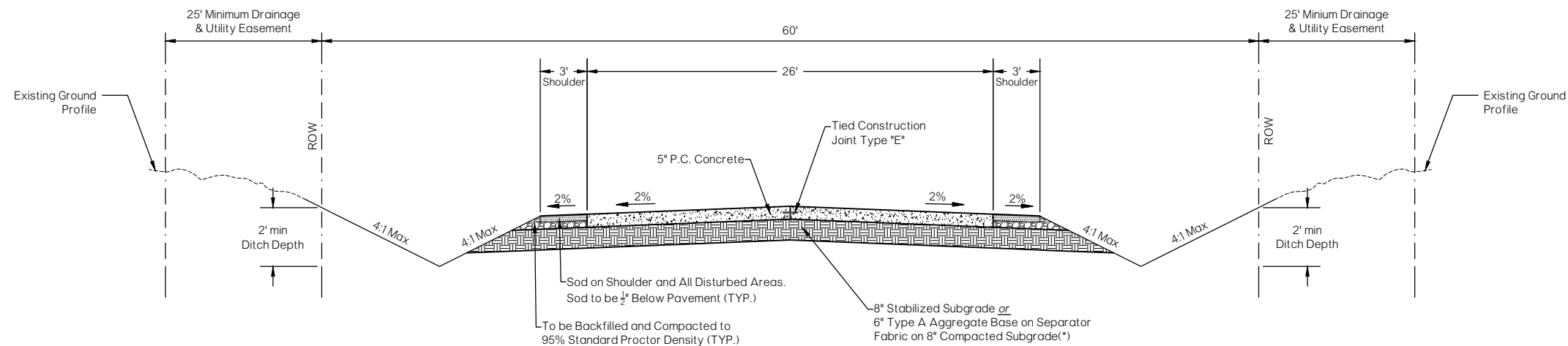
- S3 BASE COURSES SHALL USE BINDER GRADE PG 58-28 OK WITH A MAXIMUM OF 15% RECLAIMED ASPHALT PAVEMENT (RAP).
- S5 SURFACE COURSE SHALL USE BINDER GRADE PG 70-28 OK WITH A VIRGIN MIX (NO RAP).
- COURSE DESIGN MIXES, INCLUDING ACCEPTABLE TEST RESULTS, INDICATING A FINAL PERFORMANCE GRADE OF PG 64-22 OK MAY BE REQUIRED PRIOR TO APPROVAL OF A MIX FOR USE IN THE CITY OF OKLAHOMA CITY.



APPROVED BY: \_\_\_\_\_ DATE: \_\_\_\_\_  
ERIC J. WENGER, P.E.  
CITY ENGINEER  
DRAWN: OKC-PW-SRB  
DATE: 3/2/2023

**STANDARD TYPICAL SECTIONS  
P.C. CONCRETE PAVING**

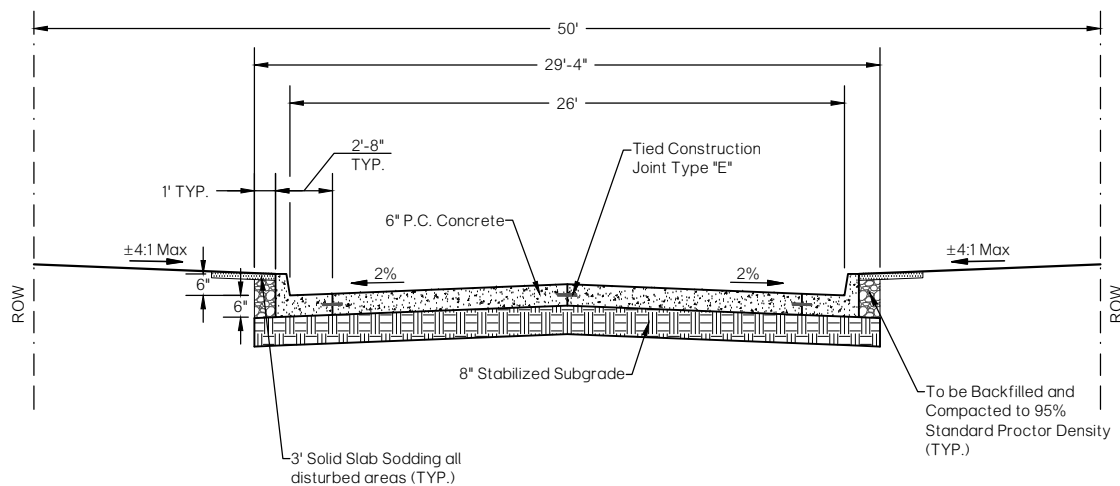
Detail Number  
D-200A



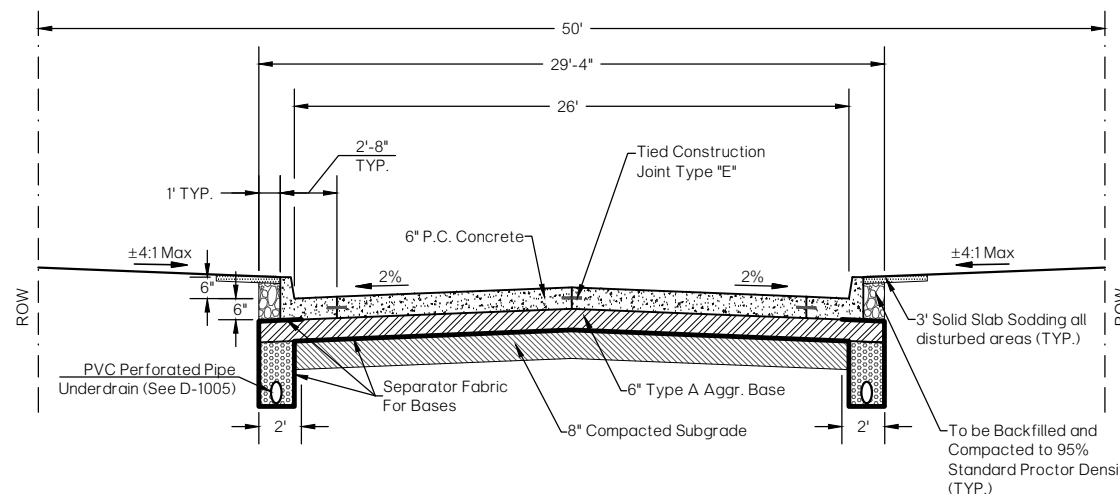
(\* Aggregate Base shall extend to edge of ditch and planed on Separator Fabric for Bases.

TYPICAL SECTION  
LOCAL RESIDENTIAL RURAL ROADWAY  
R-A and R-A2 Zoning Districts  
• 200 •

| LEGEND |  |
|--------|--|
|        | S5 (PG 70-28 OK) or S5 (PG 64-22 OK)         |
|        | S3 (PG 58-28 OK)                             |
|        | P.C. Concrete                                |
|        | Stabilized Subgrade or Type A Aggregate Base |
|        | Type A Aggregate Base (95% SPD Compaction)   |
|        | Compacted Subgrade                           |
|        | Backfill                                     |
|        | Sodding                                      |
|        | Cement Treated Base or S3 (PG 58-28 OK)      |
|        | Leveling Course                              |

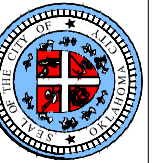


TYPICAL SECTION  
26' P.C. CONCRETE PAVING  
(STABILIZED SUBGRADE)  
LOCAL RESIDENTIAL  
• 201 •

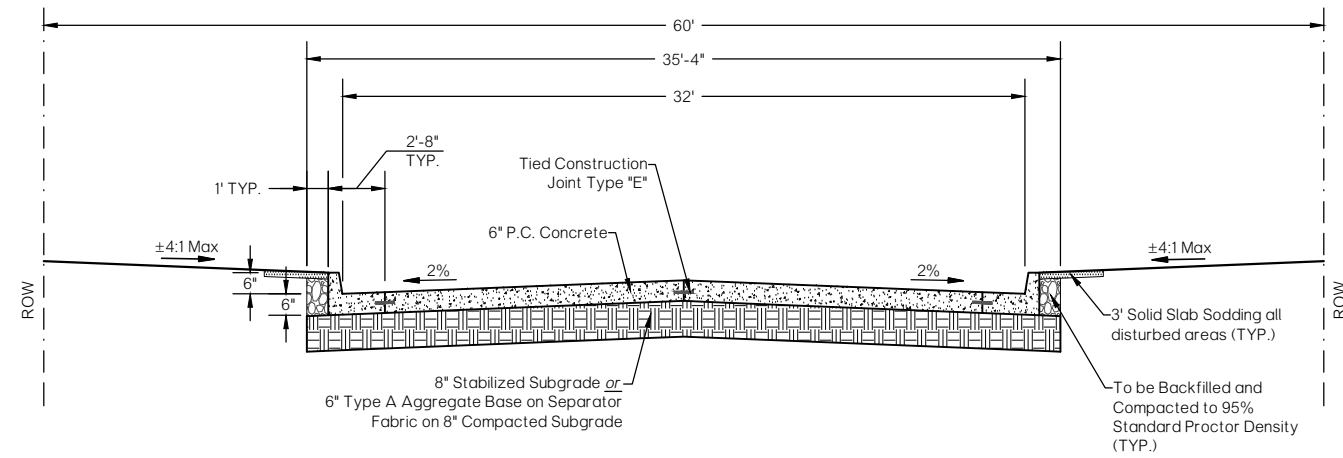


NOTE: Edge Drain Location to be Determined by the Engineer.  
Refer to Pavement Edge Drain Sheet for Details.  
(See Detail Number D-1005.)

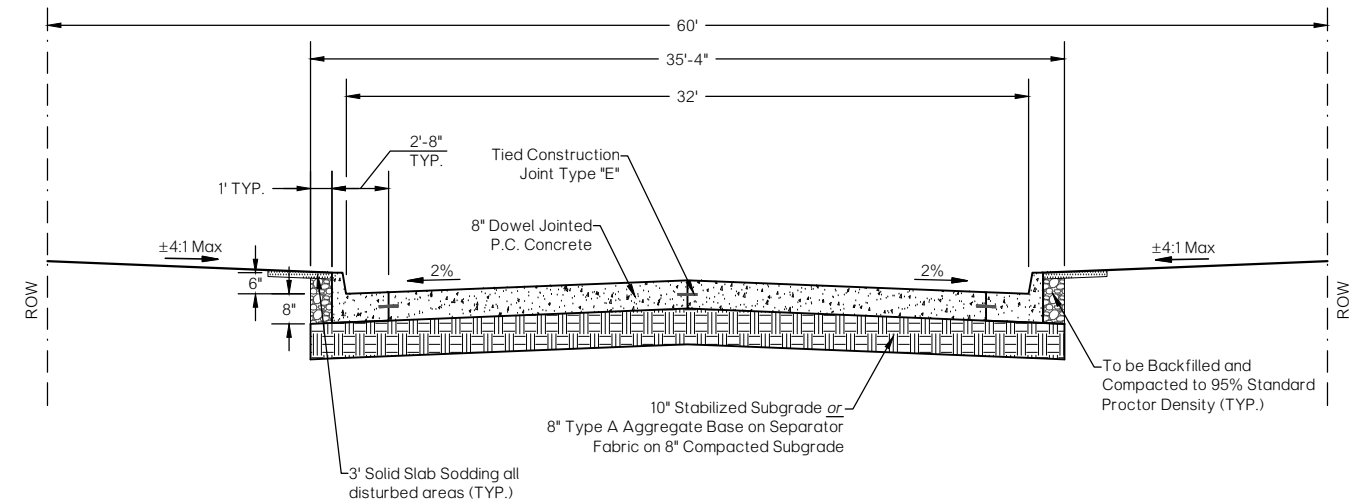
TYPICAL SECTION  
26' P.C. CONCRETE PAVING  
(AGGREGATE BASE)  
LOCAL RESIDENTIAL  
• 202 •



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CITY ENGINEER  
DRAWN: OKC-PW-SRB  
DATE: 3/2/2023

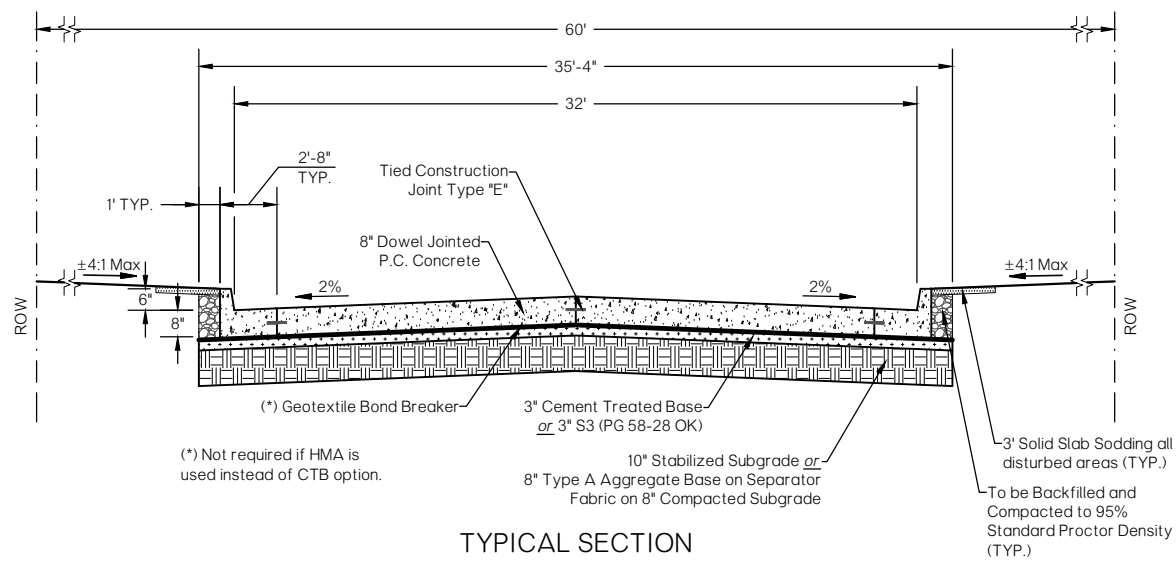


TYPICAL SECTION  
32' P.C. CONCRETE PAVING  
RESIDENTIAL COLLECTOR  
• 210 •

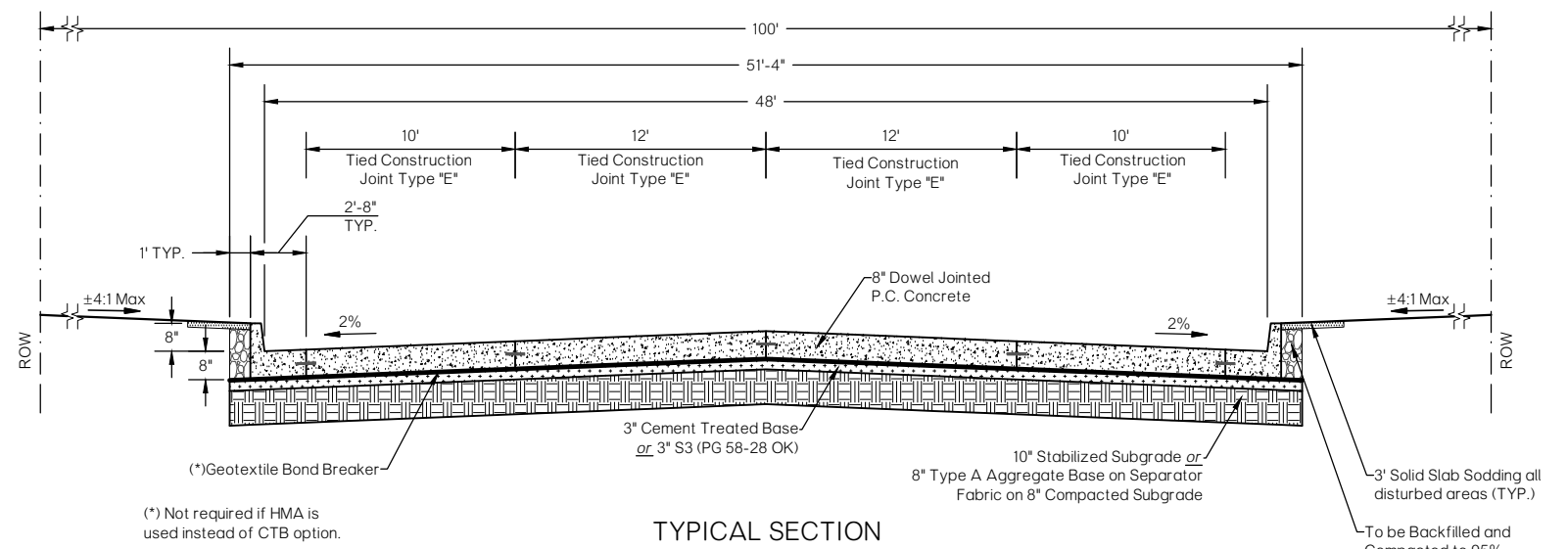


TYPICAL SECTION  
32' P.C. CONCRETE PAVING  
COMMERCIAL  
• 211 •

| LEGEND |  |
|--------|--|
|        | S5 (PG 70-28 OK) or S5 (PG 64-22 OK)         |
|        | S3 (PG 58-28 OK)                             |
|        | P.C. Concrete                                |
|        | Stabilized Subgrade or Type A Aggregate Base |
|        | Type A Aggregate Base (95% SPD Compaction)   |
|        | Compacted Subgrade                           |
|        | Backfill                                     |
|        | Sodding                                      |
|        | Cement Treated Base or S3 (PG 58-28 OK)      |
|        | Leveling Course                              |



TYPICAL SECTION  
32' P.C. CONCRETE PAVING  
INDUSTRIAL  
• 212 •

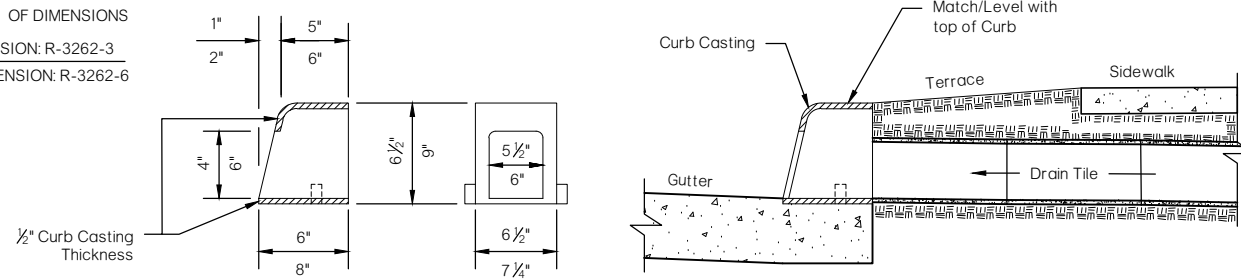


TYPICAL SECTION  
48' P.C. CONCRETE PAVING  
ARTERIAL  
• 220 •

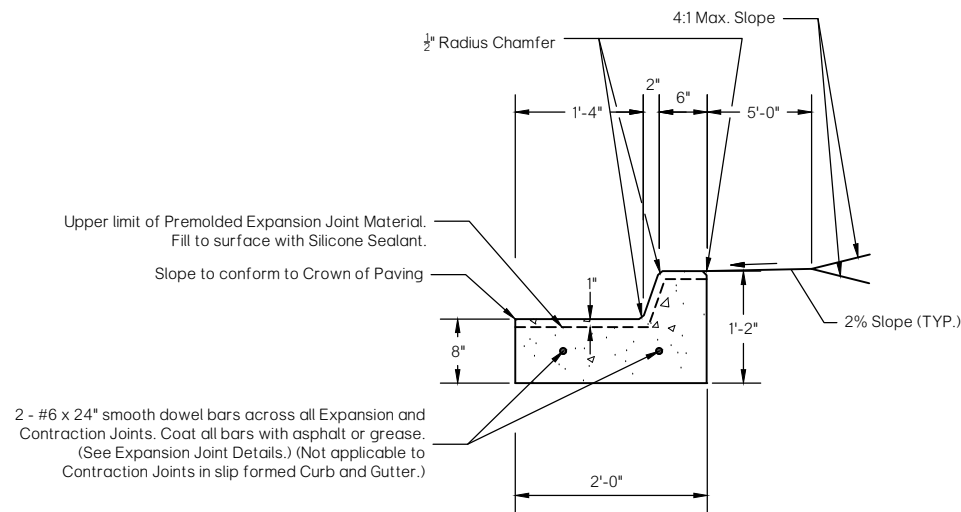
STANDARD TYPICAL SECTIONS  
P.C. CONCRETE PAVING

Detail Number  
D-200B

EXPLANATION OF DIMENSIONS  
 TOP DIMENSION: R-3262-3  
 BOTTOM DIMENSION: R-3262-6

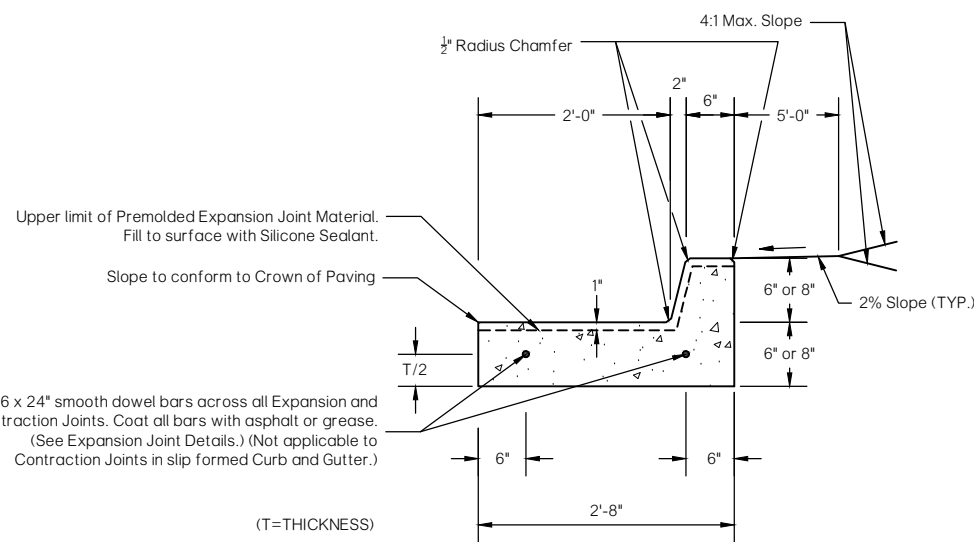


**STORM WATER CURB OPENINGS**  
 NEENAH R-3262-3 & R-3262-6



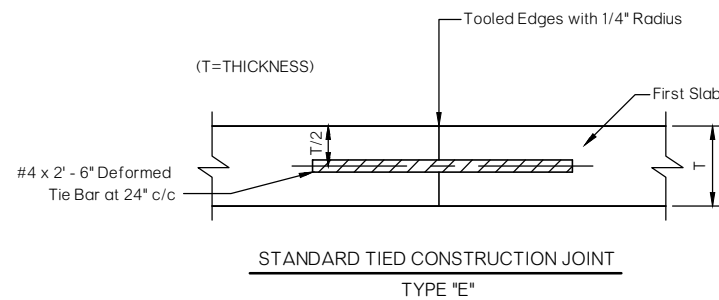
NOTE: Maximum spacing of 1/2 inch Expansion Joints to be 100' c/c with Contraction Joints 15' - 20' apart to match Driveway Returns. (Expansion Joint spacing, not applicable to slip formed Curb and Gutter.)

**CONCRETE CURB & GUTTER DETAIL FOR DOWNTOWN**

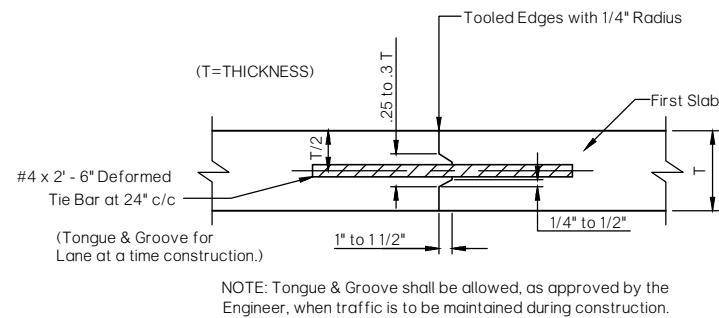


NOTE: Maximum spacing of 1/2 inch Expansion Joints to be 100' c/c with Contraction Joints 15' - 20' apart to match Driveway Returns. (Expansion Joint spacing, not applicable to slip formed Curb and Gutter.)

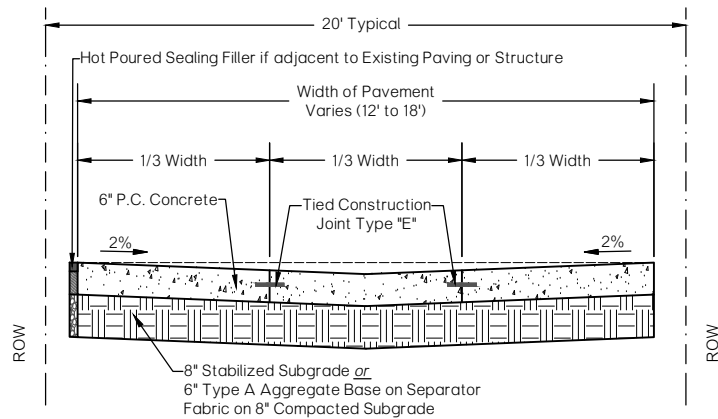
**BARRIER CURB & GUTTER DETAIL**  
 (TYPE 1)



**STANDARD TIED CONSTRUCTION JOINT**  
 TYPE "E"

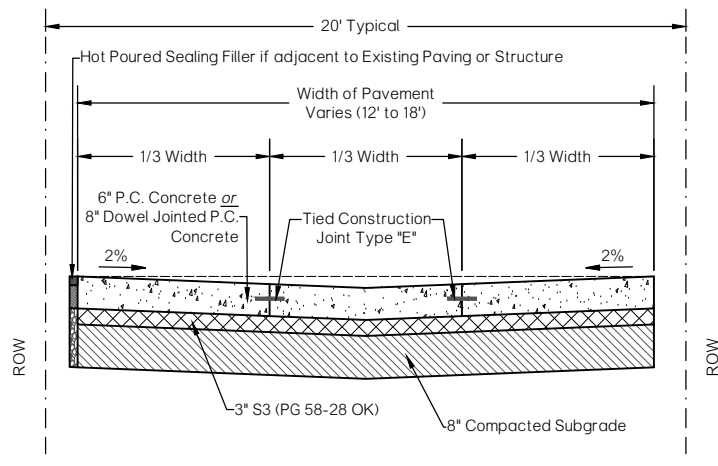


**ALTERNATE TIED CONSTRUCTION JOINT**  
 TYPE "E"



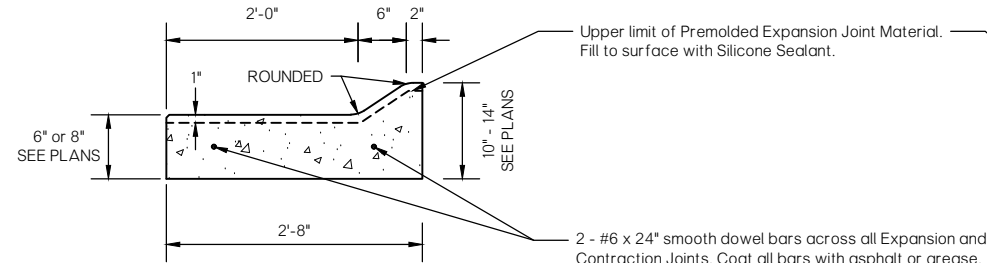
**TYPICAL SECTION**  
**P.C. CONCRETE ALLEY PAVING**  
 LOCAL RESIDENTIAL  
 • 230 •

NOTE: Transverse Joints at 10' MAX.



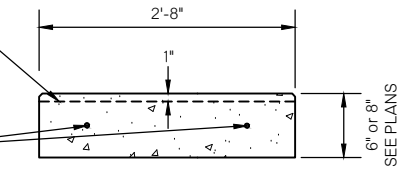
**TYPICAL SECTION**  
**P.C. CONCRETE ALLEY PAVING**  
 COMMERCIAL/INDUSTRIAL  
 • 231 •

NOTE: Transverse Joints at 10' MAX.



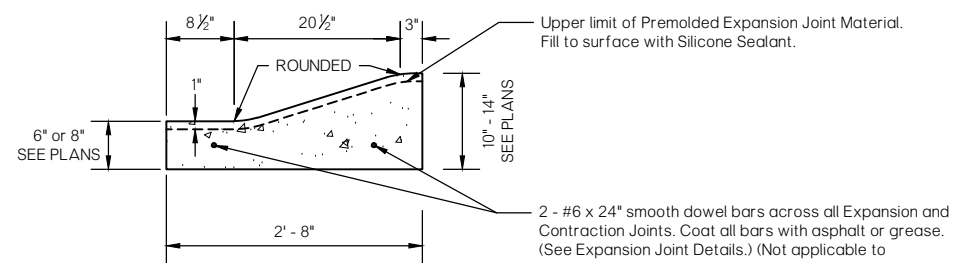
**MOUNTABLE CURB & GUTTER DETAIL**  
 (TYPE 2)

\* For use in residential street only, unless otherwise approved by Engineer.



**RIBBON CURB DETAIL**  
 (TYPE 4)

\* For use in residential street only.

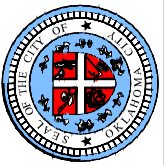


**SPECIAL MOUNTABLE CURB & GUTTER DETAIL**  
 (TYPE 3)

\* For use in residential street only, unless otherwise approved by Engineer.

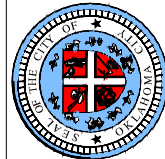
**CURBS FOR P.C. CONCRETE PAVEMENT NOTE:**

- #4 Tiebars 2'-0" long are required at 24" centers if Curb & Gutter not cast integrally with the P.C. Concrete street pavement. Longitudinal Construction Joints on Local and Collector streets may, with the approval of the Design Engineer, be Butt Type Joints with Tiebars.



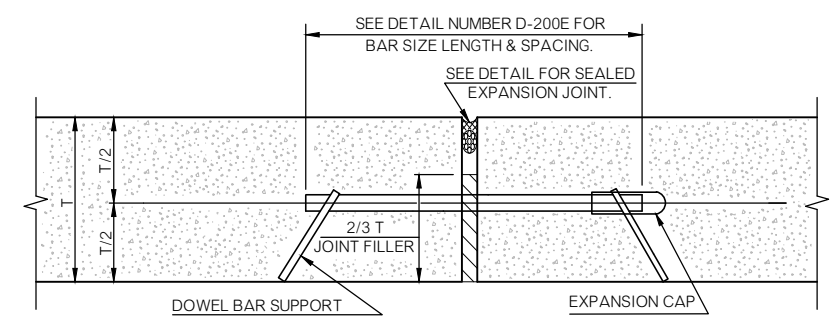
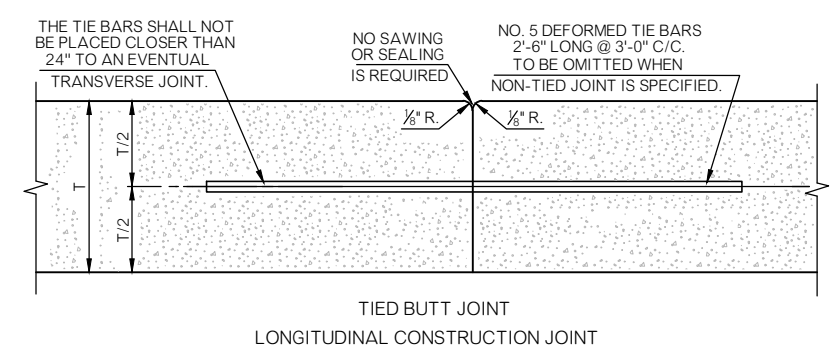
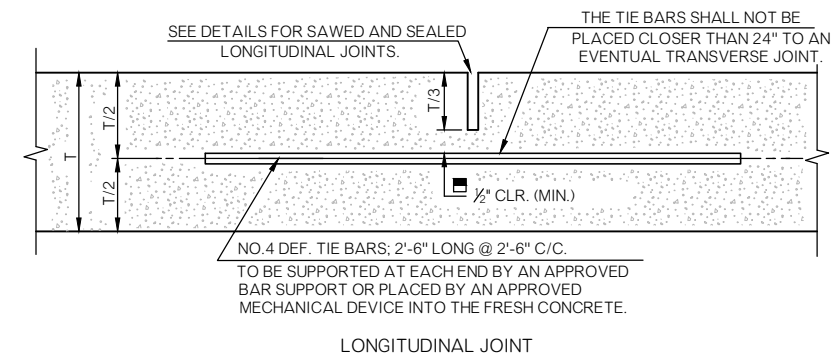
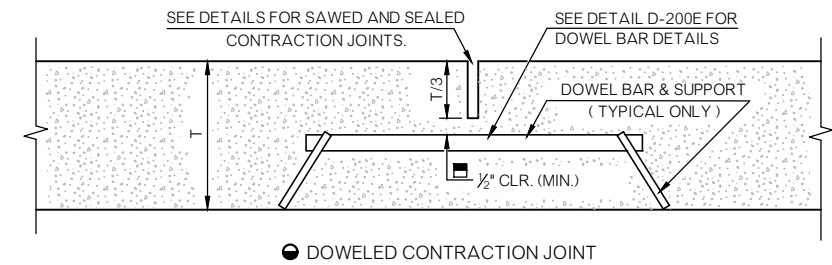
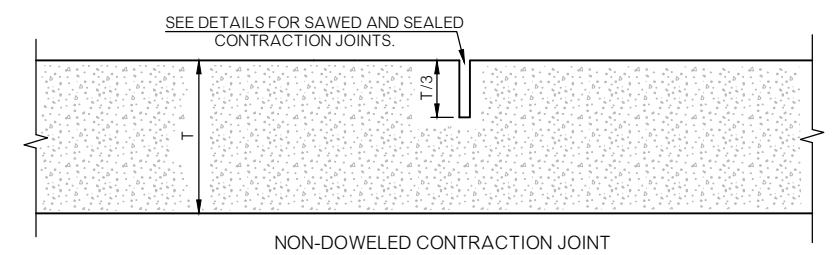
APPROVED BY: \_\_\_\_\_ DATE: \_\_\_\_\_  
 ERIC J. WENGER, P.E.  
 CITY ENGINEER  
 DRAWN: OKC-PW-SRB  
 DATE: 3/2/2023

**P.C. CONCRETE PAVING**  
**SPECIAL DETAILS**

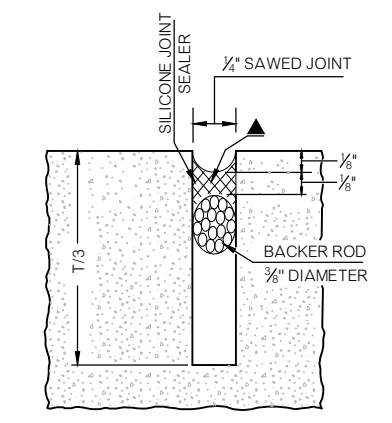


APPROVED BY: \_\_\_\_\_ DATE: \_\_\_\_\_  
ERIC J. WENGER, P.E.  
CITY ENGINEER  
DRAWN: OKC-PW-SRB  
DATE: 2/17/2023

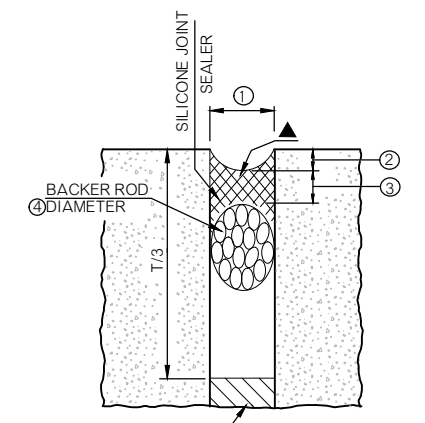
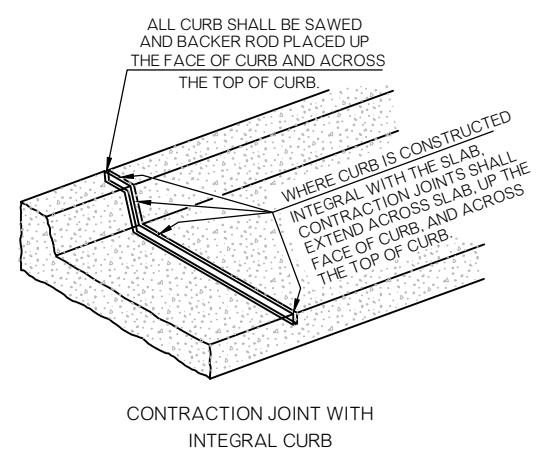
**LONGITUDINAL, EXPANSION AND  
CONTRACTION JOINTS DETAILS**



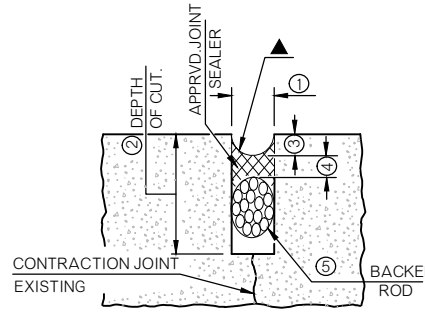
■ OMIT DOWEL BARS, CAPS & SUPPORTS FOR ISOLATION JOINTS  
SEE STANDARD DRAWING NUMBER D-200E, LOAD TRANSFER UNITS, FOR DETAILS OF ALTERNATE TYPES OF DOWEL BAR SUPPORTS.



ALTERNATE DETAILS  
SAWED AND SEALED CONTRACTION,  
AND LONGITUDINAL JOINTS



SEALED EXPANSION JOINT



| JOINT REHABILITATION TREATMENT TABLE |              |                      |                   |                     |
|--------------------------------------|--------------|----------------------|-------------------|---------------------|
| JOINT WIDTH                          | DEPTH OF CUT | SEALANT RECESS DEPTH | SEALANT THICKNESS | BACKER ROD DIAMETER |
| INCHES ①                             | INCHES ②     | INCHES ③             | INCHES ④          | INCHES ⑤            |
| 1/4"                                 | 1 1/8"       | 1/2" (MIN.)          | 1/4"              | 3/8"                |
| 3/8"                                 | 1 1/4"       | 1/2" (MIN.)          | 3/8"              | 1/2"                |
| 1/2"                                 | 1 3/4"       | 1/2" (MIN.)          | 1/2"              | 5/8"                |
| 3/4"                                 | 1 3/4"       | 1/2" (MIN.)          | 3/4"              | 7/8"                |
| 1"                                   | 1 3/4"       | 1/2" (MIN.)          | 7/8"              | 1"                  |
| 1"                                   | 2"           | —                    | —                 | 1 1/8"              |
| OVER 1"                              | OVER 2"      | —                    | —                 | 1 1/2"+             |

JOINT REHABILITATION - POLYMER SEALANT

| JOINT REHABILITATION TREATMENT TABLE |              |                      |                            |                     |
|--------------------------------------|--------------|----------------------|----------------------------|---------------------|
| JOINT WIDTH                          | DEPTH OF CUT | SEALANT RECESS DEPTH | SILICONE SEALANT THICKNESS | BACKER ROD DIAMETER |
| INCHES ①                             | INCHES ②     | INCHES ③             | INCHES ④                   | INCHES ⑤            |
| 3/8"                                 | 1 1/4"       | 1/4"                 | 3/16"                      | 1/2"                |
| 1/2"                                 | 1 3/4"       | 1/4"                 | 1/4"                       | 5/8"                |
| 3/4"                                 | 1 3/4"       | 1/4"                 | 3/8"                       | 7/8"                |
| 1"                                   | 1 3/4"       | 1/2"                 | 1/8"                       | 1"                  |
| 1"                                   | 2"           | 1/2"                 | 1/2"                       | 1 1/8"              |
| OVER 1"                              | OVER 2"      | 1/2"                 | 1/2"                       | 1 1/4"              |

JOINT REHABILITATION - SILICONE SEALANT

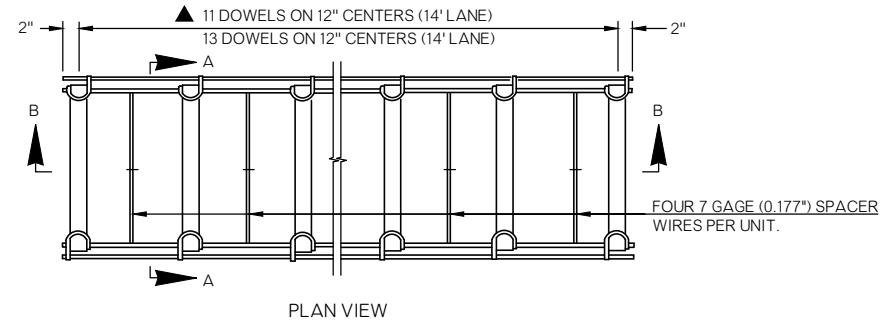
| EXPANSION JOINT / ISOLATION JOINT TREATMENT TABLE |                      |                            |                     |
|---|----------------------|----------------------------|---------------------|
| JOINT WIDTH                                       | SEALANT RECESS DEPTH | SILICONE SEALANT THICKNESS | BACKER ROD DIAMETER |
| INCHES ①  | INCHES ②             | INCHES ③                   | INCHES ④            |
| 1/2"  | 1/4"                 | 1/4"                       | 5/8"                |
| 3/4"  | 1/4"                 | 3/8"                       | 7/8"                |
| 1"  | 3/8"                 | 1/2"                       | 1 1/4"              |
| 1 1/2"  | 1/2"                 | 1/2"                       | 2"                  |
| 2"  | 1/2"                 | 3/4"                       | 2 1/2"              |

DETAILS FOR SEALED  
EXPANSION / ISOLATION JOINT

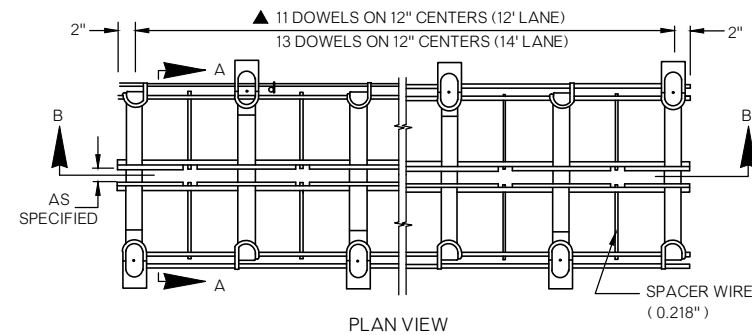
EXPANSION OR ISOLATION JOINT WIDTH SHALL BE 1/2", UNLESS OTHERWISE SPECIFIED ON THE PLANS. TABLE VALUES, AS SHOWN THIS TABLE, SHALL BE USED IN THOSE SPECIFIED CASES.

GENERAL NOTES

- ALL CONSTRUCTION AND MATERIALS REQUIREMENTS SHALL BE IN ACCORDANCE WITH THE OKC STANDARD SPECIFICATIONS FOR CONSTRUCTION OF PUBLIC IMPROVEMENTS.
- ONLY SILICONE SEALANT MEETING REQUIREMENTS OF THE OKC STANDARD SPECIFICATIONS FOR CONSTRUCTION OF PUBLIC IMPROVEMENTS SHALL BE ACCEPTABLE FOR USE.
- ALL JOINTS SHALL BE CLEANED IN ACCORDANCE WITH THE OKC STANDARD SPECIFICATIONS FOR CONSTRUCTION OF PUBLIC IMPROVEMENTS. WATER FLUSHING AND AIR CLEANING OF JOINT SHALL BE IN ONLY ONE DIRECTION-FORWARD. SANDBLASTING SHALL BE PERFORMED IN TWO PASSES, ONE FOR EACH FACE OF THE JOINT.
- THE SHAPE FACTOR COMBINED WITH JOINT CLEANNESS IS THE CRITICAL COMBINATION NECESSARY TO GUARANTEE DESIRED BONDING AND FUNCTION OF SEALED JOINTS. NO TOLERANCE EXCEPT THOSE SHOWN HERE WILL BE ALLOWED.
- THE JOINT SHAPE FACTOR IS DEFINED AS THE FINAL PRESSED SHAPE OF THE SILICONE MATERIAL. THE TOOLING OPERATION WILL FIRMLY PRESS THE FRESHLY APPLIED MATERIAL INTIMATELY AGAINST THE CUT SIDES OF THE RECESS AND THE BACKER ROD SURFACES. THE ROUNDED SHAPE ON TOP AND BOTTOM OF THE SILICONE ALLOWS THE SEALANT TO PROPERLY FLEX BUT MAINTAIN ADHERANCE TO THE PAVING.
- ON JOINTED PORTLAND CEMENT CONCRETE PAVEMENTS, DOWELED CONTRACTION JOINTS SHALL BE USED ON DRIVING LANES ONLY. CONCRETE SHOULDERS SHALL NOT BE DOWELED UNLESS SPECIFIED ON THE PLANS.
- LONGITUDINAL JOINTS BETWEEN PAVEMENT AND TIED CONCRETE SHOULDERS SHALL NOT BE SAWED OR SEALED UNLESS OTHERWISE SHOWN ON THE PLANS.
- ON ALL SAWED JOINTS, THE KERF DEPTH SHALL CLEAR DOWEL BARS, TIE BARS AND/OR REINFORCING STEEL BY A MINIMUM OF 1/2".
- CONTRACTION JOINTS IN JOINTED P. C. PAVEMENT SHALL BE AT APPROXIMATELY 15'-0" CENTERS, UNLESS OTHERWISE SPECIFIED ON THE PLANS.



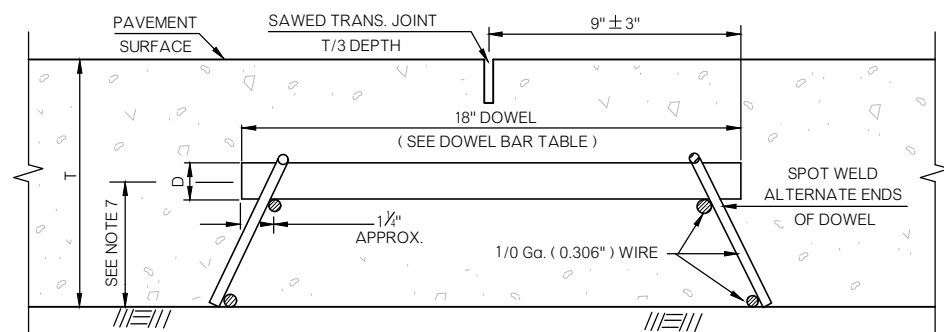
PLAN VIEW



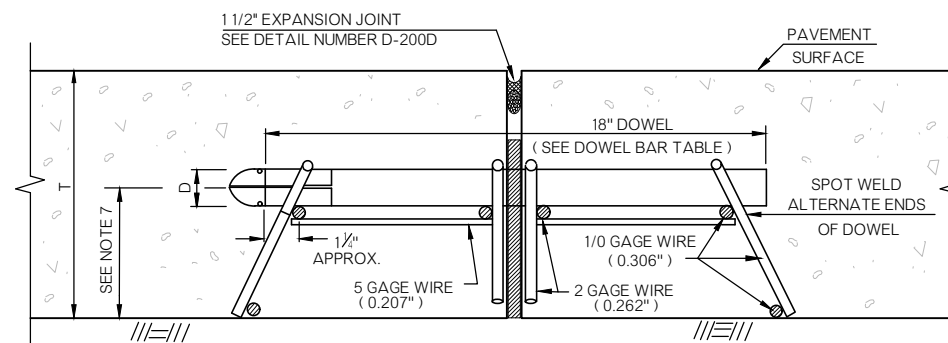
PLAN VIEW

| DOWEL BARS             |                        |                          |                         |
|------------------------|------------------------|--------------------------|-------------------------|
| ▲ SPACING & SIZE DATA  |                        |                          |                         |
| ( T )<br>SLAB<br>DEPTH | ( D )<br>DOWEL<br>DIA. | TOTAL<br>DOWEL<br>LENGTH | C/C<br>DOWEL<br>SPACING |
| 7"-10"                 | 1 1/2"                 | 18"                      | 12"                     |
| 10 1/2"& UP            | 1 1/2"                 | 18"                      | 12"                     |

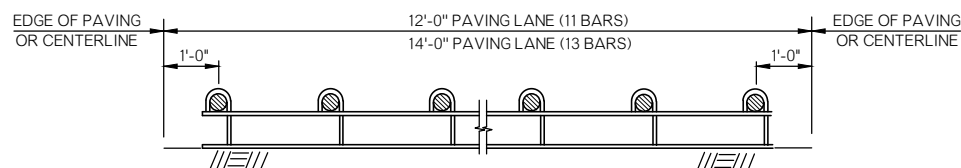
DOWEL DIAMETER WILL BE DETERMINED BY THE SLAB DEPTH ( T ) OR THE NOMINAL DEPTH WHEN SLAB DEPTH VARIES. WHEN NOMINAL DEPTH VALUE IS TO BE USED, THE CALCULATED NOMINAL DEPTH WILL BE SHOWN ON THE PLANS.



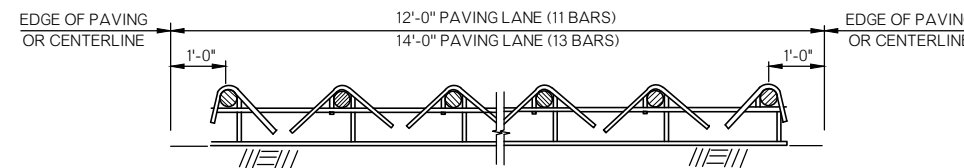
SECTION A-A



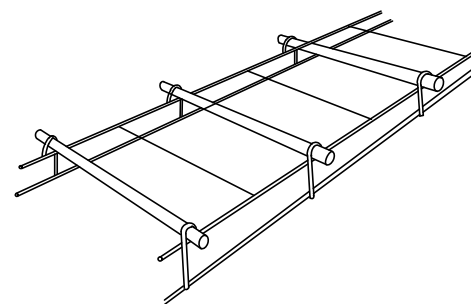
SECTION A-A



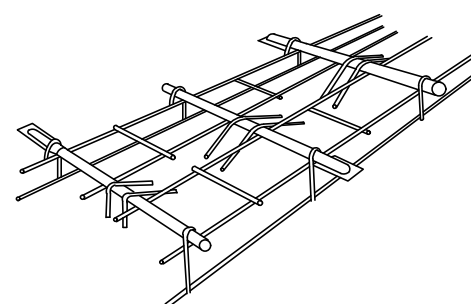
SECTION B-B



SECTION B-B



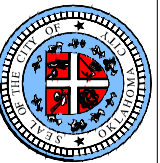
WELDED CONTRACTION JOINT ASSEMBLY



WELDED EXPANSION JOINT ASSEMBLY

GENERAL NOTES

- ALL CONSTRUCTION AND MATERIAL REQUIREMENTS SHALL BE IN ACCORDANCE WITH THE OKC STANDARD SPECIFICATIONS FOR CONSTRUCTION OF PUBLIC IMPROVEMENTS.
- ANY DEVICE USED FOR SUPPORTING DOWELS SHALL HAVE SUFFICIENT RIGIDITY AND BE HELD IN PLACE DURING CONCRETE PLACEMENT SO THAT DOWELS WILL BE IN SPECIFIED POSITION IN THE FINISHED PAVEMENT. ANY DEVICE NOT PRODUCING THE SPECIFIED RESULTS SHALL BE REJECTED.
- PRODUCER AND CONTRACTOR SHALL AVOID PATENT INFRINGEMENT OF THE BASKET AND SHALL SAVE THE CITY HARMLESS IN THE USE OF ANY BASKET.
- THE CONTRACTOR MAY SELECT THE TYPE OF BASKET TO BE USED. AFTER THE SELECTION IS MADE, THE SAME TYPE BASKET SHALL BE USED THROUGHOUT THE PROJECT, UNLESS APPROVED OTHERWISE BY THE ENGINEER.
- COLD-DRAWN STEEL WIRE, USED FOR DOWEL BASKETS, SHALL BE ACCEPTED BY VISUAL FIELD INSPECTION, AS PROVIDING SUFFICIENT DOWEL BAR SUPPORT DURING PAVING PROCESS.
- DOWEL BARS SHALL BE GRADE 60 PLAIN BARS. DOWEL BARS SHALL BE CENTERED ON THE BASKET REGARDLESS OF THE WIDTH OF THE BASKET OR THE LENGTH OF THE DOWEL BAR.
- THE HEIGHT OF THE LOAD TRANSFER UNIT ( MEASURED TO THE CENTER OF THE DOWEL BAR FROM THE PAVEMENT SURFACE ) SHALL BE 1/2 THE THICKNESS OF THE PAVEMENT, PLUS OR MINUS 1/2 THE DIAMETER OF DOWEL BAR OF THE UNIT.
- DOWEL BARS SHALL HAVE A SHOP APPLIED EPOXY COATING OVER THEIR ENTIRE LENGTH ( ENDS EXCEPTED ). ADDITIONALLY, DOWELS SHALL BE COMPLETELY COATED WITH A FORM RELEASE AGENT ( OR APPROVED EQUIVALENT BOND BREAKER ) APPLIED IN THE FIELD, IMMEDIATELY PRIOR TO PAVING. THE FORM RELEASE AGENT SHALL NOT BE ALLOWED TO EVAPORATE FROM THE BARS PRIOR TO PAVING.
- FOR EXPANSION JOINTS, THE DOWEL BARS SHALL HAVE EXPANSION CAPS WITH A MINIMUM 1" AND A MAXIMUM 2" AIR SPACE IN THE END OF THE EXPANSION CAPS ( EXPANSION JOINT ASSEMBLIES ).
- THE CONTRACTOR SHALL DEMONSTRATE TO THE ENGINEER A STAKING PATTERN THAT SHALL SECURE ALL DOWEL BASKETS SUCH THAT THE FINAL DOWEL POSITION IS WITHIN SPECIFICATION LIMITS.
- FOR EXPANSION JOINTS, IN ADDITION TO THE SUPPORTS INDICATED, THE CONTRACTOR SHALL PROVIDE SUITABLE INSTALLING DEVICES AND SUCH ADDITIONAL STAKES AS MAY BE REQUIRED TO HOLD THE JOINT FILLER VERTICAL AND SECURELY IN LINE AND POSITION. THE CONTRACTOR WILL ALSO BE REQUIRED TO SATISFACTORILY FORM THE UPPER PORTION OF THE JOINT FOR RECEIVING THE SEAL. SEE ATTACHED DETAIL NUMBER D-200D.

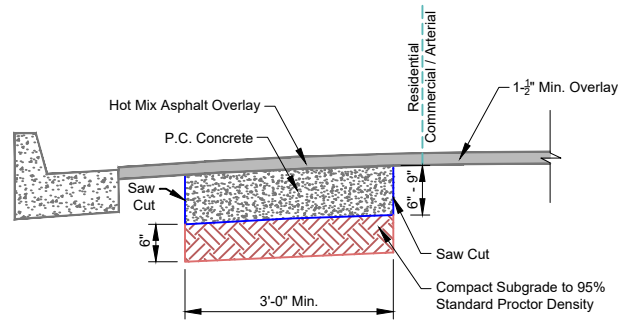


APPROVED BY: \_\_\_\_\_ DATE: \_\_\_\_\_  
ERIC J. WENGER, P.E.  
CITY ENGINEER  
DRAWN: OKC-PW-SRB  
DATE: 2/17/2023

**LOAD TRANSFER UNITS FOR  
CONCRETE PAVEMENT JOINTS  
DETAILS**

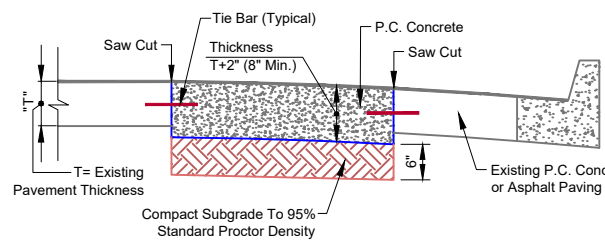


**ACTIVE RESURFACING PROJECTS  
PAVEMENT REPAIR DETAILS  
HOT MIX ASPHALT (HMA) OVERLAY**



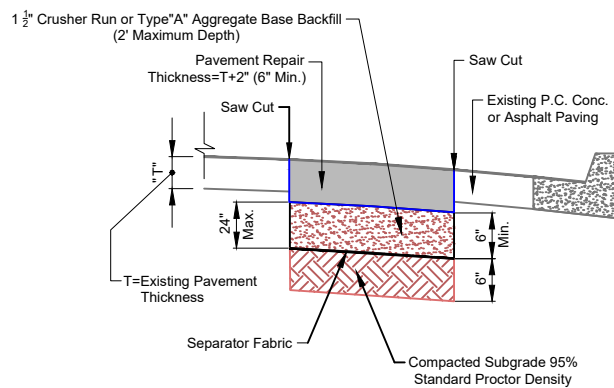
- NOTES:
1. Pavement repairs includes removal of Asphalt or P.C. Concrete Pavement depending on existing conditions, saw cut should be included in price.

**PAVEMENT REPAIR DETAILS**



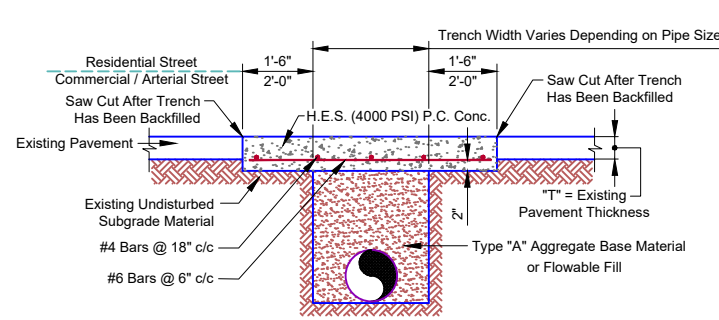
- NOTES:
1. Remove existing concrete paving, to be included in price. Partial panel replacement not permitted, saw cut should be included in price.
  2. When utility trench is the reason for pavement repair, see typical permanent repair section for details on reinforcing steel, backfill material, and trench width, etc.
  3. Tie bars to be 1" dia. deformed bars (1 1/4" dia. for pavement 8" thick and greater) 18" length and spaced at 18" centers. Anchored with epoxy.
  4. For Transverse joints, use smooth bars with same dimensions as shown above. Only One end anchored with epoxy.
  5. Concrete panel to be double sawed 6" apart to protect the pavement edge during excavation.
  6. Use black colored concrete when repairing asphalt paving. Use Soloman Color's Color #920 and apply at 25 lbs per 2 CY of concrete.

**EXISTING ASPHALT OR CONCRETE  
BASE REPAIR DETAIL**



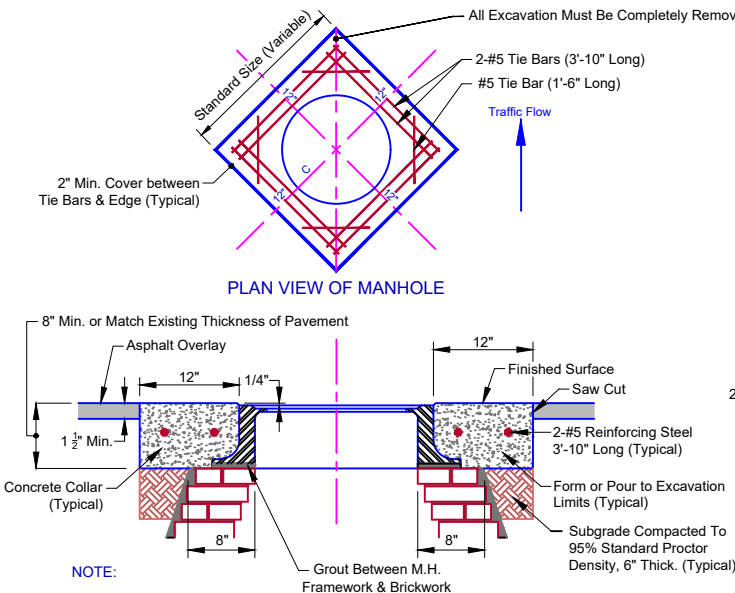
- NOTE:
1. Excavation and aggregate base backfill begins at the bottom of the existing pavement and extends downward to a maximum depth of 2 feet.
  2. The contractor shall not begin the backfill operation until measurement of the excavation has been made and agreed upon by the engineer and the contractor.
  3. Backfill material will be placed in lifts not to exceed six inches (6") and compacted to 95% Standard Proctor Density.
  4. Subgrade compaction saw cut and separator fabric will not be paid for separately. Include cost in price bid for other items of work.
  5. Use black colored concrete when repairing asphalt paving. Use Soloman Color's Color #920 and apply at 25 lbs per 2 CY of concrete.

**UTILITY PAVEMENT CUT AND PERMANENT TRENCH REPAIR  
TYPICAL REPAIR SECTION FOR CITY STREET**



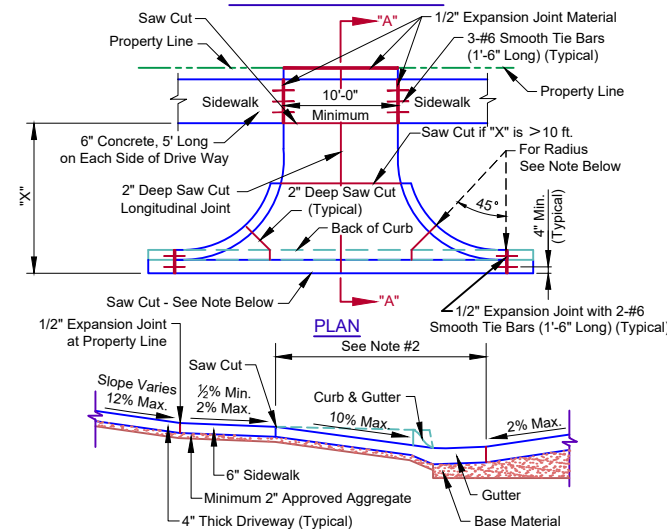
- NOTES:
1. Aggregate base to be compacted 95% Standard Proctor Density in 6" lifts.
  2. The City Engineer may require full P.C. Concrete panel replacement depending on street location and functional classification.
  3. Thickness of repair shall be "T" + 2", but shall not be less than 10 inches.
  4. The cost of saw cut, removal, rebar and placement of compacted back fill to be included in price bid per square yard of repair unless otherwise stated in the contract documents.
  5. Use black colored concrete when repairing asphalt paving. Use Soloman Color's Color #920 and apply at 25 lbs per 2 CY of concrete.

**ADJUSTMENT OF MANHOLE TO GRADE**



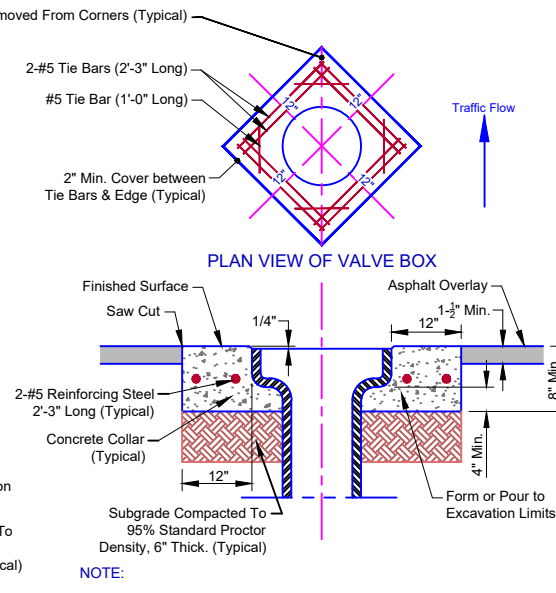
- NOTE:
1. The manhole frame shall be set to grade and concrete collar poured after surfacing operations. Existing ring and lid must be replaced with Deeter Foundry, Inc., shown on drawing number 1197-0110 and 1197-2100 respectively, or approved equal. The top of the ring and lid must match exactly the existing pavement grade, both longitudinally and transversely.
  2. Concrete collar shall be H.E.S. Class AA 4000 PSI P.C. Concrete (3000 PSI in 24 hours). Concrete must be thoroughly vibrated. Contractor must call for inspection for verification of structure & dimensions before placing concrete.
  3. The work shall be protected by barriers and lights meeting MUTCD and shall not be removed for a period of 24 hours after the pour is made.
  4. Subgrade outside the limits of the manhole cone, must be compacted with mechanical compactor such as the "Wacker Packer" before placing concrete. The subgrade must be firm and unyielding.
  5. All excavation at the corners of the concrete collar must be removed so that it is a minimum of 8" thick for the full extent of the collar.
  6. Place one #5 reinforcing steel diagonal at each corner 4" from the edge of the manhole ring.

**DRIVEWAY DETAIL**



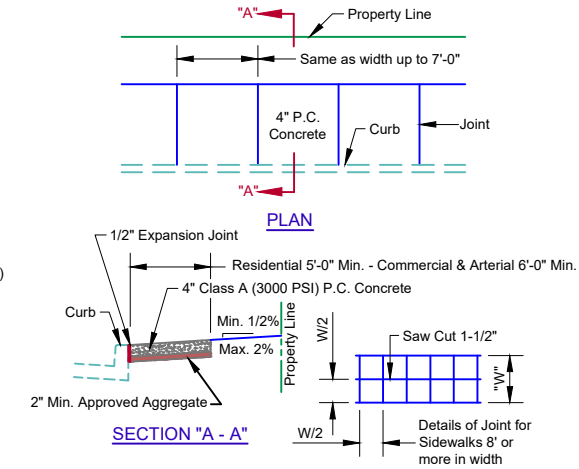
- NOTES:
1. A 5' - 0" minimum radius is approved for one & two family residences not abutting a limited access or major street. All other Driveways will have a 10' - 0" minimum radius.
  2. The Driveway Contractor shall saw cut & remove the complete Curb and Gutter section. Saw cuts shall be 2" or 1/3 the depth of the gutter, whichever is greater, include the top & face of curb as well as the gutter, be made prior to the removal of concrete, and be full depth for removal and 2" or 1/3 the depth for crack control, whichever is greater.
  3. If a gutter holds water prior to any construction by driveway Contractor, he should notify the City Engineer of the situation before doing any work. The completed driveway work will not be accepted if the gutter holds water due to poor construction by the Contractor.
  4. It is recognized that this driveway detail will not cover every possible situation encountered in construction. Additional expansion joints will be required as needed.
  5. Clean and seal all joints and saw cuts in accordance with standard specifications.
  6. Longitudinal and Transverse Joints, required for drives greater than 12' wide. Saw cut 2" or 1/3 depth and fill with silicone sealant.
  7. Do not turn radius in front of adjacent property without written permission from adjacent property owner.
  8. When connecting a new sidewalk to an existing steep driveway, which cannot be made ADA compliant, the transition panel on each side of the driveway shall not be more than 5' in length, unless approved by the engineer.
  9. For a residential or commercial structure located below street level, the high point of the sidewalk where it crosses the driveway shall be at least 6" above the street gutter elevation.

**ADJUSTMENT OF VALVE BOX TO GRADE**



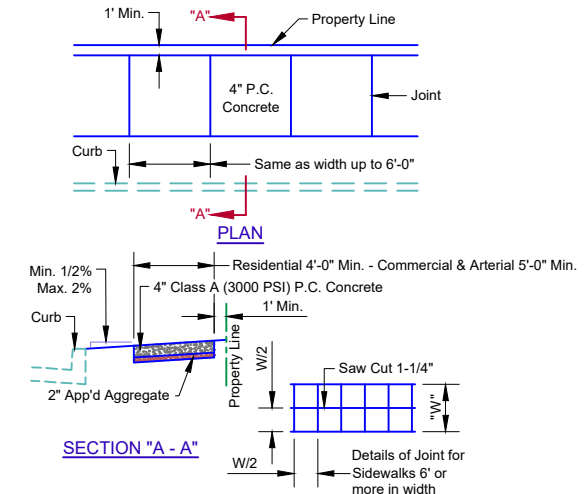
- NOTE:
1. The valve box shall be set to grade and concrete collar poured after resurfacing operations. The top of the valve box must match exactly the existing pavement grade, both longitudinally and transversely.
  2. Concrete base shall be H.E.S. Class AA 4000 PSI P.C. Concrete (3000 PSI in 24 hours). Concrete must be thoroughly vibrated. Contractor must call for inspection for verification of structure & dimensions before placing concrete.
  3. The work shall be protected by barriers and lights meeting MUTCD and shall not be removed for a period of 24 hours after the pour is made.
  4. Subgrade outside the limits of the manhole cone, must be compacted with mechanical compactor such as the "Wacker Packer" before placing concrete. The subgrade must be firm and unyielding.
  5. All excavation at the corners of the concrete collar must be removed so that it is a minimum of 8" thick for the full extent of the collar.
  6. Place one #5 reinforcing steel diagonal at each corner 4" from the edge of the manhole ring.

**DETAILS FOR SIDEWALK  
LOCATED AT CURB**



- NOTES:
1. 1/2" x 4" premolded expansion material around Power Poles or other structures in walk, with at least 36" of clear travel space.
  2. Expansion joints maximum distance = 100', use 1/2" x 4" premolded expansion material.
  3. Transverse contraction joints maximum distance = 5', saw cut or Tool 1 1/4" deep.
  4. Saw cut joints within 24 hours or 12 hours if temperature is above 85°F.
  5. Use 1/2" x 4" premolded expansion joint behind curb or attached to curb.
  6. Medium broom finish (transverse).
  7. Use edger tool on all edges.

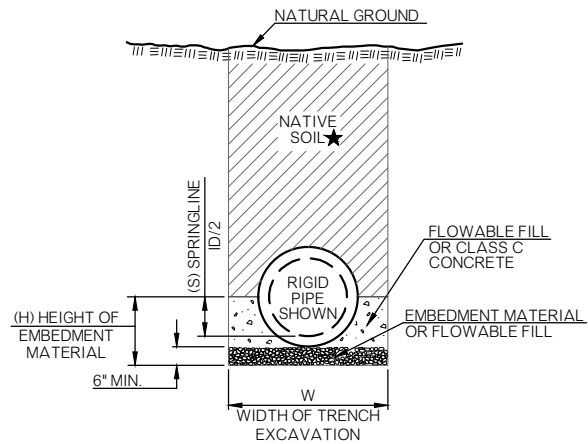
**DETAILS FOR SIDEWALK  
LOCATED AWAY FROM CURB**



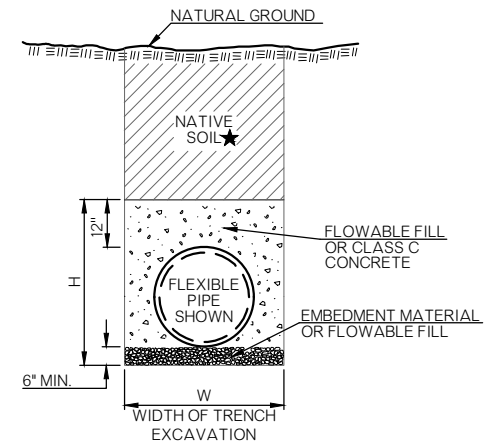
- NOTES:
1. Place 1/2" premolded expansion material around Power Poles or other structures in walk, with at least 36" of clear travel space.
  2. Expansion joints maximum distance = 100', use 1/2" x 4" premolded expansion material.
  3. Transverse contraction joints maximum distance = 5', saw cut or tool 1 1/4" deep.
  4. Saw cut joints within 24 hours or 12 hours if temperature is above 85°F.
  5. Medium broom finish (transverse).
  6. Use edger tool on all edges.



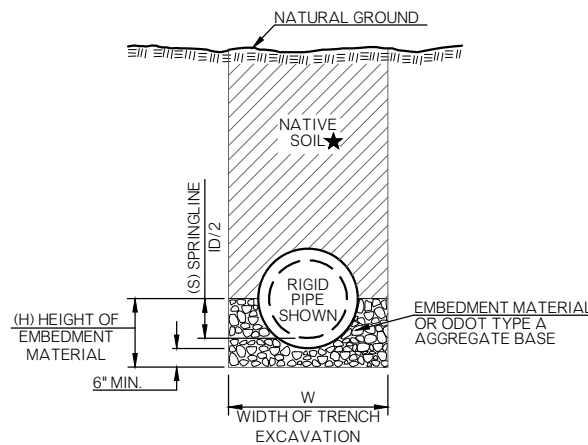
APPROVED BY: \_\_\_\_\_ DATE: \_\_\_\_\_  
ERIC J. WENGER, P.E.  
CITY ENGINEER  
DRAWN: TVN  
DATE: 5-18-22



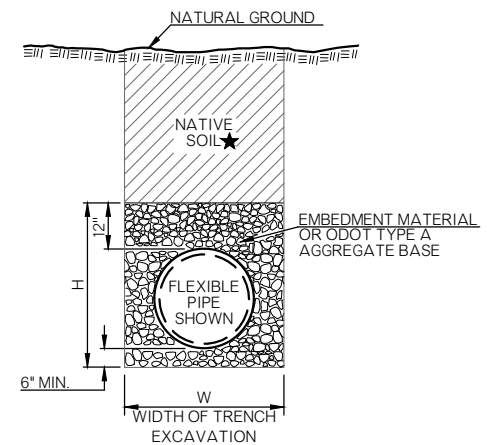
CLASS A BEDDING RIGID PIPES



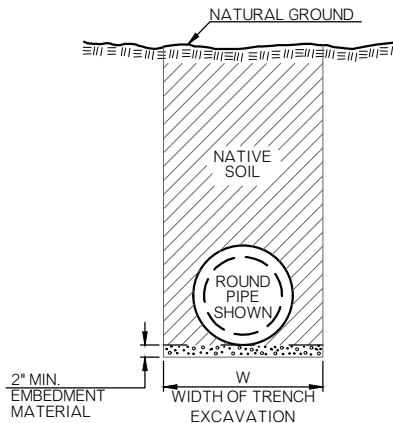
CLASS A BEDDING FLEXIBLE PIPES



CLASS B BEDDING RIGID PIPES

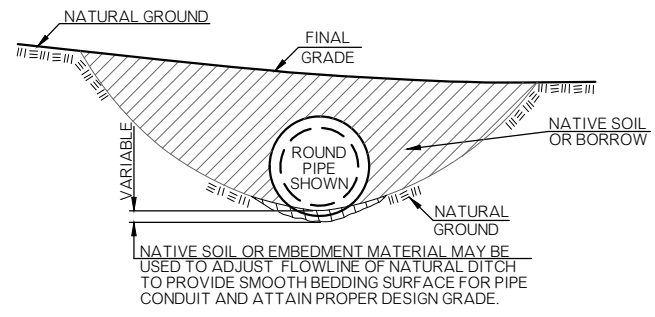


CLASS B BEDDING FLEXIBLE PIPES



CLASS C BEDDING ALTERNATE 1

NOTE: DETAIL THE SAME FOR RIGID & FLEXIBLE PIPES.



CLASS C BEDDING ALTERNATE 2

NOTE: DETAIL THE SAME FOR RIGID & FLEXIBLE PIPES.

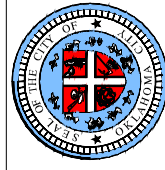
| PIPE BEDDING CLASS/DESIGN TABLE          | ■ UNDER PAVING                      |                       |                                      |                       | OUTSIDE PAVING |            |             |
|--|-------------------------------------|-----------------------|--------------------------------------|-----------------------|----------------|------------|-------------|
|  | CROSS DRAIN (NHS OR ADT > 6000 VPD) | CROSS DRAIN ( OTHER ) | STORM SEWER ( NHS OR ADT > 6000 VPD) | STORM SEWER ( OTHER ) | CROSS DRAIN    | SIDE DRAIN | STORM SEWER |
| REINFORCED CONCRETE PIPE                 | B                                   | B                     | B                                    | B                     | B              | C          | B           |
| CORRUGATED GALV. STEEL PIPE (CGSP)       | NA                                  | B                     | NA                                   | B                     | B              | C          | B           |
| MILL (POLYMER) PRECOATED CGSP            | NA                                  | B                     | NA                                   | B                     | B              | C          | B           |
| CORRUGATED GALV. STRUCT. PLATE           | NA                                  | B                     | NA                                   | B                     | B              | C          | B           |
| ALUMINIZED (ALUMINUM COATED) TYPE II CSP | NA                                  | B                     | NA                                   | B                     | B              | C          | B           |
| CORRUGATED POLYETHYLENE / PVC            | NA                                  | A/B                   | NA                                   | A/B                   | B              | B          | B           |
| POLYVINYL CHLORIDE (SC 40/80 PVC)        | NA                                  | NA                    | NA                                   | NA                    | NA             | NA         | NA          |
| POLYPROPYLENE PIPE (PP) ▲                | B                                   | B                     | B                                    | B                     | B              | C          | B           |

NOTE: CLASS A BEDDING NEEDS APPROVAL BY THE CITY ENGINEER.

- WHEN THERE IS ANY POSSIBILITY OF THE PAVEMENT BEING WIDENED DURING THE LIFE OF THE DRAINAGE STRUCTURE, THE BEDDING SHALL MEET THE 'UNDER PAVING SECTION' CRITERIA FOR THE FULL EXTENT OF ANY ANTICIPATED EXPANSION TO THE FACILITY.
- ▲ BACKFILL WITH A MINIMUM OF TWO (2) FEET OF APPROVED BACKFILL MATERIAL.

GENERAL NOTES

- ALL CONSTRUCTION AND MATERIAL REQUIREMENTS SHALL BE IN ACCORDANCE WITH THE OKLAHOMA STANDARD SPECIFICATIONS FOR CONSTRUCTION OF PUBLIC IMPROVEMENTS.
- NATIVE SOIL FOR BACKFILL TO BE COMPACTED IN ACCORDANCE WITH SECTION 212 OF THE OKC STANDARD SPECIFICATIONS.
- A BETTER CLASS OF BEDDING MAY BY SUBSTITUTED FOR THE NEXT LOWER CLASS. EXAMPLE: CLASS A STANDARD BEDDING CAN BE USED IN LIEU OF CLASS B STANDARD BEDDING.
- FOR TRENCH WIDTH (W), BEDDING HEIGHT (H), PIPE DATA, MULTIPLE PIPE SPACING & BEDDING DATA, SEE ROADWAY STANDARDS D-1001 & D-1002.
- DATA TABLE WILL DISPLAY 'NA' WHEN PIPE MATERIALS ARE NOT ALLOWED.
- STANDARD BEDDING CLASS C MATERIAL(S) ( ALTERNATE 1 ) WILL BE CONSIDERED AS INCIDENTAL AND NOT BE PAID FOR SEPARATELY. COST FOR BORROW OR FILL MATERIAL, NEEDED FOR ALTERNATE 2, WILL BE INCLUDED IN THE PRICE OF THE PIPE.
- PIPE MATERIAL(S)/PRODUCT(S) NOT SHOWN IN THE PIPE BEDDING TABLE WILL BE EVALUATED AND APPROVED ON A CASE BY CASE BASIS.
- ALL TEMPORARY PIPES SHALL HAVE CLASS C BEDDING UNLESS OTHERWISE SHOWN IN THE PLANS.
- BEDDING MATERIAL TYPE B AND C SHALL BE PLACED IN 6" LAYERS AND COMPACTED TO THE SPECIFIED DENSITY USING HAND OPERATED EQUIPMENT ONLY.
- ★ WHEN PIPE INSTALLATION IS UNDER PAVING, IN LIEU OF BACKFILLING WITH NATIVE SOIL, PLACE BEDDING MATERIAL ALL THE WAY TO TOP OF TRENCH.
- THE USE OF AN ALTERNATE PIPE AND ITS CORRESPONDING BEDDING MATERIAL WILL BE ACCEPTABLE PROVIDED THE CRITERIA IN THE DESIGN TABLE IS MET.
- POLYPROPYLENE PIPE SHALL BE INSTALLED IN ACCORDANCE WITH ASTM D2321.



APPROVED BY: \_\_\_\_\_ DATE: \_\_\_\_\_  
 ERIC J. WENGER, P.E. CITY ENGINEER  
 DRAWN: OKC-PW-SRB  
 DATE: 2/17/2023

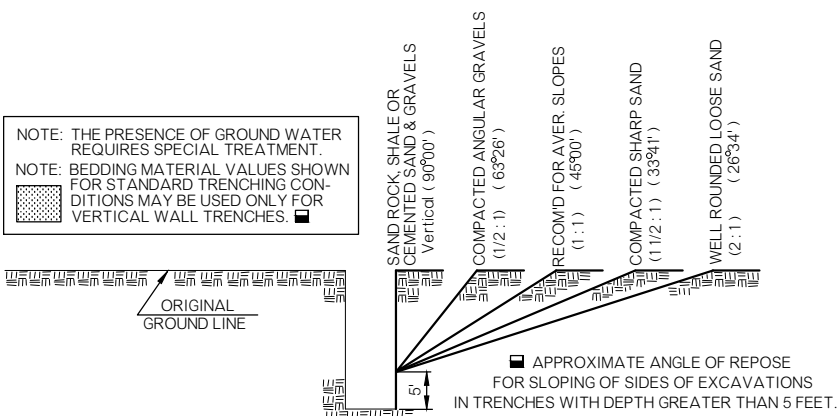
PIPE BEDDING AND BACKFILL

**TABLE OF TRENCHING AND EMBEDMENT MATERIAL QUANTITIES**

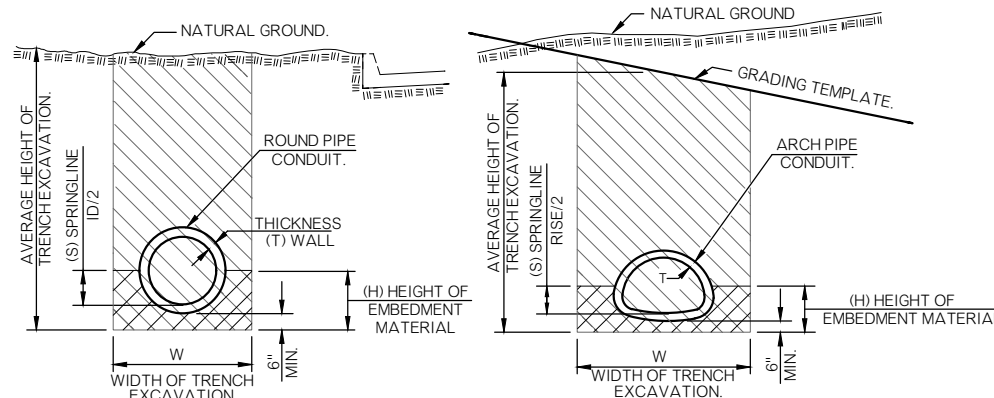
|                  | PIPE DIAM. OR DESIGN EQUIV. | H     |       | T     |       | SINGLE PIPE STANDARD TRENCHING |                              | DOUBLE PIPE STANDARD TRENCHING |                              | TRIPLE PIPE STANDARD TRENCHING |                              | SPECIAL TRENCHING SINGLE, DOUBLE & TRIPLE PIPE OPTIONS W+12" |
|------------------|-----------------------------|-------|-------|-------|-------|--------------------------------|------------------------------|--------------------------------|------------------------------|--------------------------------|------------------------------|--|
|                  |                             | IN.   | FT.   | FT.   | FT.   | W                              | EMBEDMENT MATERIAL C.Y./L.F. | W                              | EMBEDMENT MATERIAL C.Y./L.F. | W                              | EMBEDMENT MATERIAL C.Y./L.F. |  |
| CONCRETE / METAL | 18                          | 1.46  | 0.208 | 3.25  | 0.122 | 5.67                           | 0.199                        | 8.17                           | 0.281                        |                                |                              | 0.054  |
|                  | 24                          | 1.75  | 0.250 | 4.00  | 0.168 | 7.00                           | 0.272                        | 10.00                          | 0.375                        |                                |                              | 0.065  |
|                  | 30                          | 2.04  | 0.292 | 4.50  | 0.202 | 8.33                           | 0.353                        | 12.08                          | 0.499                        |                                |                              | 0.076  |
|                  | 36                          | 2.33  | 0.333 | 5.25  | 0.258 | 10.67                          | 0.531                        | 15.17                          | 0.724                        |                                |                              | 0.086  |
|                  | 42                          | 2.63  | 0.375 | 6.25  | 0.345 | 12.00                          | 0.641                        | 17.25                          | 0.889                        |                                |                              | 0.097  |
|                  | 48                          | 2.92  | 0.417 | 7.00  | 0.416 | 13.33                          | 0.760                        | 19.33                          | 1.069                        |                                |                              | 0.108  |
| ROUND PIPE       | 54                          | 3.21  | 0.458 | 8.00  | 0.524 | 14.67                          | 0.890                        | 21.42                          | 1.265                        |                                |                              | 0.119  |
|                  | 60                          | 3.50  | 0.500 | 9.00  | 0.643 | 17.00                          | 1.157                        | 24.50                          | 1.605                        |                                |                              | 0.130  |
|                  | 66                          | 3.79  | 0.542 | 9.75  | 0.739 | 18.33                          | 1.313                        | 26.58                          | 1.842                        |                                |                              | 0.140  |
|                  | 18                          | 1.27  | 0.208 | 3.25  | 0.099 | 6.33                           | 0.190                        | 9.17                           | 0.269                        |                                |                              | 0.047  |
|                  | 24                          | 1.50  | 0.250 | 4.00  | 0.130 | 7.75                           | 0.245                        | 11.13                          | 0.341                        |                                |                              | 0.056  |
|                  | 30                          | 1.73  | 0.292 | 4.50  | 0.145 | 10.13                          | 0.363                        | 14.16                          | 0.478                        |                                |                              | 0.064  |
| ARCH PIPE        | 36                          | 1.94  | 0.333 | 5.25  | 0.177 | 11.67                          | 0.437                        | 16.53                          | 0.586                        |                                |                              | 0.072  |
|                  | 42                          | 2.18  | 0.375 | 6.25  | 0.232 | 13.17                          | 0.518                        | 18.83                          | 0.703                        |                                |                              | 0.081  |
|                  | 48                          | 2.42  | 0.417 | 7.00  | 0.272 | 15.71                          | 0.697                        | 22.21                          | 0.924                        |                                |                              | 0.090  |
|                  | 54                          | 2.63  | 0.458 | 8.00  | 0.342 | 17.05                          | 0.786                        | 24.28                          | 1.053                        |                                |                              | 0.097  |
|                  | 60                          | 2.88  | 0.500 | 9.00  | 0.413 | 18.69                          | 0.900                        | 26.81                          | 1.219                        |                                |                              | 0.106  |
|                  | ELLIPTICAL PIPE             | 18    | 1.31  | 0.229 | 3.25  | 0.100                          | 6.54                         | 0.202                          | 9.46                         | 0.286                          |                              |  |
| 24               |                             | 1.56  | 0.271 | 4.00  | 0.135 | 8.04                           | 0.271                        | 11.54                          | 0.377                        |                                |                              | 0.058  |
| 30               |                             | 1.81  | 0.313 | 4.50  | 0.153 | 10.51                          | 0.407                        | 14.74                          | 0.542                        |                                |                              | 0.067  |
| 36               |                             | 2.08  | 0.375 | 5.25  | 0.191 | 12.00                          | 0.499                        | 17.00                          | 0.671                        |                                |                              | 0.077  |
| 42               |                             | 2.33  | 0.417 | 6.25  | 0.251 | 13.64                          | 0.601                        | 19.53                          | 0.822                        |                                |                              | 0.086  |
| 48               |                             | 2.54  | 0.458 | 7.00  | 0.297 | 16.08                          | 0.789                        | 22.75                          | 1.054                        |                                |                              | 0.094  |
| 54               | 2.79                        | 0.500 | 8.00  | 0.369 | 17.72 | 0.915                          | 25.28                        | 1.239                          |                              |                                | 0.103                        |  |
| 60               | 3.04                        | 0.542 | 9.00  | 0.448 | 19.36 | 1.050                          | 27.81                        | 1.436                          |                              |                                | 0.113                        |  |
| 66               | 3.29                        | 0.583 | 9.75  | 0.512 | 20.81 | 1.183                          | 30.03                        | 1.630                          |                              |                                | 0.122                        |  |

NOTE: TRENCH WIDTHS BASED UPON MINIMUM VALUES PER OKC SPEC 212. TO CALCULATE ADDITIONAL EMBEDMENT MATERIAL, MULTIPLY THE ADDITIONAL WIDTH (FT) BY THE CORRESPONDING HEIGHT (FT) AND DIVIDE BY 27 TO FIND THE ADDITIONAL CY/LF VALUES.

NOTE: BEDDING MATERIAL VALUES SHOWN FOR STANDARD TRENCHING CONDITIONS MAY BE USED ONLY FOR VERTICAL WALL TRENCHES.

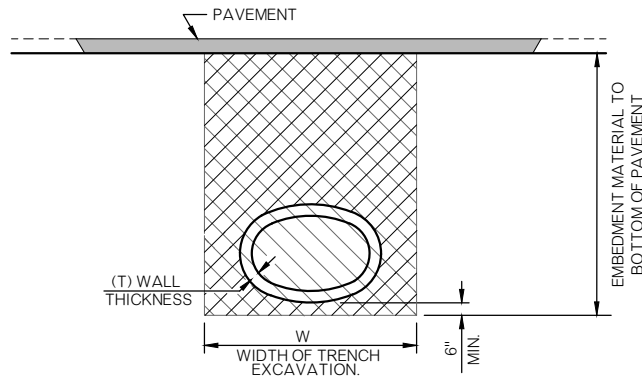


TRENCH EXCAVATION IN CUT SECTIONS

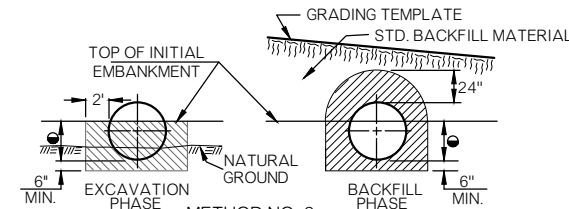


TRENCH EXCAVATION IN EMBANKMENT SECTIONS

LIMITS OF EMBEDMENT MATERIAL. QUANTITIES FOR BEDDING MATERIAL DO NOT INCLUDE THE SPACE WITHIN AND BOUNDED BY THE OUTER SURFACE OF THE PIPE CONDUIT. LIMITS OF TRENCH EXCAVATION.

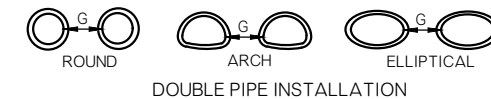


TRENCH EXCAVATION UNDER PAVEMENT



METHOD NO. 2 (OPTIONAL INSTALLATION FOR R. C. PIPE) TRENCH EXCAVATION IN EMBANKMENT SECTIONS  
 • EMBANKMENT HEIGHT PRIOR TO EXCAVATION  
 PIPE SIZES FROM 18" TO 42" = 30"  
 PIPE SIZES FROM 48" TO 84" = 2/3 DIAM.  
 METHOD NO. 1 PAY QUANTITIES WILL BE CALCULATED AND PAID FOR WHEN METHOD NO. 2 IS USED.

| FOR DIAM. OR SPAN | CONDUIT SHAPE |             |            | DIST. G |
|-------------------|---------------|-------------|------------|---------|
|                   | ROUND         | ARCH        | ELLIPTICAL |         |
| UP TO 24"         | UP TO 36"     | UP TO 36"   |            | 12"     |
| 25" TO 72"        |               |             |            | D/2"    |
|                   | 37" TO 108"   | 37" TO 108" |            | D/3"    |
| OVER 73"          | OVER 108"     | OVER 108"   |            | 36"     |

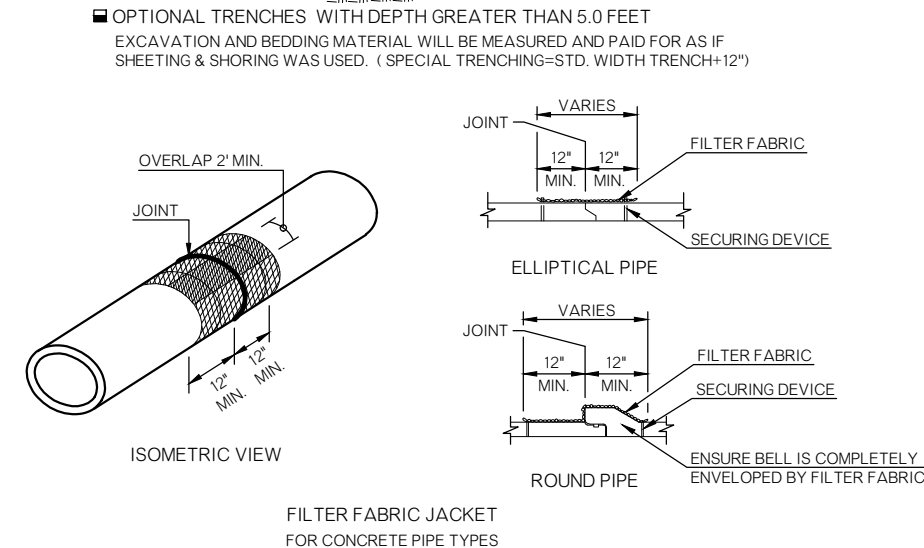


GENERAL NOTES

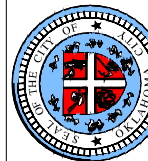
- ALL CONSTRUCTION AND MATERIAL REQUIREMENTS SHALL CONFORM TO THE OKC STANDARD SPECIFICATION FOR CONSTRUCTION OF PUBLIC IMPROVEMENTS.
- TRENCH EXCAVATION AND BEDDING MATERIAL WILL NOT BE REQUIRED FOR PIPE INSTALLATIONS OF SIDE DRAINS UNLESS OTHERWISE NOTED ON THE PLANS.
- SPECIAL TRENCHING CONDITIONS ARE THOSE AS DEFINED BY O.S.H.A. REGULATIONS, TITLE 29 CFR CHAPTER XVII, PART 1926.650, 1926.651 & 1926.652, SO DEFINED WILL APPLY UNTIL THEY ARE IN CONFLICT WITH CURRENT SPECIFICATIONS. FOR TRENCH DEPTHS OVER FIVE FEET, WHERE O.S.H.A. REGULATIONS FOR SPECIAL TRENCHING ARE APPLIED, QUANTITIES AND DIMENSIONS FOR SPECIAL TRENCHING WILL BE USED FOR COMPUTING QUANTITIES. SEE TABLE OF TRENCHING DIMENSIONS AND EMBEDMENT MATERIAL QUANTITIES.
- NORMAL BACKFILLING OPERATIONS FOR REINFORCED CONCRETE PIPE (RCP) SHALL CONFORM TO THE OKC STANDARD SPECIFICATION (ASTM C1479). IN NO CASE SHALL A PIPE INSTALLATION SUBJECT TO SUDDEN FLOW DEVELOPMENT BE LEFT WITHOUT SUFFICIENT BACKFILL TO RESTRAIN THE CONDUIT MAY BE USED TO AUGMENT OR REPLACE THIS IMMEDIATE BACKFILL REQUIREMENT.
- ANY EXCESS EXCAVATION NOT USED FOR BACKFILL WILL BECOME THE PROPERTY OF THE CONTRACTOR AND DISPOSED OF, BY HIM, IN A MANNER APPROVED BY THE ENGINEER.
- EMBEDMENT QUANTITIES FOR RCP ARE BASED ON ASTM C76 DESIGNATION CLASS III (WALL B).
- THIS METHOD PRODUCES A GUARANTEED NEGATIVE PROJECTION CONDITION. THE ONLY EXCEPTION TO THIS IS FOR INSTALLATION OF SHALLOWLY COVERED SIDE DRAINS OF LESS THAN 10.0 FEET OF DEPTH, INCLUDING SURFACING.
- LIFT THICKNESS AND COMPACTION REQUIREMENTS SHALL CONFORM TO THE OKC STANDARD SPECIFICATIONS. PER OKC SPEC 215, EMBEDMENT MATERIAL SHALL BE COMPACTED IN 6" LIFTS TO A MINIMUM 95% STANDARD PROCTOR DENSITY.
- WHEN REQUIRED, THE SIDES OF THE TRENCHES SHALL BE SHEETED AND SHORED OR OTHERWISE SUPPORTED WHEN THE TRENCH IS MORE THAN 5.0 FEET IN DEPTH. IN LIEU OF SHEETING, THE SIDES OF THE TRENCH ABOVE THE 5.0 FOOT LEVEL MAY BE SLOPED TO PRECLUDE COLLAPSE. SEE OPTIONAL TRENCHES DETAIL THIS SHEET.
- PROPER COMPACTION OF BACKFILL REQUIRES A VERTICAL WALLED TRENCH TO 24 INCHES ABOVE TOP OF PIPE, REGARDLESS OF EXCAVATION ABOVE THAT ELEVATION.
- ELLIPTICAL PIPE DIMENSIONS CONFORM TO AASHTO M 207, AS DESIGNATED RISE BY SPAN.
- EMBEDMENT MATERIAL OR ODOT TYPE A AGGREGATE BASE AS DEFINED AND REQUIRED TO TOP OF TRENCH UNDER PAVEMENT.

| EQ. DIAM. | REINF. CONC. ARCH PIPE | STEEL ARCH PIPE | REINF. CONC. ELLIPTICAL PIPE |
|-----------|------------------------|-----------------|------------------------------|
| IN.       | INCHES                 | INCHES          | INCHES                       |
| 18        | 22 X 13                | 21 X 15         | 14 X 23                      |
| 24        | 28 X 18                | 28 X 20         | 19 X 30                      |
| 27        |                        |                 | 22 X 34                      |
| 30        | 36 X 22                | 35 X 24         | 24 X 38                      |
| 36        | 43 X 26                | 42 X 29         | 29 X 45                      |
| 42        | 51 X 31                | 49 X 33         | 34 X 53                      |
| 48        | 58 X 36                | 57 X 38         | 38 X 60                      |
| 54        | 65 X 40                | 64 X 43         | 43 X 68                      |
| 60        | 73 X 45                | 71 X 47         | 48 X 76                      |
| 66        |                        | 77 X 52         | 53 X 83                      |

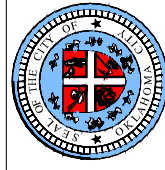
| Sieve Size | Percent Passing |
|------------|-----------------|
| 1 1/2"     | 100%            |
| 3/4"       | 40-100%         |
| 3/8"       | 30-75%          |
| #4         | 25-60%          |
| #10        | 20-43%          |
| #40        | 8-26%           |
| #200       | 4-12%           |



FILTER FABRIC JACKET FOR CONCRETE PIPE TYPES



APPROVED BY: ERIC J. WENGER, P.E. CITY ENGINEER  
 DATE: \_\_\_\_\_  
 DRAWN: OKC-PW-SRB  
 DATE: 2/17/2023



APPROVED BY: \_\_\_\_\_ DATE: \_\_\_\_\_  
ERIC J. WENGER, P.E.  
CITY ENGINEER  
DRAWN: OKC-PW-SRB  
DATE: 2/17/2023

**FLEXIBLE PIPE INSTALLATION  
DETAILS**

Detail Number  
D-1002

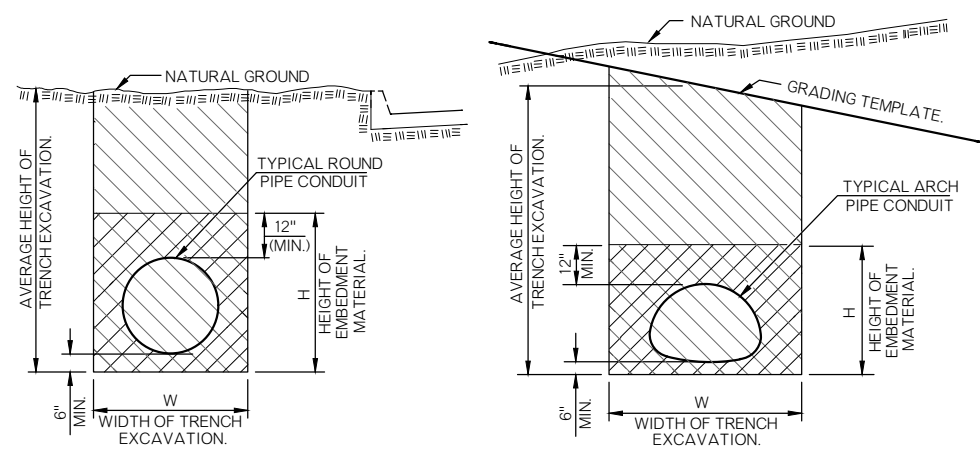
**TABLE OF TRENCHING AND  
EMBEDMENT MATERIAL QUANTITIES**

|                 | PIPE<br>DIAM.<br>OR<br>DESIGN<br>EQUIV. | H    | SINGLE PIPE<br>INSTALLATION |                       | DOUBLE PIPE<br>INSTALLATION |                       | TRIPLE PIPE<br>INSTALLATION |                       | CLEAR<br>SPACE<br>BETWEEN<br>PIPES |
|-----------------|---|------|-----------------------------|-----------------------|-----------------------------|-----------------------|-----------------------------|-----------------------|------------------------------------|
|                 |   |      | W                           | EMBEDMENT<br>MATERIAL | W                           | EMBEDMENT<br>MATERIAL | W                           | EMBEDMENT<br>MATERIAL |                                    |
|                 | IN.                                     | FT.  | FT.                         | C.Y./L.F.             | FT.                         | C.Y./L.F.             | FT.                         | C.Y./L.F.             | INCHES                             |
| ROUND PIPE      | 18                                      | 3.17 | 3.25                        | 0.30                  | 6.10                        | 0.55                  | 9.00                        | 0.81                  | 14                                 |
|                 | 24                                      | 3.67 | 4.00                        | 0.41                  | 7.70                        | 0.77                  | 11.40                       | 1.14                  | 17                                 |
|                 | 30                                      | 4.25 | 4.50                        | 0.49                  | 9.30                        | 1.02                  | 13.80                       | 1.51                  | 20                                 |
|                 | 36                                      | 4.75 | 5.25                        | 0.62                  | 10.80                       | 1.29                  | 16.20                       | 1.93                  | 23                                 |
|                 | 42                                      | 5.25 | 6.25                        | 0.81                  | 13.20                       | 1.75                  | 19.30                       | 2.53                  | 26                                 |
|                 | 48                                      | 5.75 | 7.00                        | 0.97                  | 14.75                       | 2.09                  | 21.70                       | 3.05                  | 29                                 |
| METAL ARCH PIPE | 54                                      | 6.25 | 8.00                        | 1.20                  | 15.30                       | 2.23                  | 22.70                       | 3.29                  | 32                                 |
|                 | 60                                      | 6.75 | 9.00                        | 1.45                  | 17.60                       | 2.80                  | 25.90                       | 4.07                  | 35                                 |
|                 | 66                                      | 7.25 | 9.75                        | 1.66                  | 18.80                       | 3.12                  | 27.70                       | 4.55                  | 38                                 |
|                 | 18                                      | 2.97 | 3.25                        | 0.30                  | 6.20                        | 0.56                  | 9.20                        | 0.84                  | 14                                 |
|                 | 24                                      | 3.39 | 4.00                        | 0.41                  | 7.83                        | 0.81                  | 11.67                       | 1.20                  | 17                                 |
|                 | 30                                      | 3.72 | 4.50                        | 0.45                  | 10.20                       | 1.07                  | 14.87                       | 1.55                  | 20                                 |
|                 | 36                                      | 4.14 | 5.25                        | 0.56                  | 11.75                       | 1.32                  | 17.25                       | 1.92                  | 23                                 |
|                 | 42                                      | 4.47 | 6.25                        | 0.71                  | 13.33                       | 1.55                  | 19.66                       | 2.27                  | 26                                 |
|                 | 48                                      | 4.89 | 7.00                        | 0.84                  | 15.35                       | 1.92                  | 22.60                       | 2.80                  | 29                                 |
|                 | 54                                      | 5.31 | 8.00                        | 1.03                  | 17.58                       | 2.37                  | 25.66                       | 3.41                  | 32                                 |
| 60              | 5.64                                    | 9.00 | 1.21                        | 18.92                 | 2.61                        | 27.84                 | 3.80                        | 35                    |                                    |
| 66              | 6.06                                    | 9.75 | 1.38                        | 20.65                 | 3.01                        | 30.40                 | 4.39                        | 38                    |                                    |

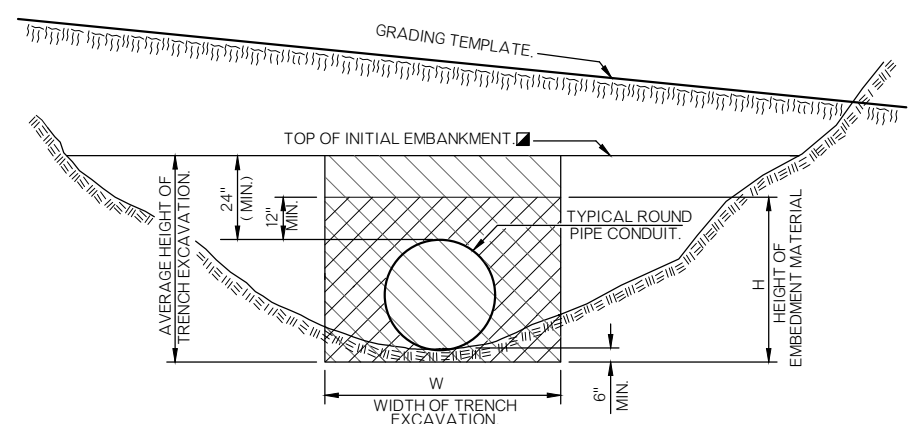
NOTE: TRENCH WIDTHS BASED UPON MINIMUM VALUES PER OKC SPEC 212. TO CALCULATE ADDITIONAL EMBEDMENT MATERIAL, MULTIPLY THE ADDITIONAL WIDTH (FT) BY THE CORRESPONDING HEIGHT (FT) AND DIVIDE BY 27 TO FIND THE ADDITIONAL CY/LF VALUES.

**TABLE OF FILL HEIGHTS**

| PIPE SIZE ( IN. ) | MINIMUM COVER OVER TOP OF PIPE (BUOYANCY) ( IN. ) | MAXIMUM COVER ( FT. ) |                |
|-------------------|---|-----------------------|----------------|
|                   |   | POLYETHYLENE          | UNDER PAVEMENT |
| 18                | 15  | 10                    | 14             |
| 24                | 20  | 10                    | 14             |
| 30                | 25  | 10                    | 14             |
| 36                | 30  | 10                    | 14             |
| 42                | 35  | 10                    | 12             |
| 48                | 40  | 10                    | 12             |
| 54                | 45  | N/A                   | 12             |
| 60                | 50  | N/A                   | 10             |
| 66                | 55  | N/A                   | 10             |

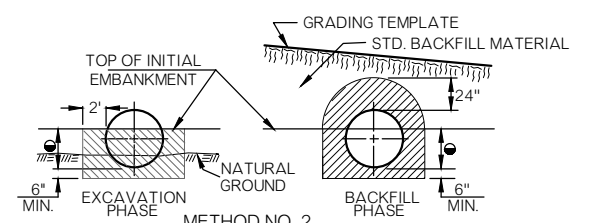


TRENCH EXCAVATION IN CUT SECTIONS



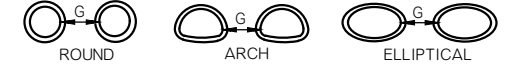
TRENCH EXCAVATION IN EMBANKMENT SECTIONS

- ☑ TO BE COMPACTED IN ACCORDANCE WITH THE OKC STANDARD SPECIFICATIONS FOR CONSTRUCTION OF PUBLIC IMPROVEMENTS.
- LIMITS OF EMBEDMENT MATERIAL. QUANTITIES FOR BEDDING MATERIAL DO NOT INCLUDE THE SPACE WITHIN AND BOUNDED BY THE OUTER SURFACE OF THE PIPE CONDUIT.
- LIMITS OF TRENCH EXCAVATION.



METHOD NO. 2  
(OPTIONAL INSTALLATION FOR R. C. PIPE)  
TRENCH EXCAVATION IN EMBANKMENT SECTIONS  
● EMBANKMENT HEIGHT PRIOR TO EXCAVATION  
● PIPE SIZES FROM 18" TO 42" = 30"  
● PIPE SIZES FROM 48" TO 84" = 2/3 DIAM.  
METHOD NO. 1 PAY QUANTITIES WILL BE CALCULATED AND PAID FOR WHEN METHOD NO. 2 IS USED.

| FOR<br>DIAM.<br>OR<br>SPAN | CONDUIT SHAPE |             |            | DIST.<br>G |
|----------------------------|---------------|-------------|------------|------------|
|                            | ROUND         | ARCH        | ELLIPTICAL |            |
| UP TO 24"                  | UP TO 36"     | UP TO 36"   | 12"        |            |
| 25" TO 72"                 | 37" TO 108"   | 37" TO 108" | D/2"       |            |
| OVER 73"                   | OVER 108"     | OVER 108"   | D/3"       |            |



**GENERAL NOTES**

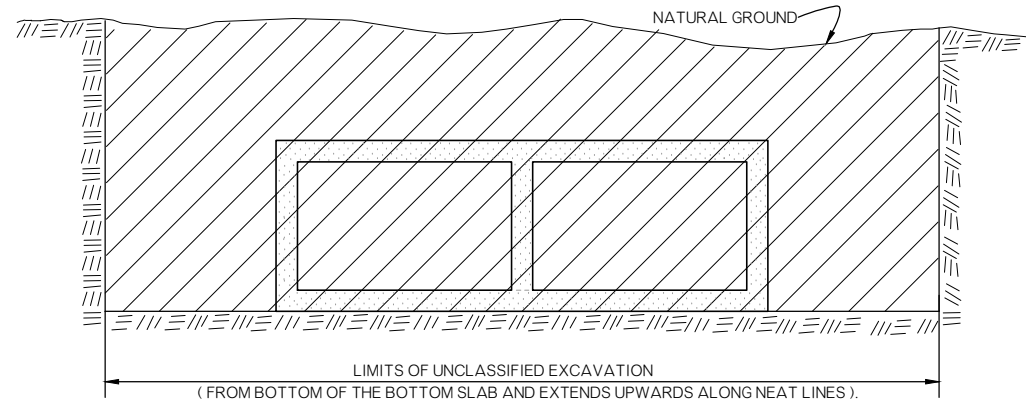
1. ALL CONSTRUCTION AND MATERIAL REQUIREMENTS SHALL BE IN ACCORDANCE WITH THE OKC STANDARD SPECIFICATIONS FOR CONSTRUCTION OF PUBLIC IMPROVEMENTS.
2. TRENCH EXCAVATION & EMBEDMENT MATERIAL WILL NOT BE REQUIRED FOR PIPE INSTALLATIONS ON SIDE DRAINS UNLESS OTHERWISE SPECIFIED ON THE PLANS.
3. TRENCH EXCAVATION WILL BE PAID FOR ON PIPE UNDERDRAIN. SEE DETAIL NUMBER D-1004.
4. TRENCHING REQUIREMENTS FOR DEPTHS OVER 5 FEET SHALL BE IN ACCORDANCE WITH, & DEFINED BY, O.S.H.A. REGS., TITLE 29 CFR, STANDARDS 1926.650, 1926.651 & 1926.652.
5. NORMAL BACKFILLING OPERATIONS FOR FLEXIBLE SHALL CONFORM TO THE OKC STANDARD SPECIFICATION (ASTM D2321-THERMOPLASTICS, AASHTO SECTION 26 CORRUGATED STEEL PIPE). IN NO CASE SHALL A PIPE INSTALLATION SUBJECT TO SUDDEN FLOW DEVELOPMENT BE LEFT WITHOUT SUFFICIENT BACKFILL TO RESTRAIN THE CONDUIT AND PREVENT JOINT SEPARATION AND/OR PIPING SCOUR. PHYSICALLY RESTRAINING THE CONDUIT MAY BE USED TO AUGMENT OR REPLACE THIS IMMEDIATE BACKFILL REQUIREMENT.
6. ANY EXCESS EXCAVATION NOT USED FOR BACKFILL WILL BECOME THE PROPERTY OF THE CONTRACTOR AND DISPOSED OF, BY HIM, IN A MANNER APPROVED BY THE ENGINEER.
7. INSTALLATION OF THERMOPLASTIC AND CORRUGATED STEEL PIPE SHALL CONFORM TO ASTM D2321 AND AASHTO SECTION 26, RESPECTIVELY. ALL FLEXIBLE PIPE INSTALLATIONS SHALL CONFORM TO THE OKC STANDARD SPECIFICATION.
- ☑ 8. LIFT THICKNESS AND COMPACTION REQUIREMENTS SHALL CONFORM TO OKC STANDARD SPECIFICATIONS. PER OKC SPEC 215, EMBEDMENT MATERIAL SHALL BE COMPACTED IN 6" LIFTS TO A MINIMUM 95% STANDARD PROCTOR DENSITY.
9. JOINTS IN METAL PIPES SHALL CONFORM TO SECTION 26.4.2.4 OF AASHTO STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES. IF A WATERTIGHT JOINT IS SPECIFIED ON THE PLANS, A 12" WIDE BY 3/4" THICK NEOPRENE SLEEVE GASKET MEETING ASTM D-1056 REQUIREMENT SHALL BE USED.
- ☑ 10. EMBEDMENT MATERIAL QUANTITIES ARE BASED ON THE TRENCH WIDTH ( W ), TRENCH HEIGHT ( H ) AND EFFECTIVE DIAMETER ( D ) OF ROUND CORRUGATED POLYETHYLENE PIPE MEETING THE REQUIREMENTS OF AASHTO M 294 ( 18"-60" ).
11. EMBEDMENT MATERIAL OR ODOT TYPE A AGGREGATE BASE AS DEFINED AND REQUIRED TO TOP OF TRENCH UNDER PAVEMENT.

**TABLE OF EQUIVALENT PIPES**

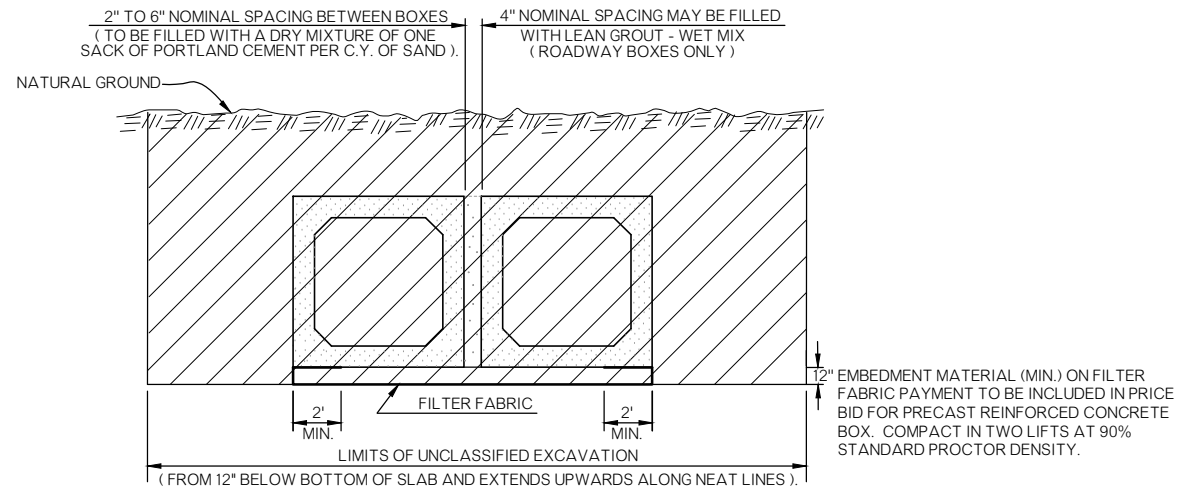
| EQ. DIAM. | REINF. CONC. ARCH PIPE | STEEL ARCH PIPE | REINF. CONC. ELLIPTICAL PIPE |
|-----------|------------------------|-----------------|------------------------------|
|           | INCHES                 | INCHES          | INCHES                       |
| 18        | 22 X 13                | 21 X 15         | 14 X 23                      |
| 24        | 28 X 18                | 28 X 20         | 19 X 30                      |
| 27        |                        |                 | 22 X 34                      |
| 30        | 36 X 22                | 35 X 24         | 24 X 38                      |
| 36        | 43 X 26                | 42 X 29         | 29 X 45                      |
| 42        | 51 X 31                | 49 X 33         | 34 X 53                      |
| 48        | 58 X 36                | 57 X 38         | 38 X 60                      |
| 54        | 65 X 40                | 64 X 43         | 43 X 68                      |
| 60        | 73 X 45                | 71 X 47         | 48 X 76                      |
| 66        |                        | 77 X 52         | 53 X 83                      |

**CLASS B EMBEDMENT  
MATERIAL GRADATION**

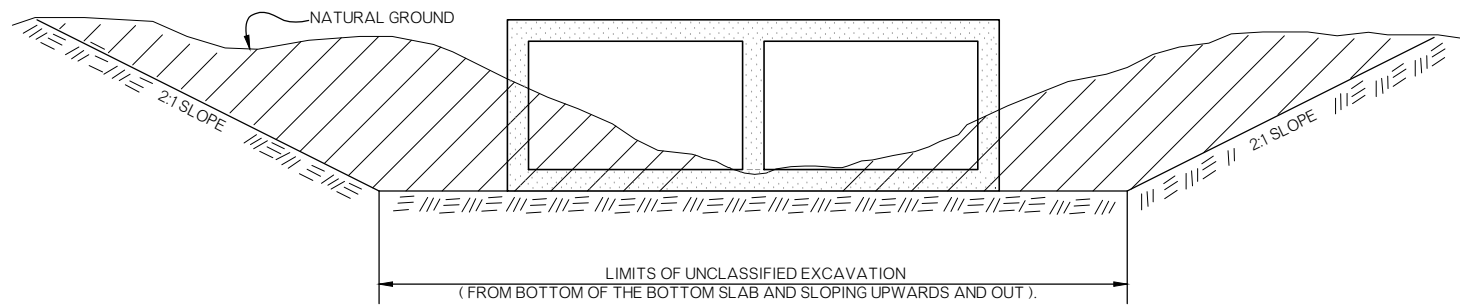
| Sieve Size | Percent Passing |
|------------|-----------------|
| 1 1/2"     | 100%            |
| 3/4"       | 40-100%         |
| 3/8"       | 30-75%          |
| #4         | 25-60%          |
| #10        | 20-43%          |
| #40        | 8-26%           |
| #200       | 4-12%           |



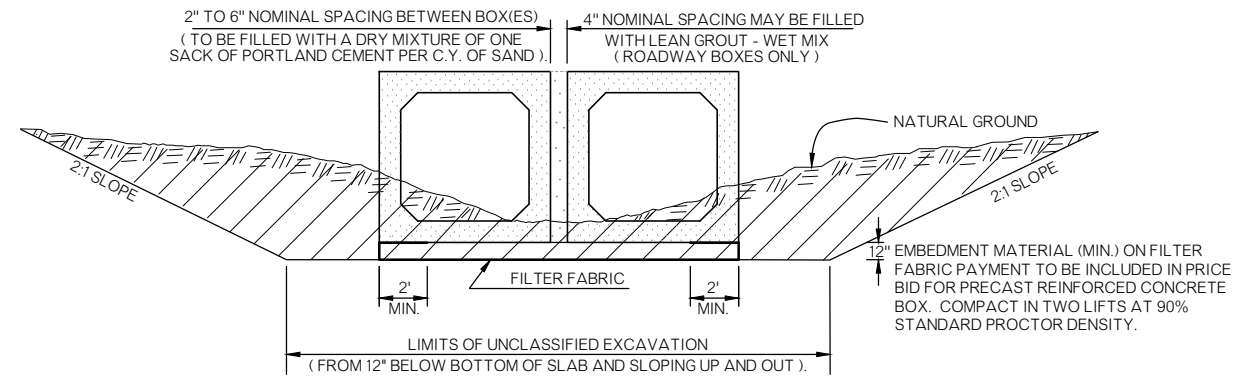
REQUIREMENTS FOR UNCLASSIFIED EXCAVATION OF R.C.B. STORM SEWERS



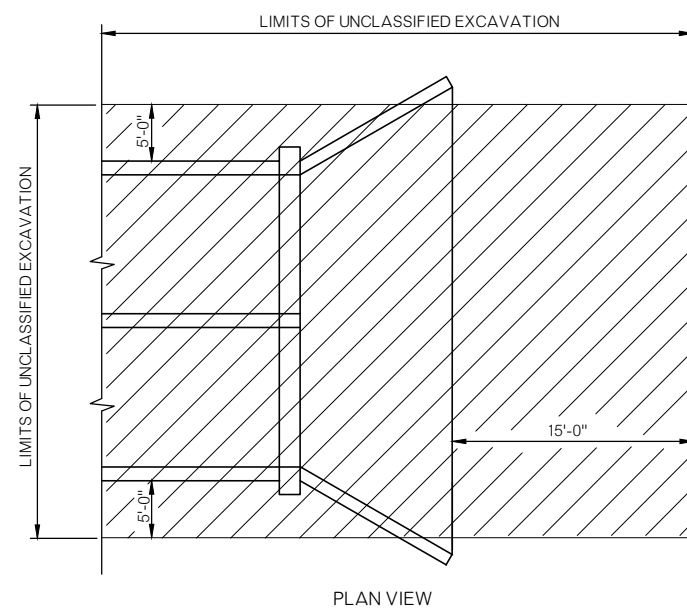
REQUIREMENTS FOR EXCAVATION OF PRECAST R.C.B. STORM SEWERS



REQUIREMENTS FOR UNCLASSIFIED EXCAVATION OF R.C.B. CULVERTS OF ROADWAY AND BRIDGE CLASSIFICATION

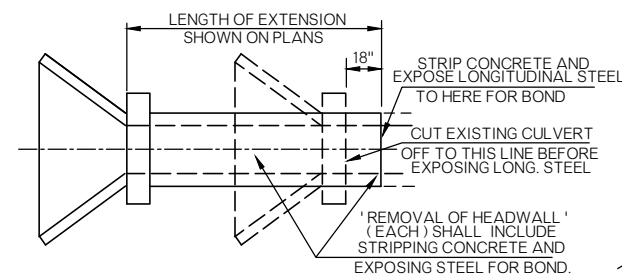


REQUIREMENTS FOR EXCAVATION OF PRECAST R.C.B. CULVERTS OF ROADWAY AND BRIDGE CLASSIFICATION.

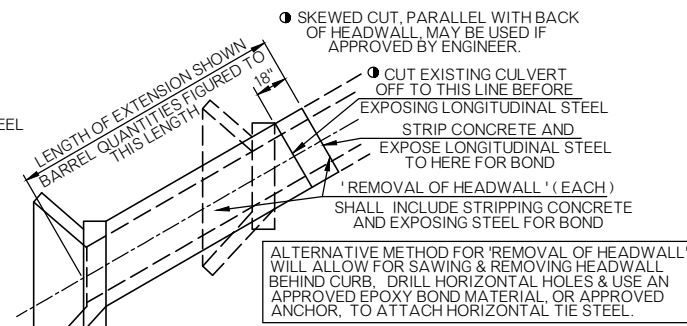


PLAN VIEW

LIMITS OF UNCLASSIFIED EXCAVATION



ALTERNATE METHOD FOR EXTENDING 0° SKEWED BOXES

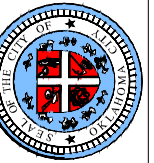


ALTERNATE METHOD FOR EXTENDING NON-0° SKEWED BOXES

EMBEDMENT MATERIAL GRADATION

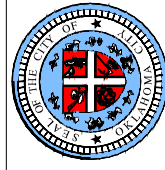
| Sieve Size | Percent Passing |
|------------|-----------------|
| 1 1/2"     | 100%            |
| 3/4"       | 40-100%         |
| 3/8"       | 30-75%          |
| #4         | 25-60%          |
| #10        | 20-43%          |
| #40        | 8-26%           |
| #200       | 4-12%           |

ALL CONSTRUCTION AND MATERIAL REQUIREMENTS SHALL CONFORM TO THE OKC STANDARD SPECIFICATION FOR CONSTRUCTION OF PUBLIC IMPROVEMENTS.  
\*THE INSTALLATION OF REINFORCED BOX CULVERTS SHALL CONFORM TO OKC STANDARD SPECIFICATION AND ASTM C1675.



APPROVED BY: \_\_\_\_\_ DATE: \_\_\_\_\_  
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CITY ENGINEER  
DRAWN: OKC-PW-SRB  
DATE: 2/17/2023

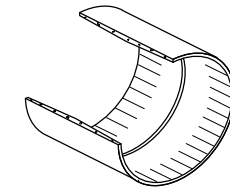
**REINFORCED CONCRETE BOX  
INSTALLATION DETAILS**



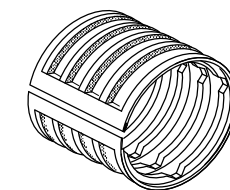
APPROVED BY: \_\_\_\_\_ DATE: \_\_\_\_\_  
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CITY ENGINEER  
DRAWN: OKC-PW-SRB  
DATE: 2/17/2023

**PIPE UNDERDRAIN INSTALLATION  
DETAILS**

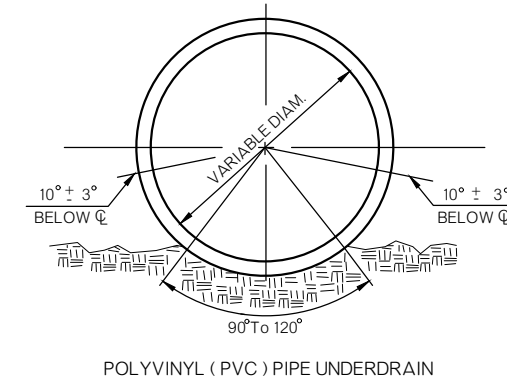
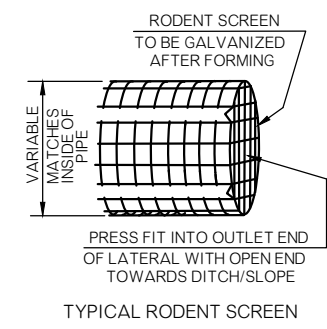
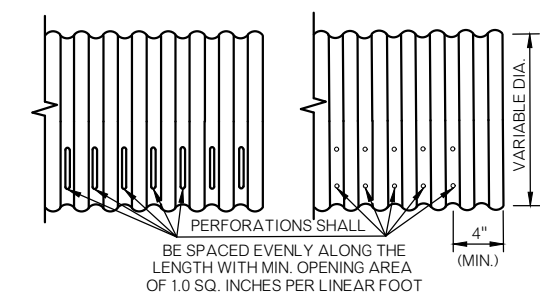
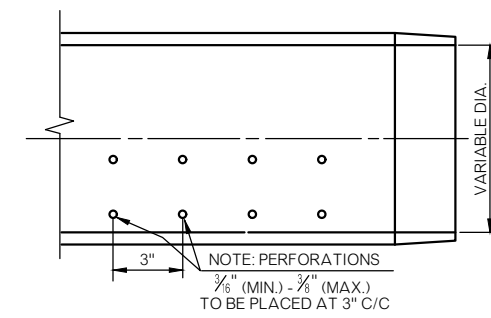
Detail Number  
D-1004



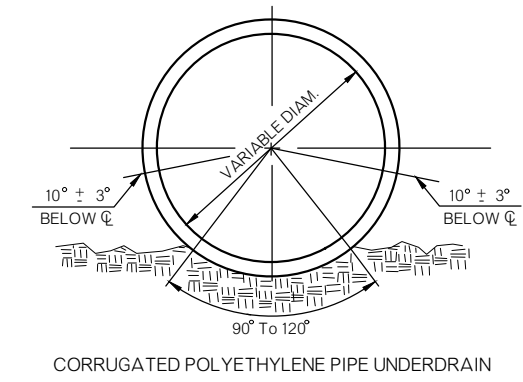
TYPICAL COUPLING FOR  
PVC PIPE UNDERDRAIN  
1/4 SECTION REMOVED



TYPICAL CORRUGATED COUPLING  
OR AN APPROVED EQUAL



POLYVINYL (PVC) PIPE UNDERDRAIN

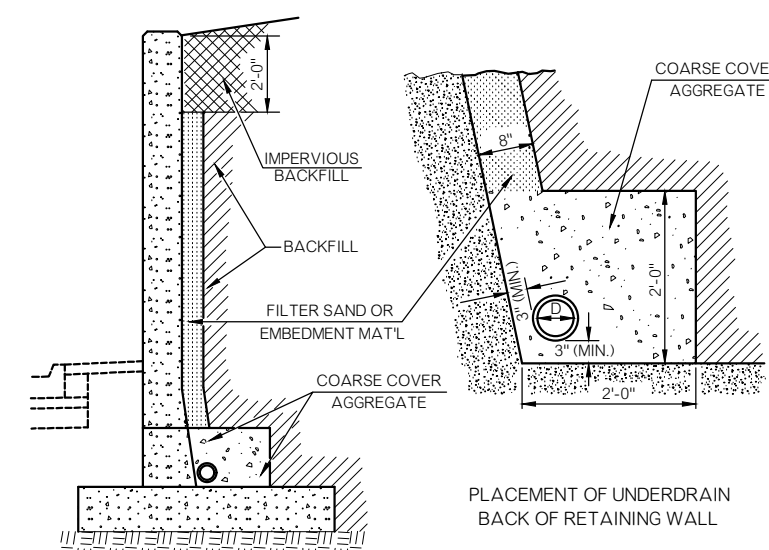


CORRUGATED POLYETHYLENE PIPE UNDERDRAIN

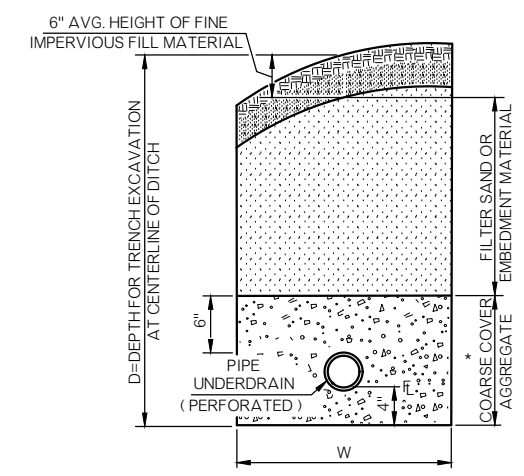
INSTALLATION TECHNIQUE: ( 12" DIAMETER OR SMALLER )  
PERFORATED PIPE UNDERDRAIN, WHEN INSTALLED IN A TRENCH, SHALL BE BEDDED ON 4" OF COARSE AGGREGATE COVER MATERIAL. THE INSTALLED PIPE SHALL THEN BE CAREFULLY BACKFILLED WITH THE REMAINING COARSE AGGREGATE COVER MATERIAL TO 6" ABOVE THE TOP OF THE PIPE. FILTER SAND SHALL BE INSTALLED TO APPROXIMATELY 6" BELOW THE ORIGINAL NATURAL GROUND AS APPROVED BY THE ENGINEER. ALL MATERIAL REQUIRED TO BE INCLUDED IN PRICE BID PER LINEAR FEET OF PIPE UNDERDRAIN.  
NON-PERFORATED PIPE UNDERDRAIN, WHEN INSTALLED IN A TRENCH, SHALL BE BEDDED IN A 4" LAYER CONSISTING OF COARSE AGGREGATE COVER MATERIAL OR A 50-50 MIX OF COARSE AGGREGATE COVER MATERIAL AND FILTER SAND. THE REMAINING BACKFILL MAY BE NATIVE SOIL REMOVED IN THE TRENCHING OPERATION. FILTER SAND OR BACKFILLED REQUIRED BY THE ENGINEER. COST TO BE INCLUDED IN OTHER ITEMS OF WORK. SEE GENERAL NOTE NUMBERS 5 & 6.

GENERAL NOTES

- ALL CONSTRUCTION AND MATERIAL REQUIREMENTS SHALL BE IN ACCORDANCE WITH THE OKC STANDARD SPECIFICATIONS FOR CONSTRUCTION OF PUBLIC IMPROVEMENTS.
- THE EXTENT, LOCATION AND DEPTH OF DRAINS MAY BE ADJUSTED BY THE ENGINEER TO SUIT CONDITIONS FOUND DURING CONSTRUCTION.
- COST OF ALL FITTINGS TO BE INCLUDED IN THE PRICE BID PER LINEAR FOOT OF PIPE UNDERDRAIN.
- FOR PIPE UNDERDRAIN OF UP TO 12" IN DIAMETER, W = 24" WITHOUT SHEETING AND SHORING; W = 36" WHEN SHEETING AND SHORING IS USED. SEE STANDARD PIPE INSTALLATION, DETAIL D-1001, FOR SHEETING & SHORING NOTES.
- FOR PIPE UNDERDRAIN LARGER THAN 12" IN DIAMETER, SEE STANDARD PIPE INSTALLATION, DETAIL D-1001, FOR ADDITIONAL TRENCH EXCAVATION DETAILS.
- MATERIALS SHOWN HERE ARE TYPICAL ONLY AND ARE NOT THE ONLY CHOICE FOR SUBSURFACE DRAINAGE PURPOSES.
- OUTLET OPENING SHALL HAVE INSTALLED A REMOVABLE RODENT SCREEN HAVING A WIRE MESH DESIGN & 0.23" TO 0.50" (NOM.) SQUARE OPENINGS. SCREEN MATERIAL MAY BE STAINLESS STEEL OR GALVANIZED WITH WIRE THICKNESS OF BETWEEN 0.023" & 0.038", AFTER SHAPING AND FABRICATION. RODENT SCREEN DESIGN SHALL BE APPROVED BY THE ENGINEER.
- THE FINAL SECTION OF THE OUTLET LATERAL CONDUIT SHALL BE NON-PERFORATED, SCHEDULE 40 OR TYPE S HIGH DENSITY POLYETHYLENE AND A MINIMUM 20'-0" IN LENGTH, INCLUDING COUPLINGS.
- FOR DETAILS OF OUTLET LATERAL HEADWALL, SEE DETAIL NUMBER D-1005.
- COARSE COVER AGGREGATE MATERIAL SHALL MEET THE REQUIREMENTS OF THE OKC STANDARD SPECIFICATIONS FOR CONSTRUCTION OF PUBLIC IMPROVEMENTS, AGGREGATE NO. 57. COST OF AGGREGATE COVER MATERIAL TO BE INCLUDED IN PRICE BID FOR EDGE DRAIN CONDUIT - PERFORATED.

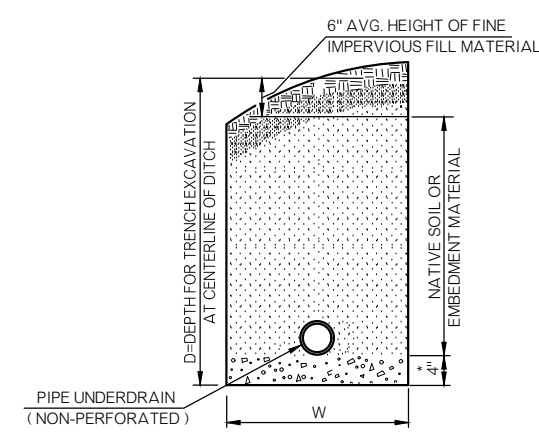


PLACEMENT OF UNDERDRAIN  
BACK OF RETAINING WALL



DETAIL  
TRENCH EXCAVATION  
PERFORATED PIPE  
UNDERDRAIN INSTALLATIONS

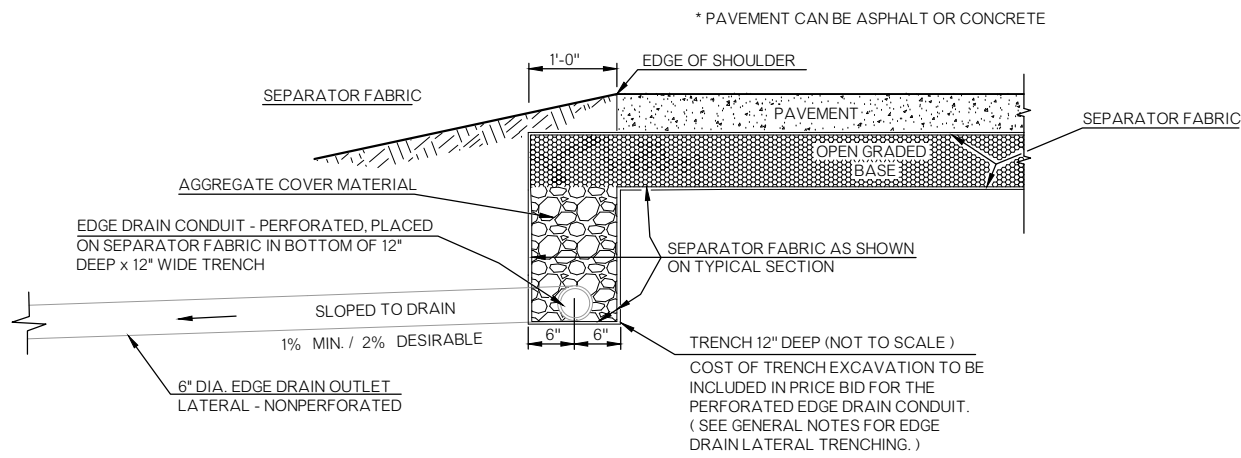
\* PIPE UNDERDRAIN COVER MATERIAL



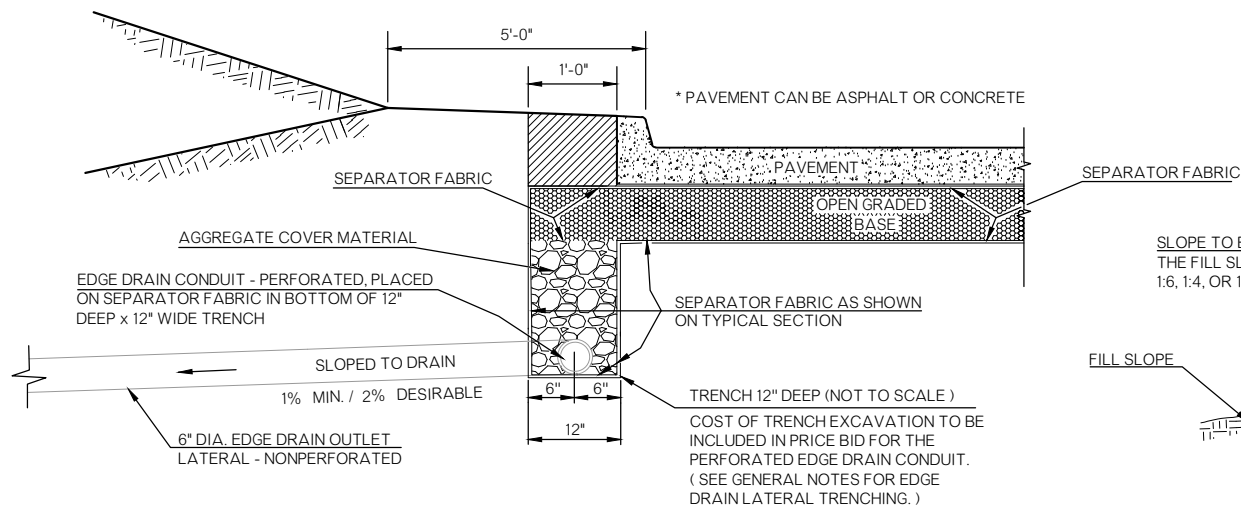
DETAIL  
TRENCH EXCAVATION  
NON-PERFORATED PIPE  
UNDERDRAIN INSTALLATIONS

\* PIPE UNDERDRAIN COVER MATERIAL

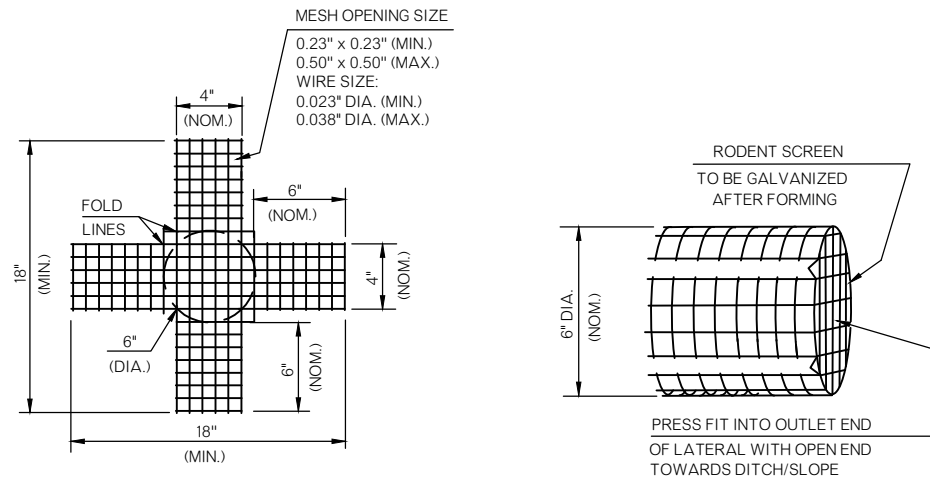
| EMBEDMENT MATERIAL GRADATION |                 |
|------------------------------|-----------------|
| Sieve Size                   | Percent Passing |
| 1 1/2"                       | 100%            |
| 3/4"                         | 40-100%         |
| 3/8"                         | 30-75%          |
| #4                           | 25-60%          |
| #10                          | 20-43%          |
| #40                          | 8-26%           |
| #200                         | 4-12%           |



EDGE DRAIN INSTALLATION - OPEN TYPICAL SECTION

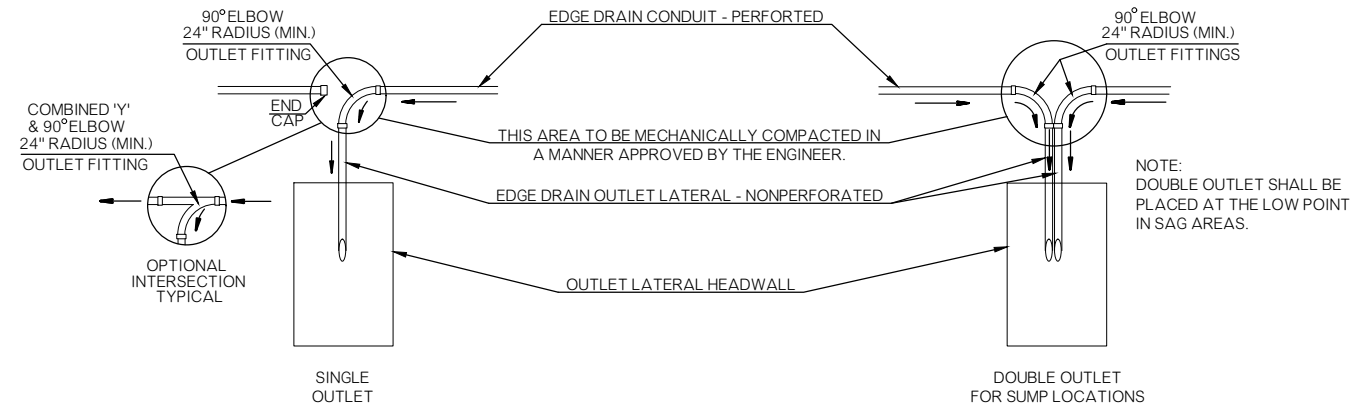


EDGE DRAIN INSTALLATION - CURBED TYPICAL SECTION

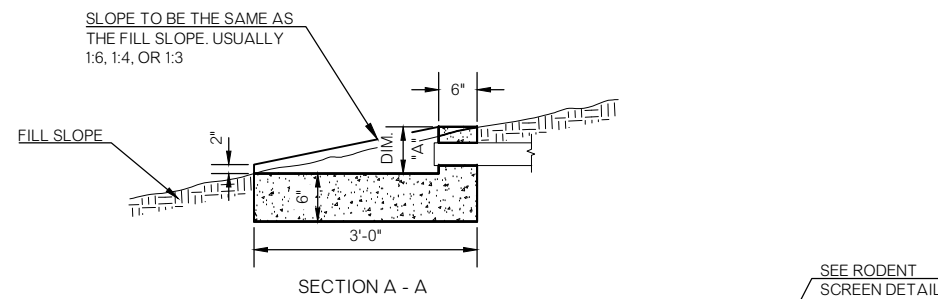


RODENT SCREEN DETAIL

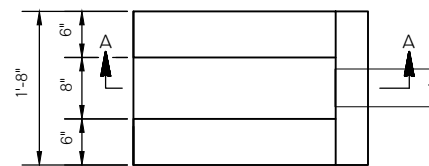
THIS RODENT SCREEN DETAIL IS TYPICAL ONLY AND OTHER DESIGN LAYOUT PATTERNS MAY BE ALLOWED IF APPROVED BY THE ENGINEER. NO TOLERANCE SHALL BE ALLOWED ON MATERIAL SPECIFICATIONS. RODENT SCREEN DIMENSIONS WILL CHANGE PROPORTIONATELY FOR ALTERNATE SIZE OUTLET LATERAL CONDUIT.



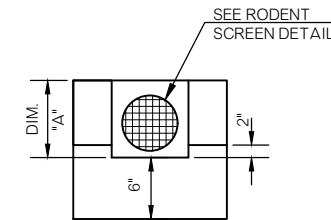
OUTLET LATERAL CONNECTIONS - PLAN



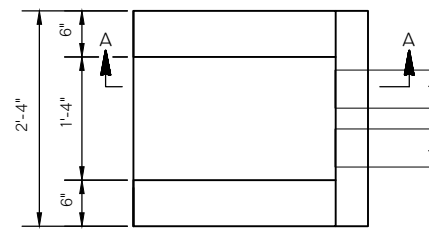
SECTION A - A



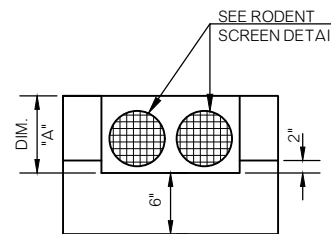
PLAN (SINGLE OUTLET)



END VIEW (SINGLE)



PLAN (DOUBLE OUTLET)



END VIEW (DOUBLE)

OUTLET LATERAL HEADWALL

NOTE: OPENING FOR LATERAL PIPE WILL VARY IN SIZE AND SHAPE, DEPENDING ON THE SIZE OF THE OUTLET LATERAL PIPE AND THE SLOPE OF THE STRUCTURE. THE OUTLET LATERAL PIPE SHALL BE CUT TO CONFORM TO THE TOP SURFACE OF THE OUTLET HEADWALL.

GENERAL NOTES

1. ALL CONSTRUCTION AND MATERIAL REQUIREMENTS SHALL BE IN ACCORDANCE WITH THE OKC STANDARD SPECIFICATIONS FOR CONSTRUCTION OF PUBLIC IMPROVEMENTS.
2. INSTALLATION OF OUTLET LATERAL PIPES SHOULD BE SCHEDULED CONCURRENT WITH THE INSTALLATION OF PAVEMENT EDGE DRAIN.
3. PAVEMENT EDGE DRAIN CONDUIT SHALL NOT BE LEFT IN PLACE LONGER THAN 48 HOURS WITHOUT BEING CONNECTED TO OUTLET LATERAL PIPES.
4. OUTLET ELBOWS (90°) SHALL BE USED WHEN PIPE EDGE DRAIN SLOPE EXCEEDS TWO (2) PERCENT.
5. CONNECTION OF THE OUTLET LATERAL PIPE TO THE OUTLET FITTING SHALL BE DONE IN A MANNER APPROVED BY THE ENGINEER. COST OF ALL CAPS, FITTINGS, LATERAL PIPE, BONDING MATERIALS, RODENT SCREENS, TRENCHING, AND BACKFILLING NEEDED TO INSTALL OUTLET LATERAL PIPE SHALL BE INCLUDED IN THE PRICE BID FOR EDGE DRAIN OUTLET LATERAL (NON-PERFORATED).
6. EDGE DRAINS AND OUTLET LATERALS SHALL BE LOCATED ON LOW SIDE OF SUPER ELEVATED SECTIONS AT CURVES. OUTLET LATERALS ARE TO BE PLACED AT 300' INTERVALS ON GRADE OR AS APPROVED BY THE ENGINEERS.
7. PRICE BID FOR OUTLET LATERAL HEADWALL INCLUDES SURFACE PREPARATION, CLASS A CONCRETE, LABOR AND ANY INCIDENTALS NECESSARY FOR CONSTRUCTION.
8. CLASS A CONCRETE SHALL MEET REQUIREMENTS OF THE OKC STANDARD SPECIFICATIONS FOR CONSTRUCTION OF PUBLIC IMPROVEMENTS.
9. AGGREGATE COVER MATERIAL SHALL MEET THE REQUIREMENTS OF THE OKC STANDARD SPECIFICATIONS FOR CONSTRUCTION OF PUBLIC IMPROVEMENTS, AGGREGATE NO. 57. COST OF AGGREGATE COVER MATERIAL TO BE INCLUDED IN PRICE BID FOR EDGE DRAIN CONDUIT - PERFORATED.
10. DETAILS ON THIS SHEET ARE BASED ON 6" DIA. EDGE DRAIN CONDUIT. THE CONTRACTOR SHALL MAKE ALL NECESSARY ADJUSTMENTS TO ACCOMMODATE OTHER SIZE EDGE DRAINS.

| OUTLET LATERAL HEADWALL SCHEDULE |          |                          |               |
|----------------------------------|----------|--------------------------|---------------|
| FILL SLOPE                       | DIM. "A" | CLASS A CONCRETE QUALITY |               |
|                                  |          | SINGLE OUTLET            | DOUBLE OUTLET |
| 1 : 3                            | 1'-0"    | 0.18 C.Y.                | 0.23 C.Y.     |
| 1 : 4                            | 9 1/2"   | 0.17 C.Y.                | 0.21 C.Y.     |
| 1 : 6                            | 7"       | 0.16 C.Y.                | 0.19 C.Y.     |



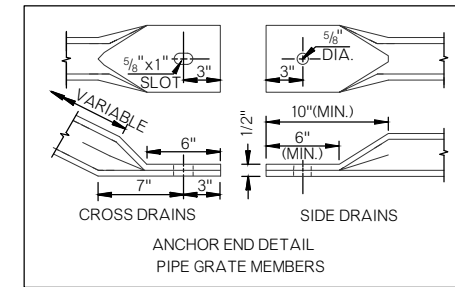
APPROVED BY: \_\_\_\_\_ DATE: \_\_\_\_\_  
ERIC J. WENGER, P.E.  
CITY ENGINEER  
DRAWN: OKC-PW-SRB  
DATE: 2/17/2023

| SINGLE PIPE INSTALLATION - 4 TO 1 SAFETY SLOPE                          |              |                               |                        |                           |                                     |                          |                           |  |  |  |
|---|--------------|-------------------------------|------------------------|---------------------------|-------------------------------------|--------------------------|---------------------------|--|--|--|
| TABLE A - SCHEDULE OF PIPE SAFETY GRATES - AASHTO DESIGNATED PIPE SIZES |              |                               |                        |                           |                                     |                          |                           |  |  |  |
| C. E. T. TYPE   | ROUND INCHES | REINF. CONC. ARCH PIPE INCHES | STEEL ARCH PIPE INCHES | ALUMINUM ARCH PIPE INCHES | REINF. CONC. ELLIPTICAL PIPE INCHES | SIDE DRAIN GRATES L (SD) | CROSS DRAIN GRATES L (CD) |  |  |  |
| A4  | 15"          | 22 x 13                       | 21 x 15                | 21 x 15                   | 14 x 23                             | 36"                      | NONE                      |  |  |  |
|   | 18"          | 26 x 15                       | 24 x 18                | 24 x 18                   |                                     | 42"                      | NONE                      |  |  |  |
| B4  | 21"          |                               |                        |                           |                                     | 45"                      | NONE                      |  |  |  |
|   | 24"          | 28 x 18                       | 28 x 20                | 28 x 20                   | 19 x 30                             | 48"                      | 1 @ 10'-9"                |  |  |  |
|   | (24")        | 36 x 22                       | 35 x 24                | 35 x 24                   | 22 x 34                             | 54"                      | 1 @ 12'-0"                |  |  |  |
| C4  | 30"          | 43 x 26                       | 42 x 29                | 42 x 29                   | 29 x 45                             | 64"                      | 1 @ 13'-6"                |  |  |  |
|   |              |                               | 49 x 33                | 49 x 33                   | 34 x 53                             | 70"                      | 1 @ 14'-3"                |  |  |  |
|   |              | 51 x 31                       |                        |                           |                                     | 70"                      | 1 @ 15'-3"                |  |  |  |
| D4  | 36"          | 58 x 36                       | 57 x 38                | 57 x 38                   | 38 x 60                             | 78"                      | 1 @ 15'-9"                |  |  |  |
|   | 42"          | 65 x 40                       | 64 x 43                | 64 x 43                   |                                     | 84"                      | 2 @ 16'-6"                |  |  |  |
| E4  | 48"          |                               |                        |                           | 43 x 68                             | 88"                      | 2 @ 17'-3"                |  |  |  |
|   | (48")        | 73 x 45                       | 71 x 47                | 71 x 47                   | 48 x 76                             | 96"                      | 2 @ 18'-9"                |  |  |  |

☐ NUMBER OF HORIZONTAL PIPE GRATES FOR SIDE DRAIN OPTIONS. ● DIMENSIONS SHOWN AS RISE BY SPAN.

| SINGLE PIPE INSTALLATION - 4 TO 1 SAFETY SLOPE      |          |         |         |          |          |          |            |            |                     |                     |        |  |
|---|----------|---------|---------|----------|----------|----------|------------|------------|---------------------|---------------------|--------|--|
| TABLE B - SCHEDULE OF DIMENSIONS FOR C. E. T. TYPES |          |         |         |          |          |          |            |            |                     |                     |        |  |
| C.E.T. TYPE   | LENGTH A | WIDTH B | WIDTH C | LENGTH D | HEIGHT H | HEIGHT K | CONC. C.Y. | CONC. C.Y. | STEEL LENGTH H-BARS | STEEL LENGTH H-BARS | S-BARS |  |
| A4  | 10'-4"   | 5'-6"   | 6'-2"   | 5'-8"    | 21"      | 9"       | 1.70       | 2.00       | 5'-2"               | 5'-10"              | 12'-4" |  |
| B4  | 12'-4"   | 6'-0"   | 7'-2"   | 6'-0"    | 22"      | 14"      | 2.00       | 2.60       | 5'-8"               | 6'-10"              | 15'-4" |  |
| C4  | 15'-9"   | 6'-6"   | 8'-5"   | 7'-4"    | 26"      | 20"      | 2.85       | 3.95       | 6'-2"               | 8'-1"               | 19'-6" |  |
| D4  | 19'-3"   | 7'-6"   | 9'-6"   | 8'-0"    | 28"      | 27"      | 3.50       | 5.05       | 7'-2"               | 9'-2"               | 21'-6" |  |
| E4  | 20'-8"   | 8'-0"   | 10'-4"  | 8'-8"    | 30"      | 30"      | 4.05       | 5.75       | 7'-8"               | 10'-0"              | 23'-4" |  |

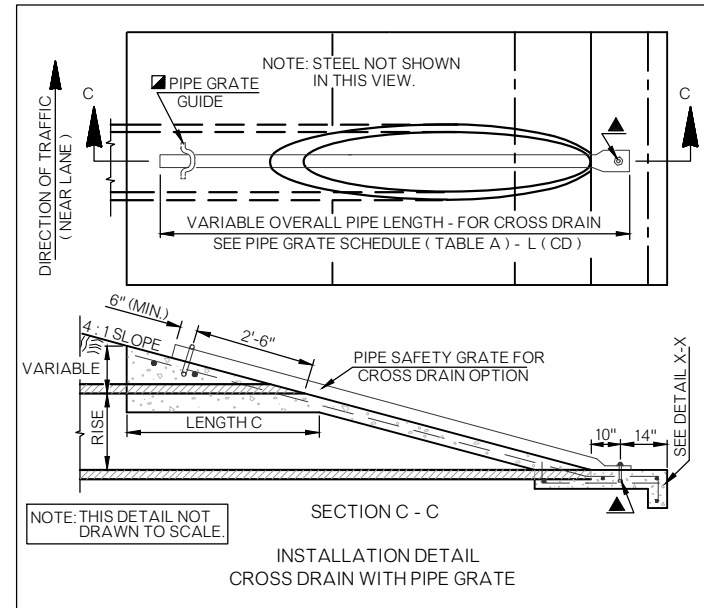
Ⓡ ROUND SHAPE CULVERT OPTIONS  
 Ⓐ ARCH SHAPE CULVERT OPTIONS  
 Ⓢ HORIZONTAL ELLIPSE SHAPE CULVERT OPTIONS



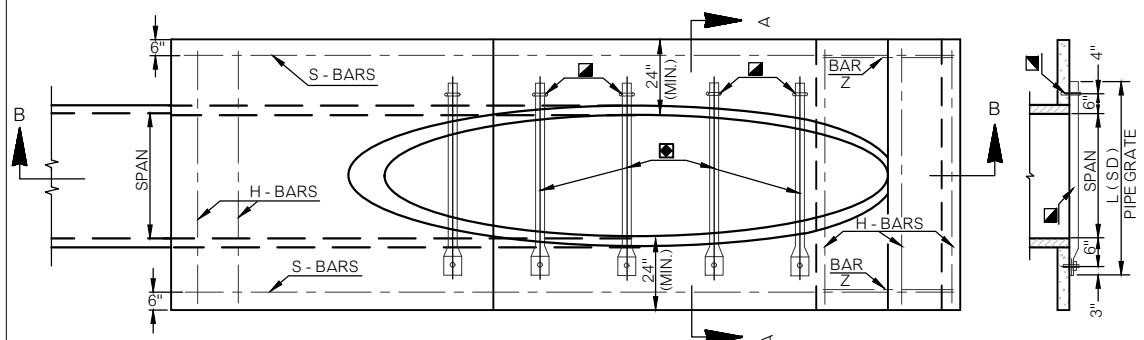
GENERAL NOTES

- ALL CONSTRUCTION AND MATERIAL REQUIREMENTS SHALL BE IN ACCORDANCE WITH THE OKC STANDARD SPECIFICATIONS FOR CONSTRUCTION OF PUBLIC IMPROVEMENTS.
- QUANTITIES SHOWN IN TABLE A ARE FOR ONE END ONLY. CLASS A CONCRETE SHALL CONFORM TO THE MINIMUM REQUIREMENTS OF THE OKC STANDARD SPECIFICATIONS FOR CONSTRUCTION OF PUBLIC IMPROVEMENTS.
- TYPES A4 THROUGH E4 END SECTIONS, AS SHOWN IN TABLE A, MAY BE USED WITH ANY AASHTO DESIGNATED METAL, ALUMINUM & CONCRETE PIPE SIZES, AS SHOWN IN TABLE B. END SECTION QUANTITIES ARE BASED ON METAL PIPE DIMENSIONS, NO PIPE WALL THICKNESS AND SMALLEST LISTED CULVERT ROUND OR ARCH PIPE WITHIN TYPE.
- SLOPED END OF CULVERT PIPE SHALL BE SHOP CUT. TWO COATS OF COLD GALVANIZATION WILL BE APPLIED TO CUT EDGES OF STEEL CULVERT PIPE. COST OF CUTTING AND GALVANIZING IS INCLUDED IN THE PRICE BID FOR PIPE CULVERT.
- ALL SIZES OF CULVERT PIPE WILL BE CUT ON 4 TO 1 SLOPE.
- PIPE FOR SAFETY GRATES SHALL BE 3" x 7.58 LBS./FT. STANDARD WEIGHT STEEL PIPE, SCHEDULE 40. IT SHALL BE FURNISHED GALVANIZED, PLAIN END AND SHALL MEET THE MINIMUM REQUIREMENTS OF ASTM A-53 (HYDROSTATIC TESTS MAY BE WAIVED) OR ASTM F 1083. COST OF GRATES TO BE INCLUDED IN PRICE BID FOR THE C.E.T.
- ANY GALVANIZED AREA(S) OF METAL PIPE DISTRESSED DURING THE POST FABRICATION AND/OR HANDLING PROCESS SHALL BE COATED WITH AN APPROVED ZINC RICH PAINT.
- REINFORCING STEEL AND PIPE GRATE GUIDES SHALL BE NO. 4 DEFORMED BARS. COST OF STEEL SHALL BE INCLUDED IN PRICE BID FOR THE CULV. END TREATMENT.
- CRITERIA FOR USE OF PIPE SAFETY GRATE MEMBERS:
  - (A) ALL SIDE DRAIN AND MULTIPLE PIPE INSTALLATIONS WITHIN THE CLEAR ZONE.
  - (B) ALL CROSS DRAIN INSTALLATIONS WITH A CULVERT SPAN OF 30" OR MORE.
  - (C) ALL INSTALLATIONS OUTSIDE THE CLEAR ZONE WHERE HAZARD POTENTIAL IS HIGH BASED ON TRAFFIC DIRECTION, SPEED, VOLUME AND SIZE OF CULVERT.
 NOTE: ANALYZE HYDRAULIC PERFORMANCE AT VARYING DEGREES OF CLOGGING AND APPLY RISK ASSESSMENT BEFORE USING GRATES.
- PIPE GRATE MEMBERS ARE NOT SHOWN IN END VIEW.
- ANCHOR END OF PIPE GRATE MEMBERS SHALL BE HELD IN PLACE WITH A 1/2" x 5 1/2" GALVANIZED BOLT, NUT AND WASHER, THREADS, 1 3/4" (NOM.) SHALL REMAIN EXPOSED FOR INSTALLING GRATE, WASHER AND NUT. ALL BOLTS, NUTS AND WASHERS SHALL CONFORM TO ASTM A-307 WITH COST TO BE INCLUDED IN THE PRICE BID FOR THE CULVERT END TREATMENT.
- FOR TOTAL QUANTITY OF EXTRA DEPTH TOE WALL, MULTIPLY WIDTH B TIMES 0.0185 FOR EACH FOOT OF DEPTH OF TOE WALL REQUIRED. PAYMENT TO BE INCLUDED IN PRICE BID FOR THE CULVERT END TREATMENT.
- LONGITUDINAL PIPE SAFETY GRATES FOR CROSS DRAIN INSTALLATIONS ARE NOT NECESSARY OR REQUIRED FOR OPEN TRENCH/DITCH SPANS LESS THAN 30".

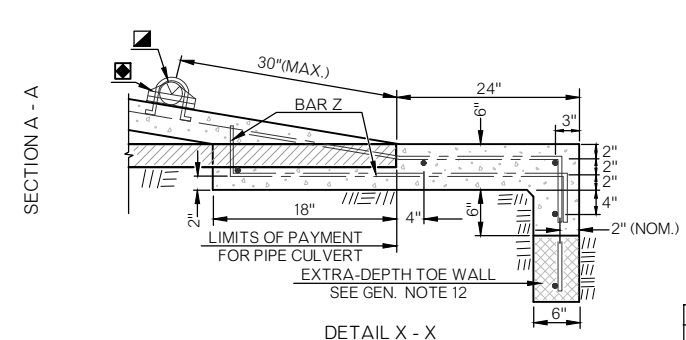
PRECAST CULVERT END TREATMENTS OR OTHER ALTERNATIVE DESIGNS MAY BE USED IF APPROPRIATE DRAWINGS ARE SUBMITTED TO AND APPROVED BY THE ENGINEER.



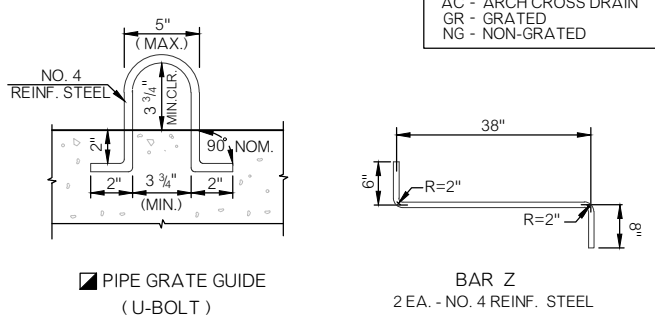
SECTION C - C  
 INSTALLATION DETAIL  
 CROSS DRAIN WITH PIPE GRATE



SECTION B - B  
 INSTALLATION DETAIL  
 SIDE DRAIN WITH PIPE GRATES

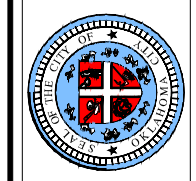


TYPICAL ABBREVIATIONS  
 RS - ROUND SIDE DRAIN  
 RC - ROUND CROSS DRAIN  
 AS - ARCH SIDE DRAIN  
 AC - ARCH CROSS DRAIN  
 GR - GRATED  
 NG - NON-GRATED



END VIEW  
 (PIPE GRATES NOT SHOWN THIS VIEW)

PIPE GRATE GUIDE  
 (U-BOLT)  
 BAR Z  
 2 EA. - NO. 4 REINF. STEEL



APPROVED BY: \_\_\_\_\_ DATE: \_\_\_\_\_  
 ERIC J. WENGER, P.E.  
 CITY ENGINEER  
 DRAWN: OKC-PW-SRB  
 DATE: 2/17/2023

CULVERT END TREATMENT  
 SINGLE PIPE DETAILS

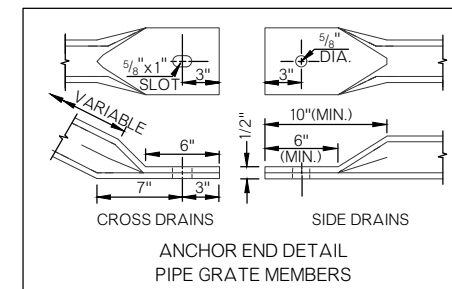


| DOUBLE PIPE INSTALLATION - 4 TO 1 SAFETY SLOPE                          |              |                               |                        |                           |                                     |                          |                           |    |         |
|---|--------------|-------------------------------|------------------------|---------------------------|-------------------------------------|--------------------------|---------------------------|----|---------|
| TABLE A - SCHEDULE OF PIPE SAFETY GRATES - AASHTO DESIGNATED PIPE SIZES |              |                               |                        |                           |                                     |                          |                           |    |         |
| C. E. T. TYPE   | ROUND INCHES | REINF. CONC. ARCH PIPE INCHES | STEEL ARCH PIPE INCHES | ALUMINUM ARCH PIPE INCHES | REINF. CONC. ELLIPTICAL PIPE INCHES | SIDE DRAIN GRATES L (SD) | CROSS DRAIN GRATES L (CD) | G  |         |
| AA4   | 15"          | 2                             |                        |                           |                                     | 5'-2"                    | NONE                      | 12 |         |
|   | 18"          | 2                             |                        |                           |                                     | 5'-8"                    | NONE                      | 12 |         |
|   | (18")        |                               | 22 x 13                | 1                         | 21 x 15                             | 2                        | 21 x 15                   | 2  | 14 x 23 |
| BB4   | 21"          | 2                             |                        |                           |                                     | 6'-2"                    | NONE                      | 12 |         |
|   | 24"          | 2                             |                        |                           |                                     | 6'-8"                    | NONE                      | 12 |         |
|   | (24")        |                               | 28 x 18                | 2                         |                                     |                          |                           |    | 19 x 30 |
|   |              |                               | 36 x 22                | 3                         |                                     |                          |                           |    | 22 x 34 |
|   |              |                               |                        |                           | 35 x 24                             | 3                        | 35 x 24                   | 3  |         |
| CC4   | 30"          | 5                             |                        |                           |                                     | 7'-8"                    | NONE                      | 12 |         |
|   | (30")        |                               | 43 x 26                | 3                         |                                     |                          |                           |    | 24 x 38 |
|   |              |                               |                        |                           | 42 x 29                             | 3                        | 42 x 29                   | 3  |         |
|   |              |                               |                        |                           |                                     |                          |                           |    | 29 x 45 |
|   |              |                               |                        |                           | 49 x 33                             | 4                        | 49 x 33                   | 4  |         |
| DD4   | 36"          | 4                             |                        |                           |                                     | 10'-0"                   | 2 @ 13'-6"                | 15 |         |
|   | 42"          | 5                             |                        |                           |                                     | 10'-0"                   | 2 @ 14'-3"                | 15 |         |
|   | (42")        |                               | 58 x 36                | 4                         | 57 x 38                             | 5                        | 57 x 38                   | 5  | 38 x 60 |
| EE4   | 48"          | 6                             |                        |                           |                                     | 11'-3"                   | 2 @ 15'-3"                | 18 |         |
|   | (48")        |                               | 73 x 45                | 6                         | 71 x 47                             | 6                        | 71 x 47                   | 6  | 48 x 76 |
|   |              |                               |                        |                           |                                     |                          |                           |    | 43 x 68 |

☐ NUMBER OF HORIZONTAL PIPE GRATES FOR SIDE DRAIN OPTIONS. ● DIMENSIONS SHOWN AS RISE BY SPAN.

| DOUBLE PIPE INSTALLATION - 4 TO 1 SAFETY SLOPE      |          |          |          |          |          |          |            |            |            |        |        |        |
|---|----------|----------|----------|----------|----------|----------|------------|------------|------------|--------|--------|--------|
| TABLE B - SCHEDULE OF DIMENSIONS FOR C. E. T. TYPES |          |          |          |          |          |          |            |            |            |        |        |        |
| C. E. T. TYPE                                       | LENGTH A | WIDTH BB | WIDTH BB | LENGTH C | HEIGHT H | HEIGHT K | CONC. C.Y. | CONC. C.Y. | CONC. C.Y. | H-BARS | H-BARS | S-BARS |
| AA4   | 10'-4"   | 8'-0"    | 9'-4"    | 5'-8"    | 21"      | 9"       | 2.45       | 2.90       | 7'-8"      | 9'-0"  | 12'-4" |        |
| BB4   | 12'-4"   | 9'-0"    | 11'-0"   | 6'-0"    | 22"      | 14"      | 2.95       | 3.75       | 8'-8"      | 10'-8" | 15'-4" |        |
| CC4   | 15'-9"   | 10'-4"   | 14'-0"   | 7'-4"    | 26"      | 20"      | 4.45       | 5.75       | 10'-0"     | 13'-8" | 19'-6" |        |
| DD4   | 19'-3"   | 12'-9"   | 16'-6"   | 8'-0"    | 28"      | 27"      | 6.00       | 8.00       | 12'-5"     | 16'-2" | 21'-6" |        |
| EE4   | 20'-8"   | 14'-0"   | 18'-0"   | 8'-8"    | 30"      | 30"      | 7.35       | 9.30       | 13'-8"     | 17'-8" | 23'-4" |        |

Ⓡ ROUND SHAPE CULVERT OPTIONS  
 Ⓜ ARCH SHAPE CULVERT OPTIONS  
 Ⓜ HORIZONTAL ELLIPSE SHAPE CULVERT OPTIONS

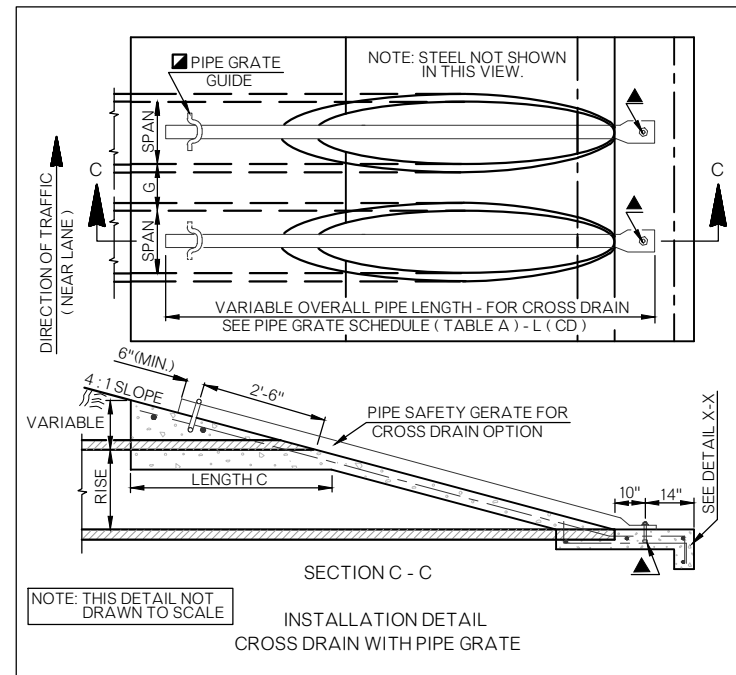


ANCHOR END DETAIL  
PIPE GRATE MEMBERS

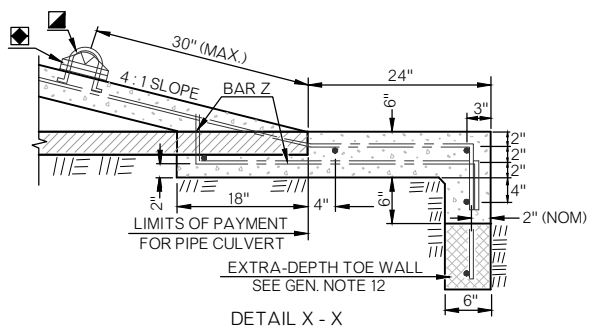
GENERAL NOTES

- ALL CONSTRUCTION AND MATERIAL REQUIREMENTS SHALL BE IN ACCORDANCE WITH THE OKC STANDARD SPECIFICATIONS FOR CONSTRUCTION OF PUBLIC IMPROVEMENTS.
- QUANTITIES SHOWN IN TABLE A ARE FOR ONE END ONLY. CLASS A CONCRETE SHALL CONFORM TO THE MINIMUM REQUIREMENTS OF THE OKC STANDARD SPECIFICATIONS FOR CONSTRUCTION OF PUBLIC IMPROVEMENTS.
- TYPES A4 THROUGH E4 END SECTIONS, AS SHOWN IN TABLE A, MAY BE USED WITH ANY AASHTO DESIGNATED METAL, ALUMINUM & CONCRETE PIPE SIZES, AS SHOWN IN TABLE B. END SECTION QUANTITIES ARE BASED ON METAL PIPE DIMENSIONS, NO PIPE WALL THICKNESS AND SMALLEST LISTED ROUND OR ARCH CULVERT PIPE WITHIN TYPE.
- SLOPED END OF CULVERT PIPE SHALL BE SHOP CUT. TWO COATS OF COLD GALVANIZATION WILL BE APPLIED TO CUT EDGES OF STEEL CULVERT PIPE. COST OF CUTTING AND GALVANIZING IS INCLUDED IN THE PRICE BID FOR PIPE CULVERT.
- ALL SIZES OF CULVERT PIPE WILL BE CUT ON 4 TO 1 SLOPE.
- PIPE FOR SAFETY GRATES SHALL BE 3" x 7.58 LBS./FT. STANDARD WEIGHT STEEL PIPE, SCHEDULE 40. IT SHALL BE FURNISHED GALVANIZED, PLAIN END AND SHALL MEET THE MINIMUM REQUIREMENTS OF ASTM A-53 (HYDROSTATIC TESTS MAY BE WAIVED) OR ASTM F 1083. COST OF GRATES TO BE INCLUDED IN PRICE BID FOR THE C.E.T.
- ANY GALVANIZED AREA(S) OF METAL PIPE DISTRESSED DURING THE POST FABRICATION AND/OR HANDLING PROCESS SHALL BE COATED WITH AN APPROVED ZINC RICH PAINT.
- REINFORCING STEEL AND PIPE GRATE GUIDES SHALL BE NO. 4 DEFORMED BARS. COST OF STEEL SHALL BE INCLUDED IN PRICE BID FOR THE CULV. END TREATMENT.
- CRITERIA FOR USE OF PIPE SAFETY GRATE MEMBERS:
  - (A) ALL SIDE DRAIN AND MULTIPLE PIPE INSTALLATIONS WITHIN THE CLEAR ZONE.
  - (B) ALL CROSS DRAIN INSTALLATIONS WITH A CULVERT SPAN OF 30" OR
  - (C) ALL INSTALLATIONS OUTSIDE THE CLEAR ZONE WHERE HAZARD POTENTIAL IS HIGH BASED ON TRAFFIC DIRECTION, SPEED, VOLUME AND SIZE OF CULVERT.
 NOTE: ANALYZE HYDRAULIC PERFORMANCE AT VARYING DEGREES OF CLOGGING AND APPLY RISK ASSESSMENT BEFORE USING GRATES.
- PIPE GRATE MEMBERS ARE NOT SHOWN IN END VIEW.
- ANCHOR END OF PIPE GRATE MEMBERS SHALL BE HELD IN PLACE WITH A 1/2" x 5 1/2" GALVANIZED BOLT, NUT AND WASHER, THREADS, 1 3/4" (NOM.) SHALL REMAIN EXPOSED FOR INSTALLING GRATE, WASHER AND NUT. ALL BOLTS, NUTS AND WASHERS SHALL CONFORM TO ASTM A-307 WITH COST TO BE INCLUDED IN THE PRICE BID FOR THE CULVERT END TREATMENT.
- FOR TOTAL QUANTITY OF EXTRA DEPTH TOE WALL, MULTIPLY WIDTH BB TIMES 0.0185 FOR EACH FOOT OF DEPTH OF TOE WALL REQUIRED. PAYMENT TO BE INCLUDED IN PRICE BID FOR THE CULVERT END TREATMENT.
- LONGITUDINAL PIPE SAFETY GRATES FOR CROSS DRAIN INSTALLATIONS ARE NOT NECESSARY OR REQUIRED FOR OPEN TRENCH/DITCH SPANS LESS THAN 30".

PRECAST CULVERT END TREATMENTS OR OTHER ALTERNATIVE DESIGNS MAY BE USED IF APPROPRIATE DRAWINGS ARE SUBMITTED TO AND APPROVED BY THE ENGINEER.

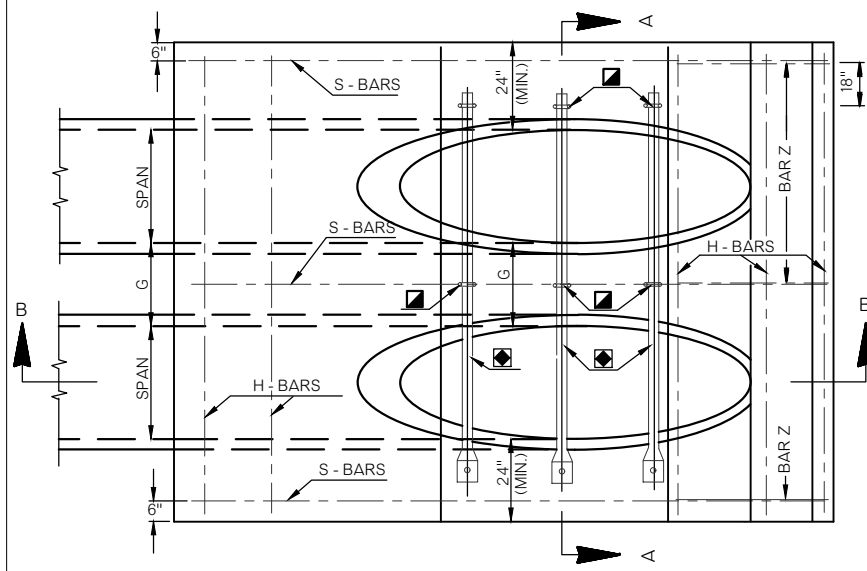


SECTION C - C  
INSTALLATION DETAIL  
CROSS DRAIN WITH PIPE GRATE

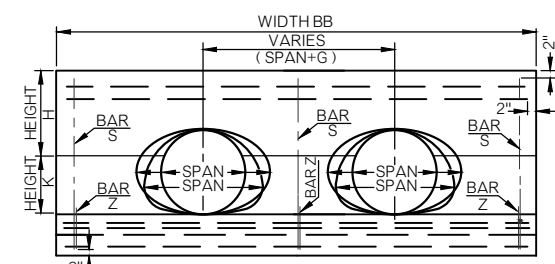


DETAIL X - X

TYPICAL ABBREVIATIONS  
 RS - ROUND SIDE DRAIN  
 RC - ROUND CROSS DRAIN  
 AS - ARCH SIDE DRAIN  
 AC - ARCH CROSS DRAIN  
 GR - GRATED  
 NG - NON-GRATED

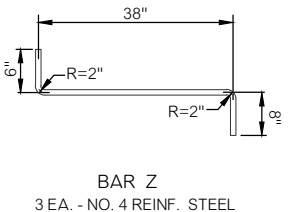


SECTION B - B  
INSTALLATION DETAIL  
SIDE DRAIN WITH PIPE GRATES

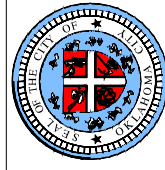


END VIEW  
(PIPE GRATES NOT SHOWN THIS VIEW)

PIPE GRATE GUIDE  
(U-BOLT)

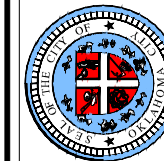


BAR Z  
3 EA. - NO. 4 REINF. STEEL

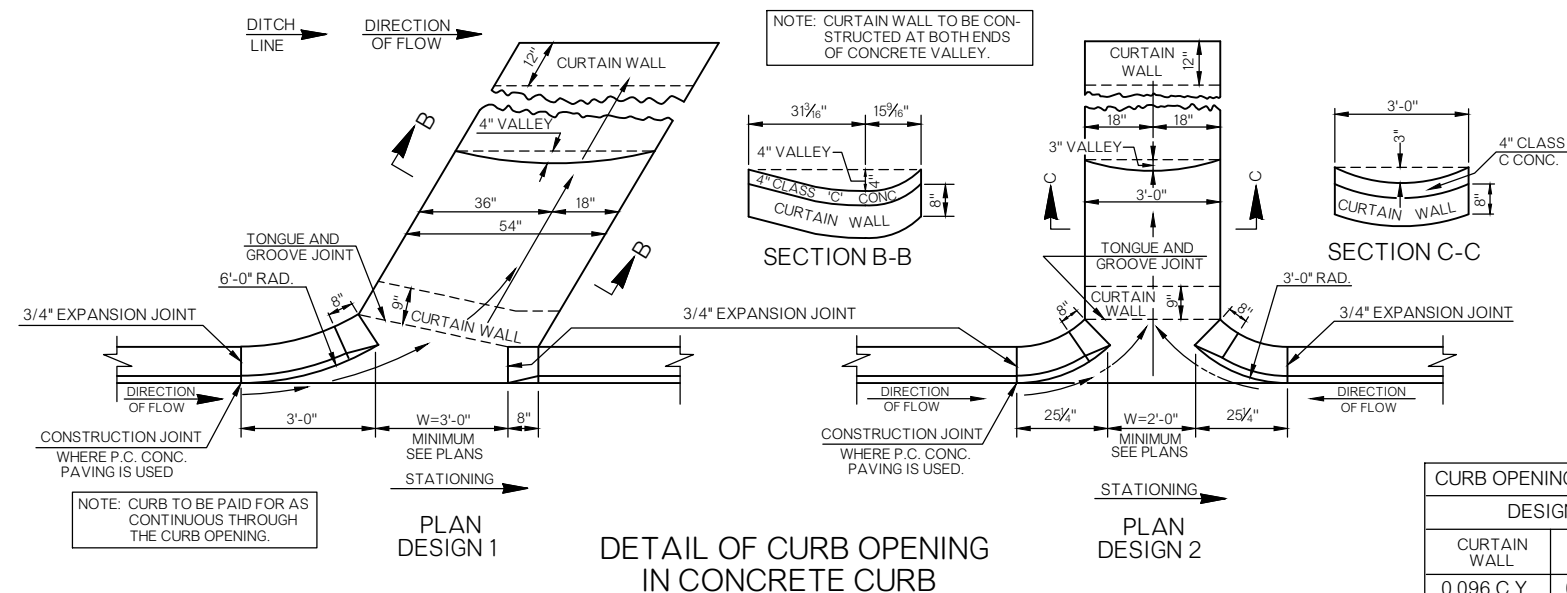


APPROVED BY: \_\_\_\_\_ DATE: \_\_\_\_\_  
 ERIC J. WENGER, P.E.  
 CITY ENGINEER  
 DRAWN: OKC-PW-SRB  
 DATE: 2/17/2023

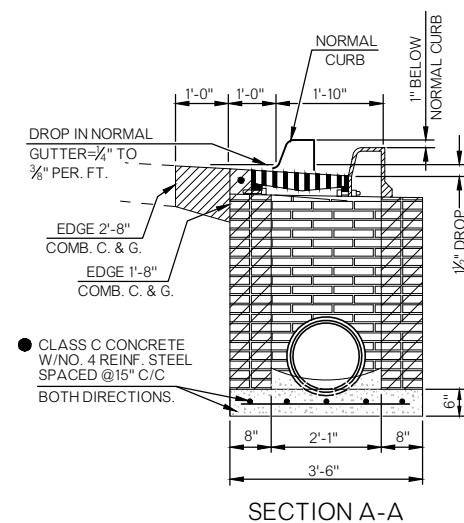
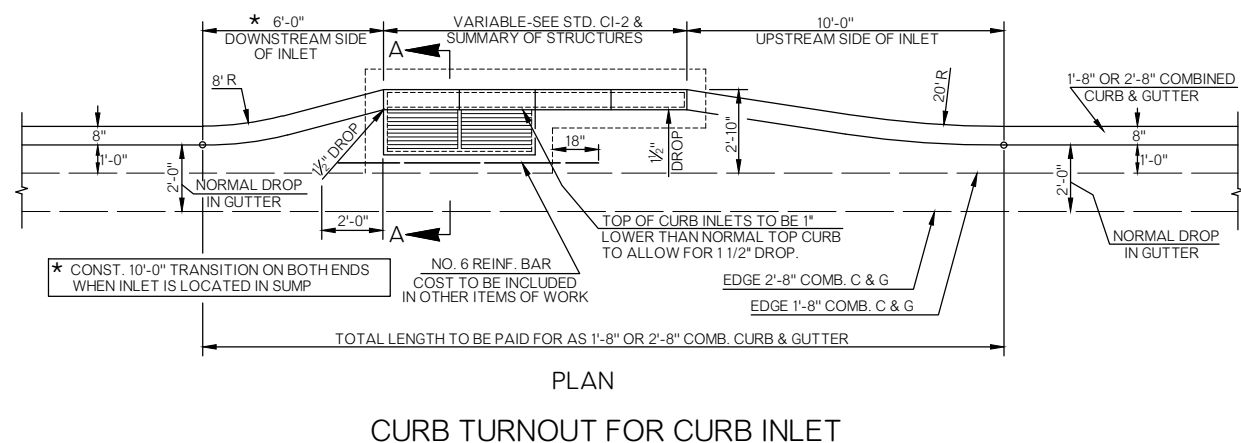
CULVERT END TREATMENT  
DOUBLE PIPE DETAILS



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ERIC J. WENGER, P.E.  
CITY ENGINEER  
DRAWN: OKC-PW-SRB  
DATE: 2/17/2023



| CURB OPENING - CLASS C CONCRETE QUANTITIES |                   |              |                   |
|--|-------------------|--------------|-------------------|
| DESIGN 1                                   |                   | DESIGN 2     |                   |
| CURTAIN WALL                               | PER FOOT OF FLUME | CURTAIN WALL | PER FOOT OF FLUME |
| 0.096 C.Y.                                 | 0.048 C.Y.        | 0.074 C.Y.   | 0.037 C.Y.        |



GENERAL NOTES

1. ALL CONSTRUCTION AND MATERIAL REQUIREMENTS SHALL BE IN ACCORDANCE WITH THE OKC STANDARD SPECIFICATIONS FOR CONSTRUCTION OF PUBLIC IMPROVEMENTS.
2. INLET STRUCTURES MAY BE SUPPLIED AS PRECAST UNITS IF PROPOSED PRECAST DESIGN IS SUBMITTED TO THE ENGINEER AND APPROVED FOR USE.

STORM SEWER CONSTRUCTION  
DETAILS