



## STANDARD

## DETAIL

## DRAWINGS

Revised July 2021

**APPROVED**

A handwritten signature in cursive script, reading 'Richard J. Tuttle', is written over a horizontal line.

City of Grain Valley

July 23, 2021

\_\_\_\_\_  
**Date**

\*Enclosed are Grain Valley's Standard Details for infrastructure. Contractors doing work on Grain Valley infrastructure are required to have a copy of this document with them in the field at all times.

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DATE:	4/28/2020
SCALE:	NO SCALE



## **GENERAL NOTES**

1. The contractor shall have one (1) signed copy of the plans (approved by the City of Grain Valley) and one (1) copy of the approved Construction Standards and Specifications at the job site at all times.
2. Construction of the improvements shown or implied by this set of drawings shall not be initiated or any part thereof undertaken until the City is notified of such intent, and all required and properly executed bonds, permit fees and other agency permits are received and approved by the City.
3. The City of Grain Valley plan review is only for general conformance with City of Grain Valley Criteria and the City Code. The City is not responsible for the accuracy and adequacy of the design, or dimensions and elevations, which shall be confirmed and correlated at the job site. The City of Grain Valley through approval of this document assumes no responsibility other than that as stated above for the completeness and/or accuracy of this document.
4. Development plans are approved initially for one (1) year after which they automatically become void and must be updated and re-approved by the City Engineer before any construction will be permitted.
5. All construction materials and methods used shall comply with the current City of Grain Valley standards and construction specifications.
6. All materials and workmanship associated with this project shall be subject to inspection by the City of Grain Valley. The City of Grain Valley reserves the right to accept or reject any such materials and workmanship that does not conform to the City Standards and Technical Specifications.
7. The Contractor shall satisfy himself as to the accuracy of all measurements prior to construction of any permanent structure.
8. The contractor shall notify the City of Grain Valley Engineering Services Department forty-eight (48) hours prior to beginning construction.

9. All existing utilities indicated on the drawings are according to the best information available to the Engineer; however, all utilities actually existing may not be shown. Utilities damaged through the negligence of the contractor to obtain the location of same shall be repaired or replaced by the contractor at his expense and with immediate notice to the City prior to repair or replacement.
10. Contractor shall not be allowed to work on Saturdays, Sundays or Holidays without prior approval by the City.
11. By use of these plans the Contractor agrees that he shall be solely responsible for the safety of the construction workers and the public.
12. The Contractor shall notify the engineer immediately of any discrepancies in the plans.
13. All fill areas indicated shall be compacted to 95% Standard Proctor Density at +/-2% optimum moisture content. Documentation shall be provided and approved by the City.
14. All ditch lines within the Street right of way shall be compacted to 95% Standard Proctor Density at +/- 2% optimum moisture content. Documentation shall be provided and approved by the City.
15. Excavation and the removal of existing paving and curbs may not be wasted on site and is to be hauled off by the contractor. Contractor to be responsible for the disposal of excess materials.
16. It shall be the responsibility of the Contractor to control erosion and siltation during all phases of construction. All areas disturbed by the contractor shall be sodded or seeded if approved by City unless otherwise noted on the plans.
17. Relocation of any water line, sewer line or service line thereof required for the construction of this project shall be the responsibility of the contractor at his expense and with prior notice to the City.
18. The Contractor shall be responsible for the removal and/or temporary mounting and replacement of all existing street marker signs, stop signs, speed limit and other traffic control signs affected by construction with prior notice to the City.
19. Storm sewer pipe under streets shall be reinforced concrete pipe with HDPE as a potential alternative at the discretion of the City.



20. All proposed and existing street crossings shall be tamped granular backfill (Type 3) from the bottom of the trench to a point that is 15" below the finished grade of the street. All existing street crossings shall be filled with flowable fill per detail STR-011.
21. Pipes that are to be encased and or anchored with concrete, the trench line is to remain open until the concrete has reached 2000 PSI or 7 days, whichever comes first.
22. The location of existing utilities as shown are approximate. It shall be the responsibility of the Contractor to verify the locations of all exiting utilities.
23. Contractor shall submit all Asphaltic Concrete and PCC mix designs to the City of Grain Valley for approval prior to the start of construction.

**APPROVAL BLOCK.** A signature block shall be required on the cover sheet of all plans and reports submitted for review and approval. All plans require the signature of the City Engineer and the date of such signing for formal approval by the City.

The general form of the approval block shall be as follows:

**APPROVED**

\_\_\_\_\_  
**City of Grain Valley**

\_\_\_\_\_  
**Date**

**APPROVED FOR ONE YEAR FROM THIS DATE**



STREET

DETAIL

DRAWINGS

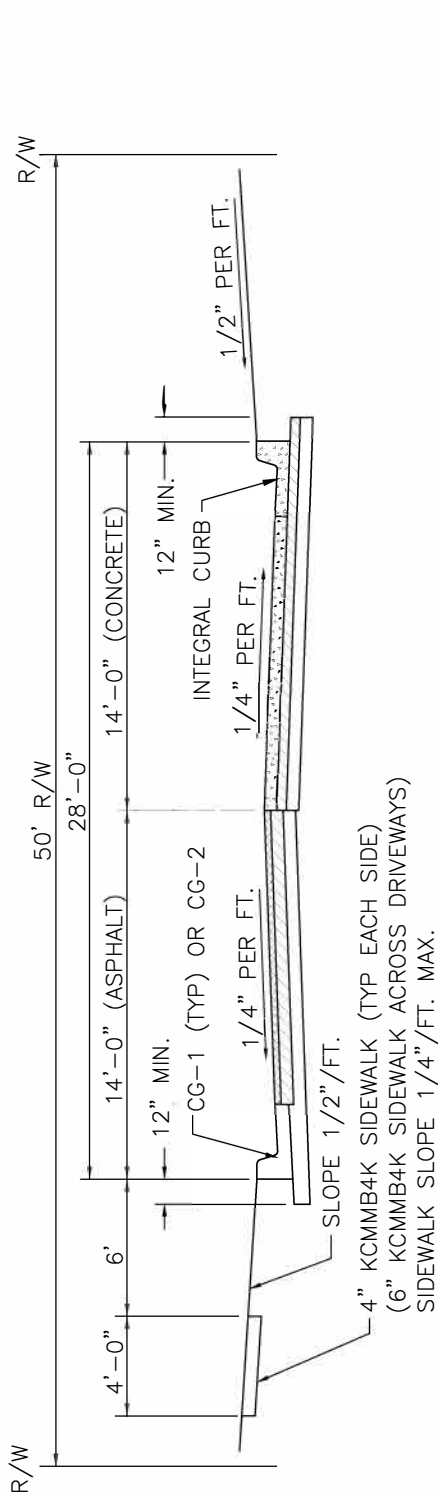


## **STREET NOTES**

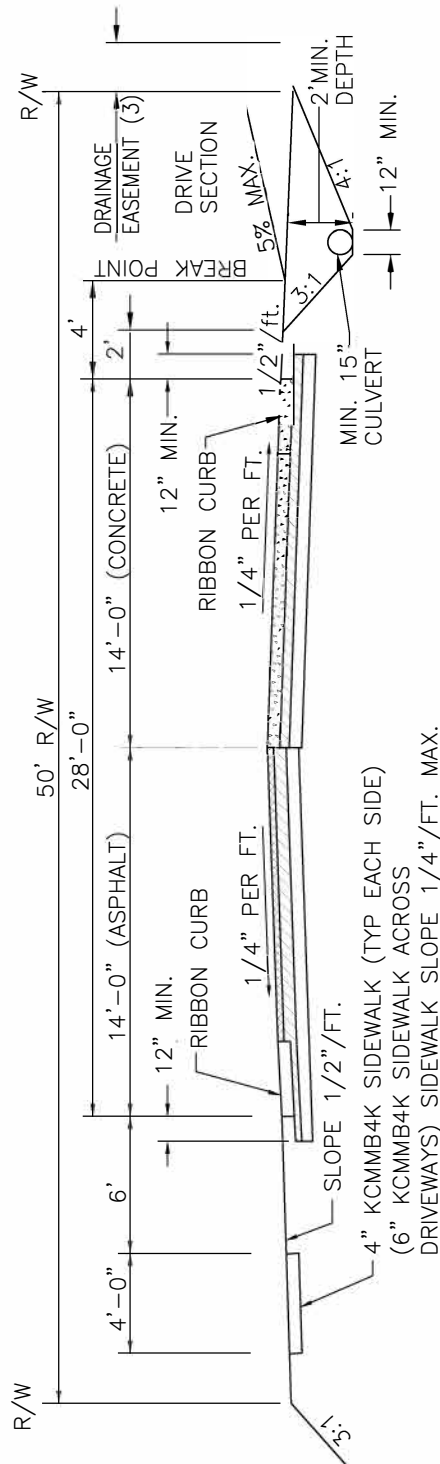
1. All street construction on this project to be performed in accordance with City of Grain Valley and APWA Standard Specifications.
2. Wheelchair (Handicap) ramps shall be required at all intersections.
3. City may require testing of concrete or asphalt material, aggregate sub-base and subgrade; cost of testing to be incurred by the contractor.
4. Testing of subgrade will be required to determine need for subgrade stabilization per APWA Standards.
5. City to be notified 24 hours prior to sampling for proctor testing and/ or compaction testing. The City retains the right to halt construction for failing to be made aware of testing.
6. All construction shall meet APWA and City of Grain Valley Standard Details and Specifications.
7. All fill to be placed in maximum 12" lifts. All fill to be tested for compaction every 12", in accordance with APWA 2106.2.
8. Concrete used for sidewalks, curbs, pavement (including driveways within City ROW) and storm inlets shall meet standards of KCMMB 4K.
9. All proposed and existing street crossings shall be tamped granular backfill (Type 3) from the bottom of the trench to a point that is 15" below the finished grade of the street. All existing street crossings shall be filled with flowable fill per detail STR-011.
10. Asphaltic concrete mixes shall be in conformance with Section 2205.3 of the latest version of APWA Standard Specifications as modified herein. Base and surface course shall be Type 5-01 except as noted below. Performance Graded Asphalt binder grade PG64-22 shall be used in all mixes.
  - a) Fractionated Reclaimed Asphalt Pavement (FRAP) may be used as an aggregate source. Maximum combined FRAP is 30% of the total

mix by weight. **Recycled Asphalt Shingles (RAS) are not allowed.**

- b) All bituminous mixtures shall contain an anti-stripping agent at a rate of 0.75% by weight of the total asphalt cement.
  - c) The resistance of compacted bituminous mixture to moisture induced damage must be greater than 80% as determined AASHTOT 283-03 using a 4 inch mold. Specimens shall be conditioned by freezing and thawing.
  - d) Tack coat (CSS-1h) shall be in accordance with Section 2204 of the latest version of the APWA Standard Specifications and must be applied between each layer of new asphaltic surface and other surfaces specified including curbs.
11. For all new subdivisions, utilities (Evergy, Spire, Comcast, ATT etc.) shall be required to submit their proposed design along with a permit application prior to beginning construction. All utilities shall be designed and installed as close as possible to the design shown in STR-015.



### LOCAL - RESIDENTIAL STREET TYPICAL SECTION



### LOCAL - RESIDENTIAL STREET TYPICAL SECTION

#### RURAL ROADWAY OPTION

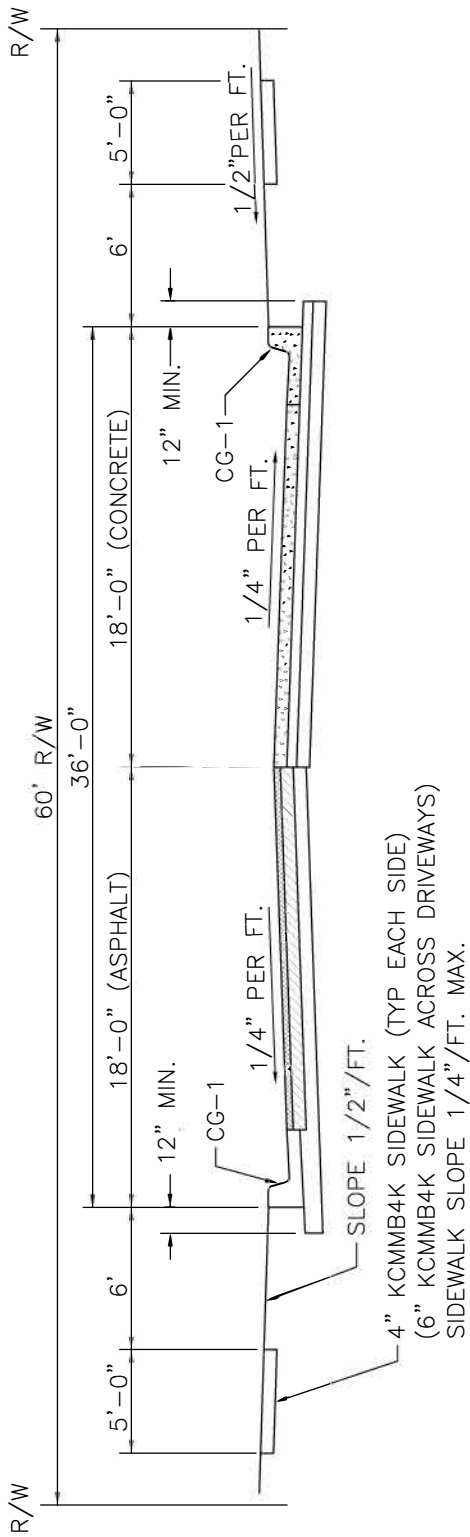
(ONLY AS APPROVED BY CITY)

#### PAVEMENT NOTE:

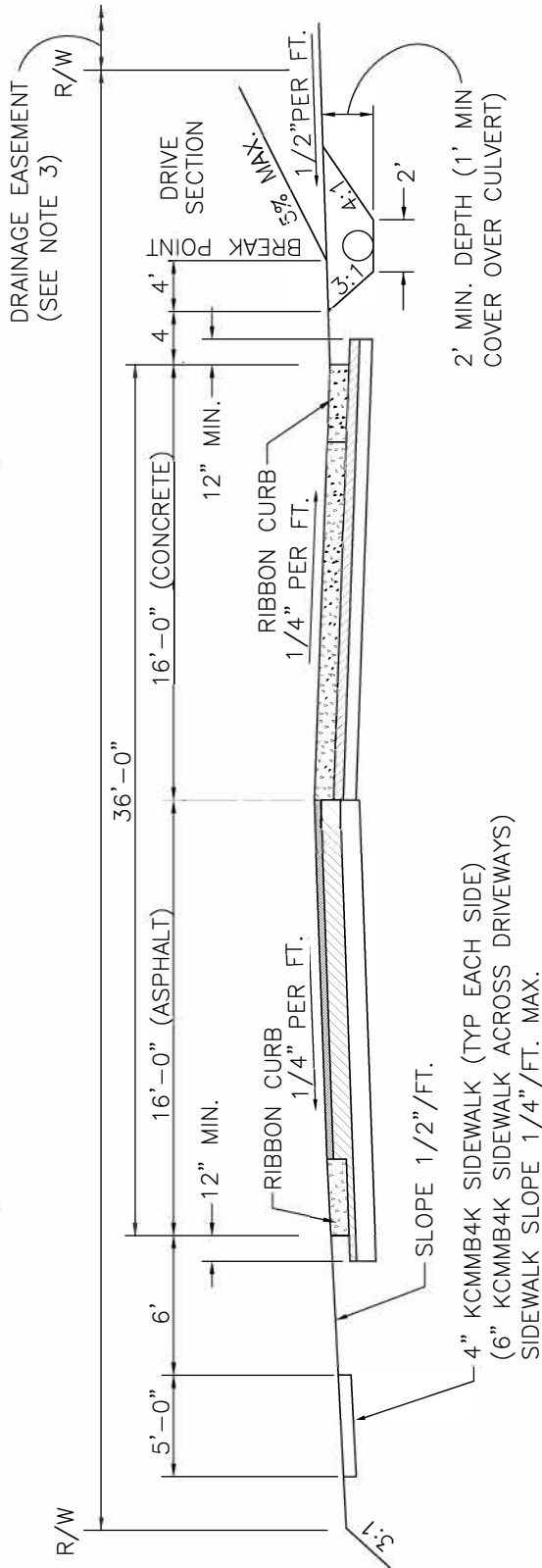
SEE STR-004 FOR PAVEMENT TYPE AND THICKNESS.

#### NOTES:

1. CONSTRUCT SIDEWALK ON SEWER SIDE OF STREET.
2. SEE JOINT LOCATION DETAIL FOR PCC PAVEMENT.
3. DRAINAGE EASEMENT TO EXTEND TO A POINT THAT IS 6" ABOVE 10YR STORM DEPTH.
4. HYDRANTS ON SIDEWALK SIDE SHALL BE PLACED BETWEEN SIDEWALK AND RIGHT-OF-WAY.
5. WATERMAIN AND HYDRANTS ON SWALE SIDE SHALL BE PLACED AT A MINIMUM OF 10' FROM EDGE OF TRAVELED WAY AND OUTSIDE OF 10YR STORM, BUT NO FARTHER THAN 15' FROM TRAVELED WAY.
6. DESIGNER TO SHOW SEWER SERVICE LINES AND WATER SERVICE LINES AT A MINIMUM 3 FEET OF COVER THROUGH BOTTOM OF SWALES.



### COLLECTOR STREET - TYPICAL SECTION



### COLLECTOR STREET - TYPICAL SECTIONS

#### RURAL ROADWAY SECTION

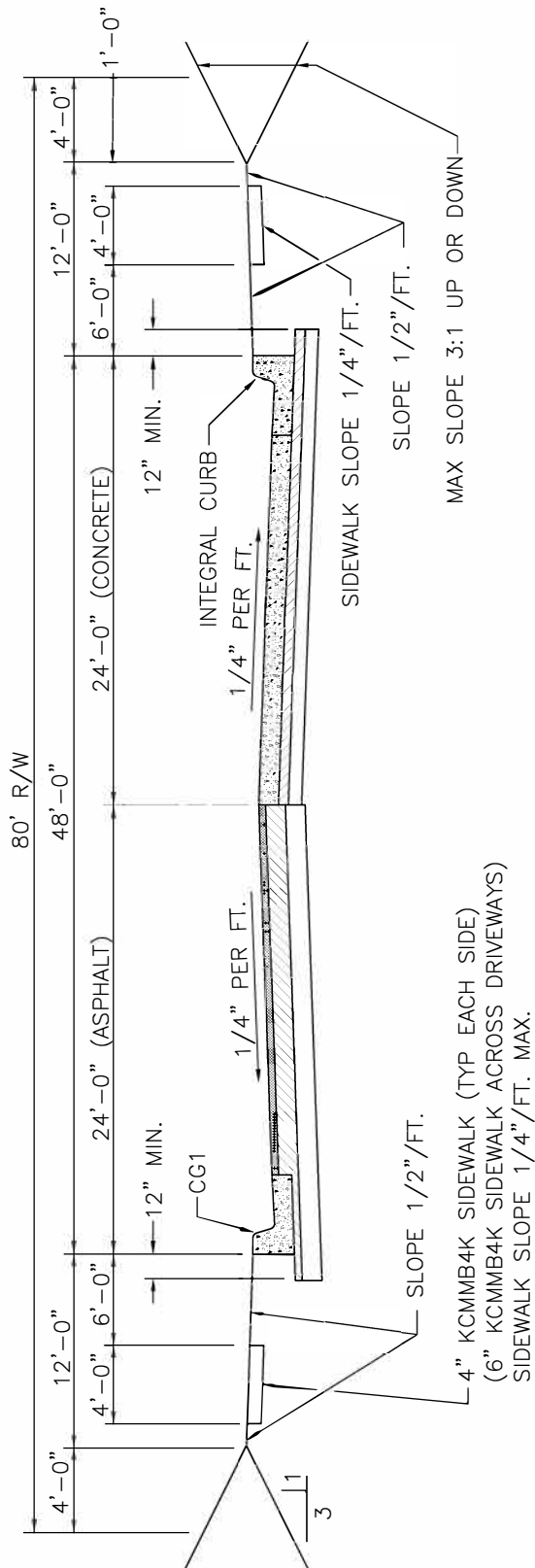
(ONLY AS APPROVED BY CITY)

PAVEMENT NOTE:

SEE STR-004 FOR PAVEMENT TYPE AND THICKNESS.

NOTES:

1. CONSTRUCT SIDEWALK ON BOTH SIDES OF STREET.
2. SEE JOINT LOCATION DETAIL FOR PCC PAVEMENT.
3. DRAINAGE EASEMENT TO EXTEND TO A POINT THAT IS 6" ABOVE 10YR STORM DEPTH.
4. HYDRANTS ON SIDEWALK SIDE SHALL BE PLACED BETWEEN SIDEWALK AND RIGHT-OF-WAY.
5. HYDRANTS ON SWALE SIDE SHALL BE ON PROPERTY SIDE STARTING AT A POINT THAT IS 6" ABOVE 10YR STORM, ACCESS EASEMENT SHALL BE PROVIDED FROM ROW TO 1' PAST SIDEWALK.



NOTES:

1. CONSTRUCT SIDEWALK ON EACH SIDE OF STREET
2. SEE JOINT LOCATION DETAIL FOR PCC PAVEMENT

ARTERIAL STREET TYPICAL SECTION

PAVEMENT NOTE:

SEE STR-004 FOR PAVEMENT  
TYPE AND THICKNESS.



**Grain Valley**  
*Come Home To Opportunity*

DATE:	04/28/20
SCALE:	NO SCALE

STR-003

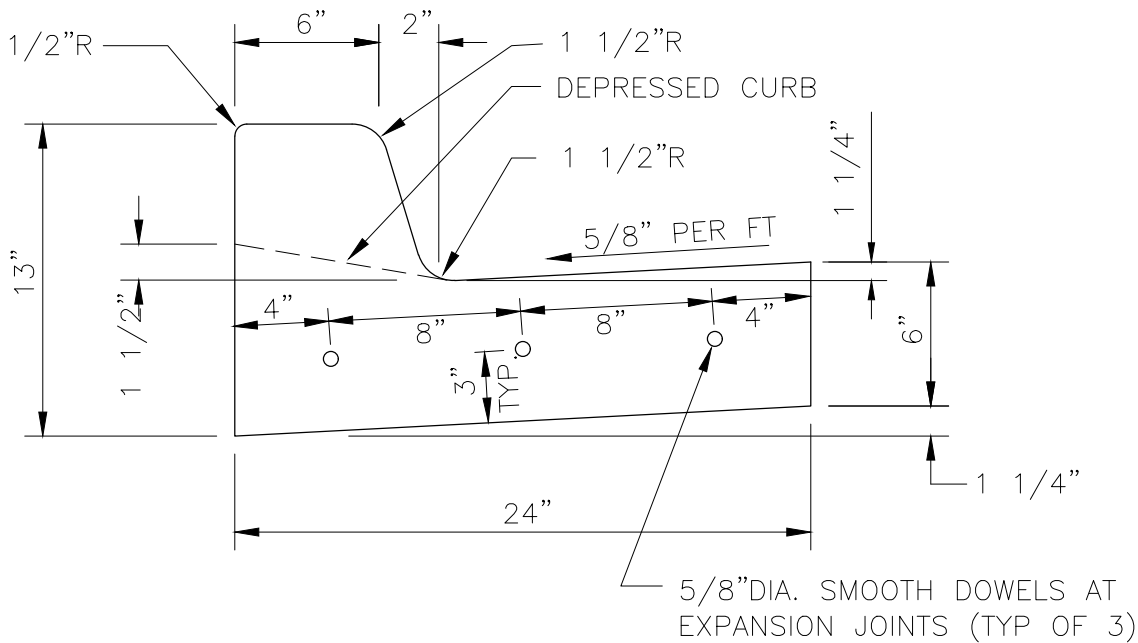


STREET CLASSIFICATION	PAVEMENT TYPES AND REQUIRED BASE/SUB-BASE STRUCTURE		
	OPTION 1	OPTION 2	OPTION 3
RESIDENTIAL	6" MIN. PORTLAND CEMENT CONCRETE PAVEMENT 6" MIN. COMPACTED/STABILIZED SUBGRADE 95% OF STANDARD MAX. DENSITY	2" TYPE 5 MODIFIED ASPHALTIC CONCRETE SURFACE 6" MIN. TYPE 5 MODIFIED ASPHALTIC CONCRETE BASE COURSE 6" MIN. COMPACTED/STABILIZED SUBGRADE 95% OF STANDARD MAX. DENSITY	2" TYPE 5 MODIFIED ASPHALTIC CONCRETE SURFACE 4" MIN. TYPE 5 MODIFIED ASPHALTIC CONCRETE BASE COURSE 6" MIN. MODOT TYPE 5 AGGREGATE SUB BASE COMPACTED 95% OF STANDARD DENSITY 6" MIN. COMPACTED/STABILIZED SUBGRADE 95% STANDARD MAX. DENSITY
COLLECTORS			
RESIDENTIAL	6" MIN. PORTLAND CEMENT CONCRETE PAVEMENT 6" MIN. COMPACTED/STABILIZED SUBGRADE 95% OF STANDARD MAX. DENSITY	2" TYPE 5 MODIFIED ASPHALTIC CONCRETE SURFACE 6" MIN. TYPE 5 MODIFIED ASPHALTIC CONCRETE BASE COURSE 6" MIN. COMPACTED/STABILIZED SUBGRADE 95% OF STANDARD MAX. DENSITY	2" TYPE 5 MODIFIED ASPHALTIC CONCRETE SURFACE 5" MIN. TYPE 5 MODIFIED ASPHALTIC CONCRETE BASE COURSE 6" MIN. MODOT TYPE 5 AGGREGATE SUB BASE COMPACTED 95% OF STANDARD DENSITY 6" MIN. COMPACTED/STABILIZED SUBGRADE 95% STANDARD MAX. DENSITY
COMMERCIAL	6" MIN. PORTLAND CEMENT CONCRETE PAVEMENT 6" MIN. COMPACTED/STABILIZED SUBGRADE 95% OF STANDARD MAX. DENSITY	2" TYPE 5 MODIFIED ASPHALTIC CONCRETE SURFACE 6" MIN. TYPE 5 MODIFIED ASPHALTIC CONCRETE BASE COURSE 6" MIN. COMPACTED/STABILIZED SUBGRADE 95% OF STANDARD MAX. DENSITY	2" TYPE 5 MODIFIED ASPHALTIC CONCRETE SURFACE 5" MIN. TYPE 5 MODIFIED ASPHALTIC CONCRETE BASE COURSE 6" MIN. MODOT TYPE 5 AGGREGATE SUB BASE COMPACTED 95% OF STANDARD DENSITY 6" MIN. COMPACTED/STABILIZED SUBGRADE 95% STANDARD MAX. DENSITY
INDUSTRIAL	8" MIN. PORTLAND CEMENT CONCRETE PAVEMENT 6" MIN. COMPACTED/STABILIZED SUBGRADE 95% OF STANDARD MAX. DENSITY	2" TYPE 5 MODIFIED ASPHALTIC CONCRETE SURFACE 9" MIN. TYPE 5 MODIFIED ASPHALTIC CONCRETE BASE COURSE 6" MIN. COMPACTED/STABILIZED SUBGRADE 95% OF STANDARD MAX. DENSITY	2" TYPE 5 MODIFIED ASPHALTIC CONCRETE SURFACE 8" MIN. TYPE 5 MODIFIED ASPHALTIC CONCRETE BASE COURSE 6" MIN. MODOT TYPE 5 AGGREGATE SUB BASE COMPACTED 95% OF STANDARD DENSITY 6" MIN. COMPACTED/STABILIZED SUBGRADE 95% STANDARD MAX. DENSITY
ARTERIAL			
MINOR	8" MIN. PORTLAND CEMENT CONCRETE PAVEMENT 6" MIN. COMPACTED/STABILIZED SUBGRADE 95% STANDARD MAX. DENSITY	2" TYPE 5 MODIFIED ASPHALTIC CONCRETE SURFACE 9" MIN. TYPE 5 MODIFIED ASPHALTIC CONCRETE BASE COURSE 6" MIN. COMPACTED/STABILIZED SUBGRADE 95% OF STANDARD MAX. DENSITY	2" TYPE 5 MODIFIED ASPHALTIC CONCRETE SURFACE 8" MIN. TYPE 5 MODIFIED ASPHALTIC CONCRETE BASE COURSE 6" MIN. MODOT TYPE 5 AGGREGATE SUB BASE COMPACTED 95% OF STANDARD DENSITY 6" MIN. COMPACTED/STABILIZED SUBGRADE 95% STANDARD MAX. DENSITY
MAJOR	9" MIN. PORTLAND CEMENT CONCRETE PAVEMENT 6" MIN. COMPACTED/STABILIZED SUBGRADE 95% STANDARD MAX. DENSITY	2" TYPE 5 MODIFIED ASPHALTIC CONCRETE SURFACE 10" MIN. TYPE 5 MODIFIED ASPHALTIC CONCRETE BASE COURSE 6" MIN. COMPACTED/STABILIZED SUBGRADE 95% STANDARD MAX. DENSITY	2" TYPE 5 MODIFIED ASPHALTIC CONCRETE SURFACE 9" MIN. TYPE 5 MODIFIED ASPHALTIC CONCRETE BASE COURSE 6" MIN. MODOT TYPE 5 AGGREGATE SUB BASE COMPACTED 95% OF STANDARD DENSITY 6" MIN. COMPACTED/STABILIZED SUBGRADE 95% STANDARD MAX. DENSITY
SUBGRADE			
SUBGRADE "REQUIREMENTS FOR ALL PAVEMENTS"	CONSTRUCTION OF PAVEMENTS ON HIGH PLASTICITY SOILS SHALL BE MODIFIED WITH HYDRATED LIME, CEMENT, OR CLASS "C" FLY ASH OR REPLACED WITH LOWER PLASTICITY SOILS. HIGH PLASTICITY SOILS SHALL BE DEFINED AS SOILS WITH A LIQUID LIMIT GREATER THAN 50 AND A PLASTICITY INDEX GREATER THAN 30. DETERMINATION OF THE SOIL PLASTICITY SHALL BE PROVIDED BY THE CONTRACTOR AT THE DIRECTION OF THE CITY ENGINEER		

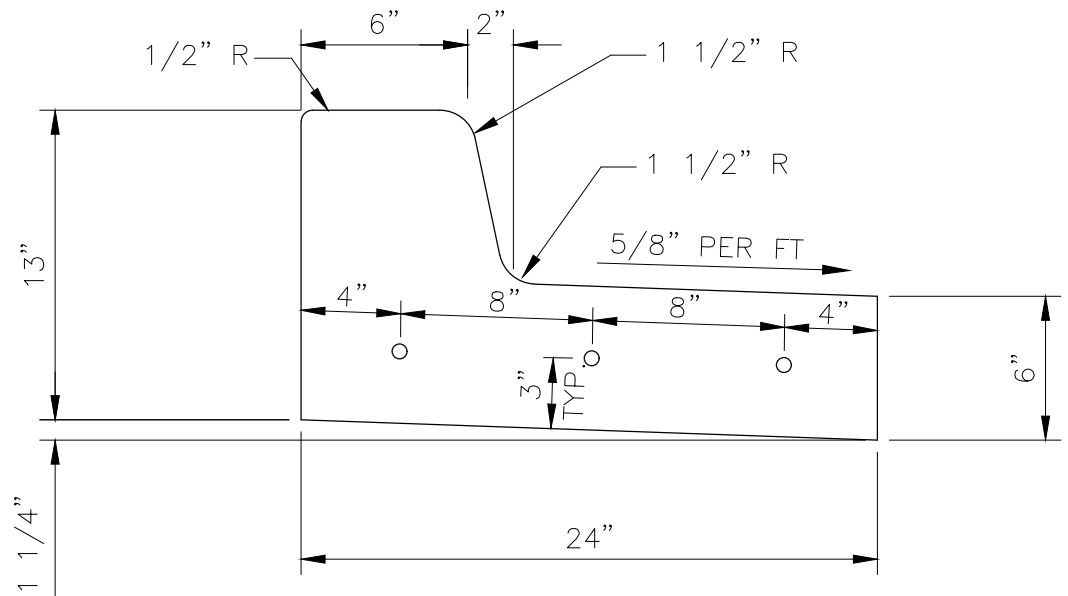


DATE: 07/23/21  
SCALE: NO SCALE

STR-004



CROSS SECTION



CROSS SECTION

NOTES:

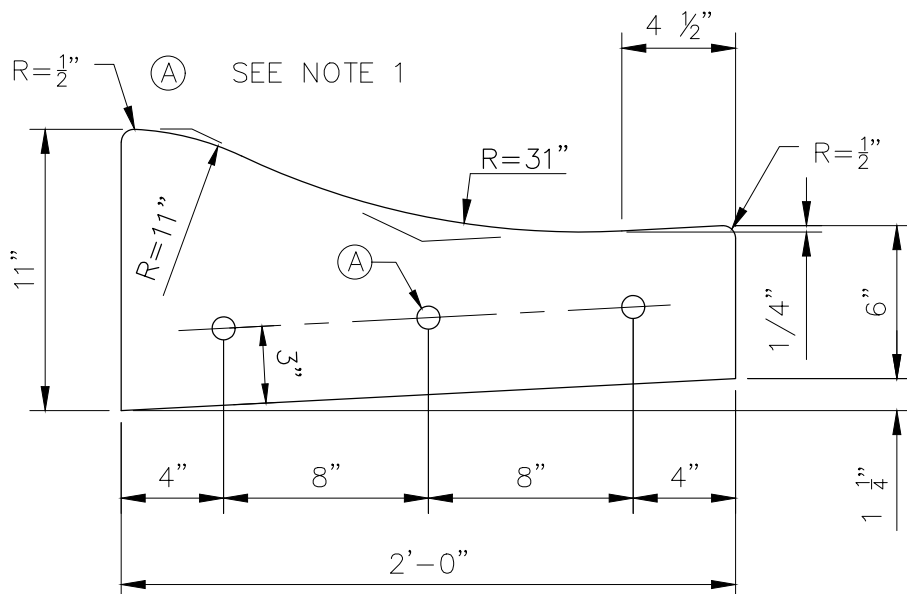
(DRY CURB)

1. 3/4" EXPANSION JOINTS WITH 3-#5 X 2' DOWELS TO BE PLACED AT THE RADIUS POINTS AND NOT MORE THAN 100 FEET APART ON STRAIGHT RUNS. THESE DOWELS SHALL BE GREASED AND WRAPPED ON END WITH EXPANSION TUBES.
2. 1 1/2" DEEP CONTRACTION JOINTS SHALL BE INSTALLED AT APPROXIMATELY 15' INTERVALS. THESE JOINTS SHALL PASS THROUGH THE ENTIRE CURB SECTION SURFACE.
3. ALL CONCRETE CONSTRUCTION TO BE KCMMB4K.

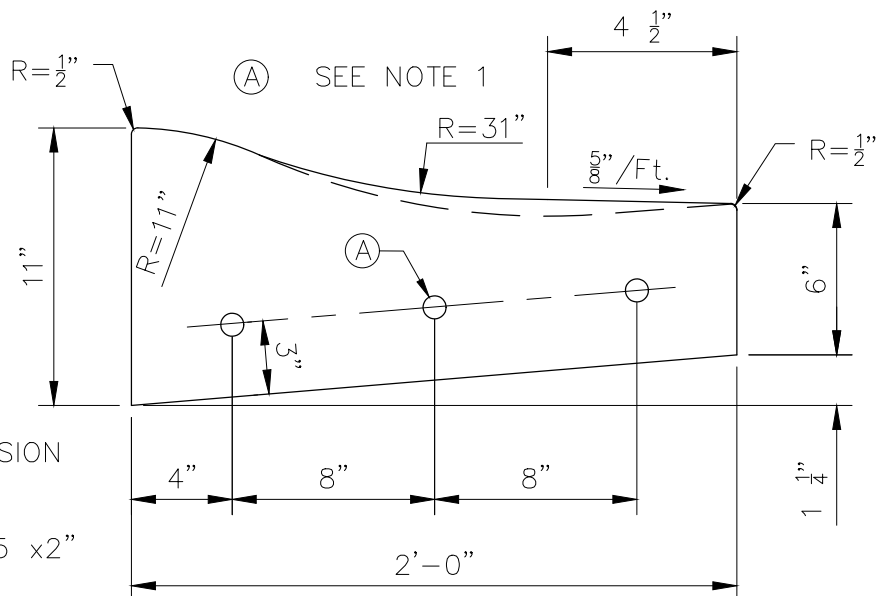
TYPICAL BARRIER CURB AND GUTTER

APWA TYPE CG-1





CROSS SECTION



CROSS SECTION  
(DRY CURB)

NOTES:

1.  $\frac{5}{8}$ " DIA. SMOOTH DOWELS AT EXPANSION JOINTS (TYP. OF 3)
2.  $\frac{3}{4}$ " EXPANSION JOINTS WITH 3 - #5 x2" DOWELS TO BE PLACED AT RADIUS POINTS AND NOT MORE THAN 100' APART. THESE DOWELS SHALL BE GREASED AND WRAPPED ON END WITH EXPANSION TUBES.
3. 1  $\frac{1}{2}$ " DEEP CONTRACTION JOINTS SHALL BE INSTALLED AT APPROXIMATELY 15' INTERVALS THESE JOINTS SHALL PASS THROUGH THE ENTIRE CURB SECTION SURFACE.
4. ALL CONCRETE CONSTRUCTION SHALL BE KCM MB4K

TYPICAL ROLL BACK CURB AND GUTTER

APWA TYPE CG-2

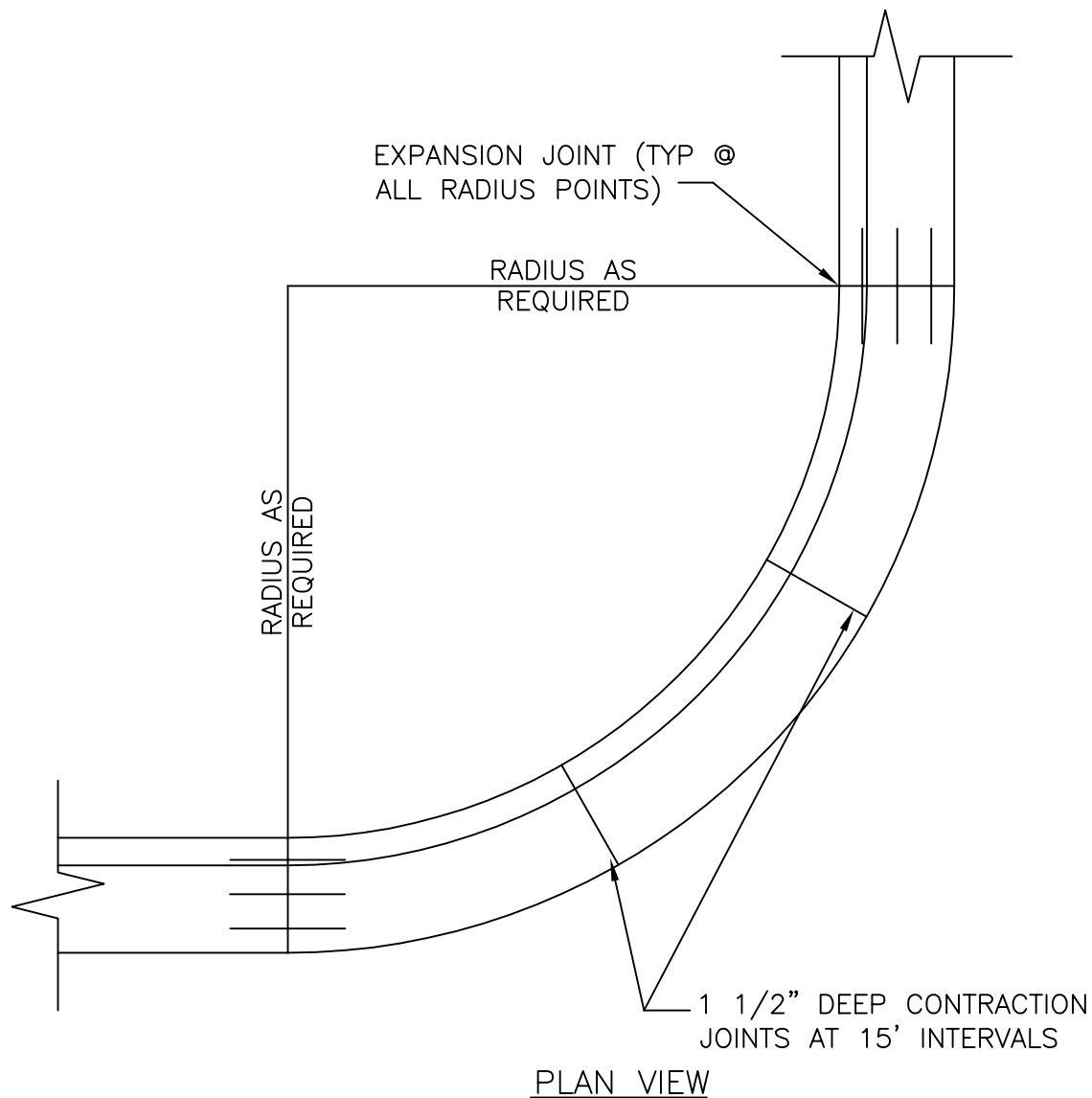


*Grain Valley*  
Come Home To Opportunity

DATE: 04/28/20  
SCALE: NO SCALE

STR-006

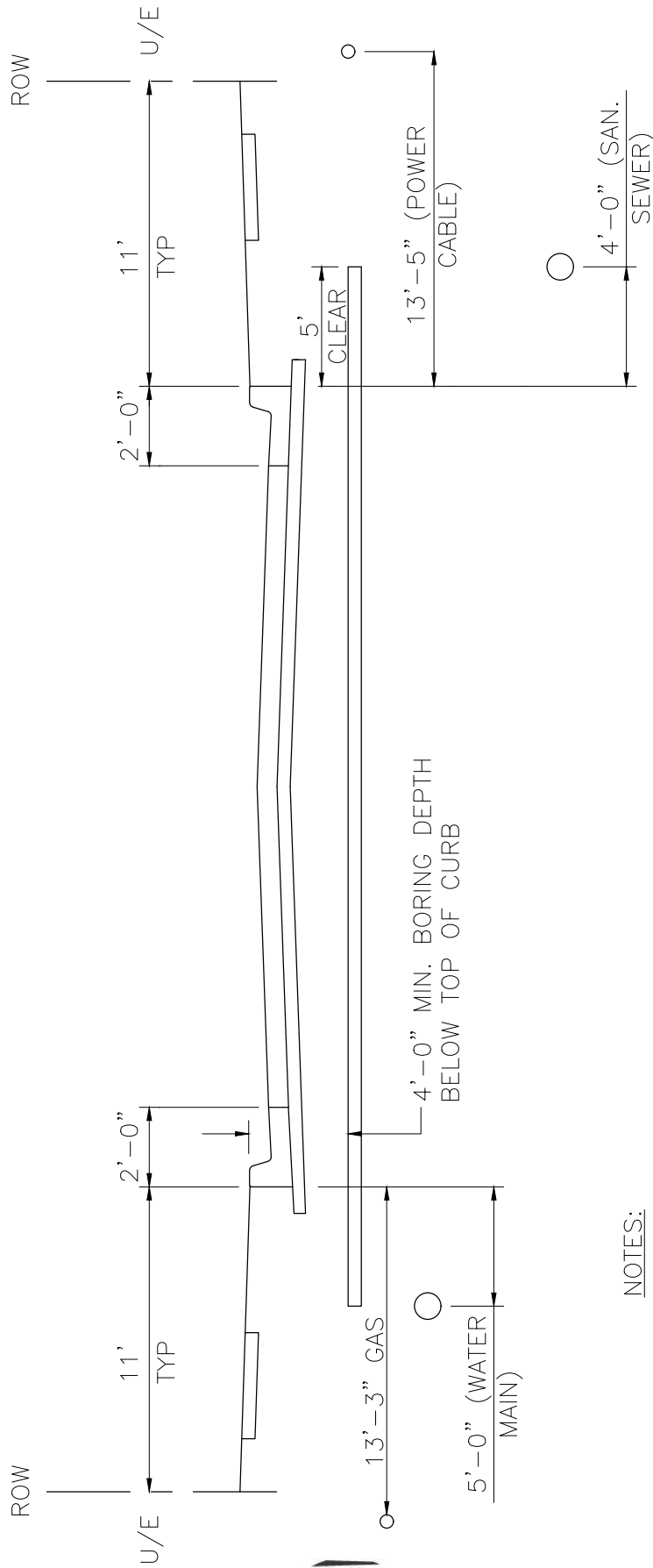




RADIUS	= FT
RESIDENTIAL	= 25'
RESIDENTIAL COLLECTOR	= 35'
INDUSTRIAL COLLECTOR	= 50'
COMMERCIAL COLLECTOR	= 30'
MINOR ARTERIAL	= 35'
MAJOR ARTERIAL	= 35'–50'

## CURB EXPANSION JOINTS



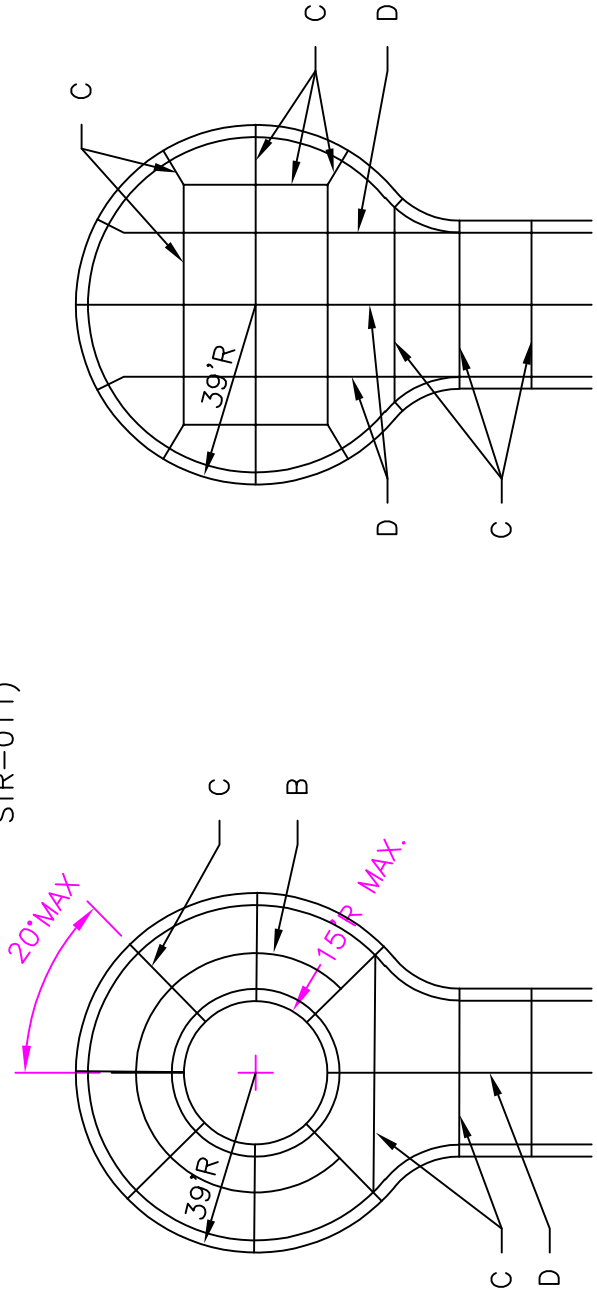
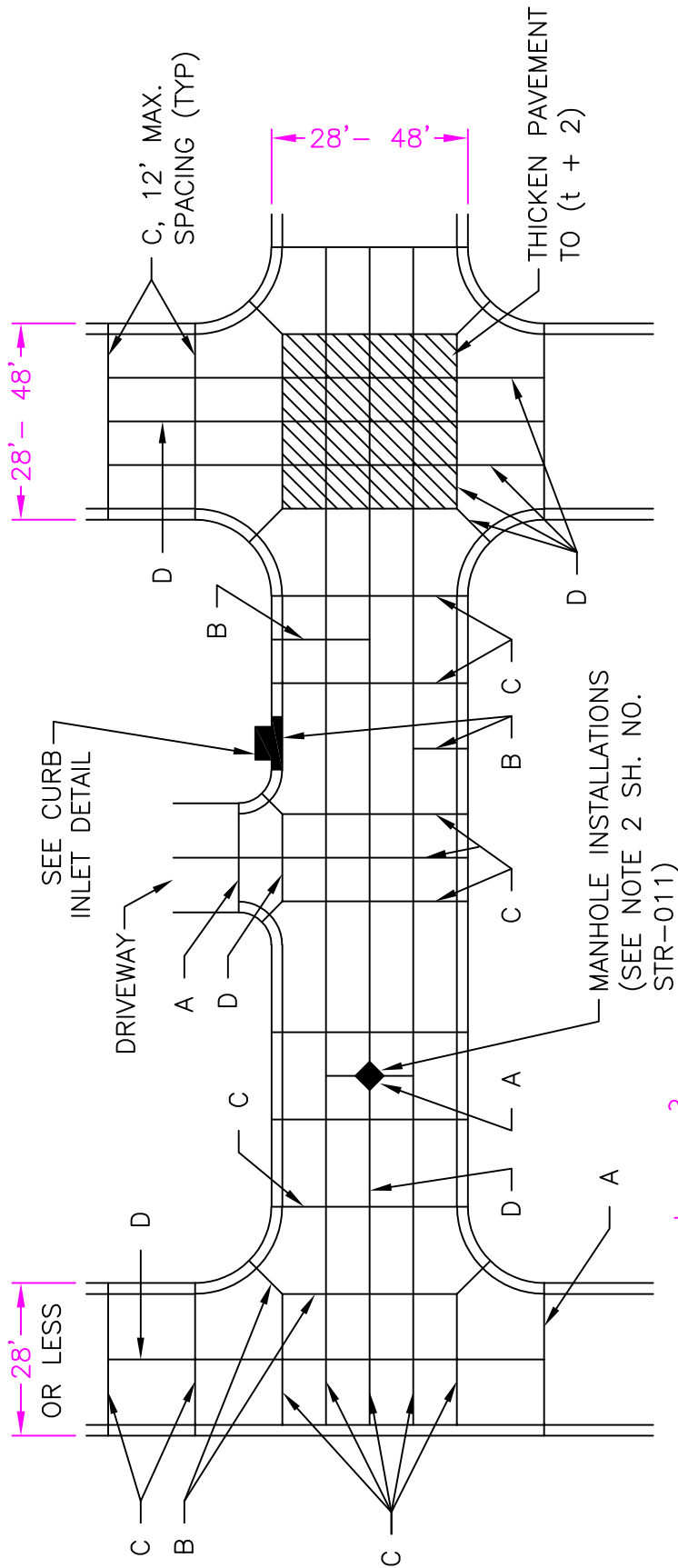


NOTES:

1. NO UTILITIES MAY BE LOCATED WITHIN 5' OF THE BACK OF CURBS.
2. ALL TRENCHES, TAP HOLES, AND BORING HOLES MUST BE BACKFILLED AND TAMPED WHEN WORK IS COMPLETED.
3. ALL BORING MUST BE LOCATED NO CLOSER THAN 4' TO THE BACK OF CURB WITH MIN. DEPTH NOT LESS THAN 2' FROM TOP OF CURB TO THE TOP OF THE BORE HOLE.

STANDARD UTILITY LOCATION DETAIL





## P.C.C. PAVEMENT SPECIAL DETAILS

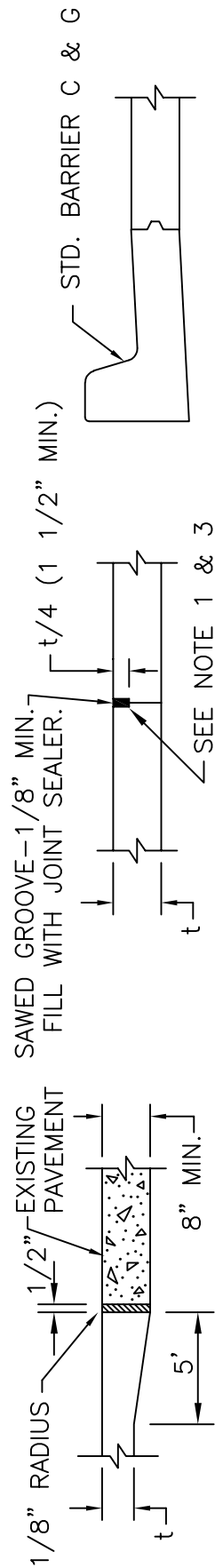


Grain Valley  
Come Home To Opportunity

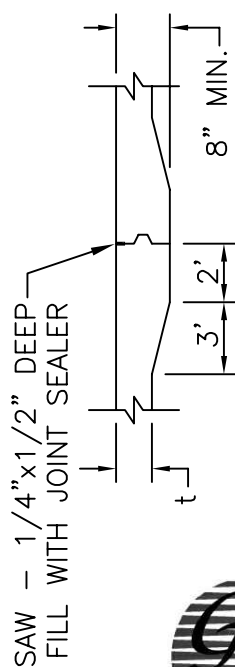
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SCALE: NO SCALE

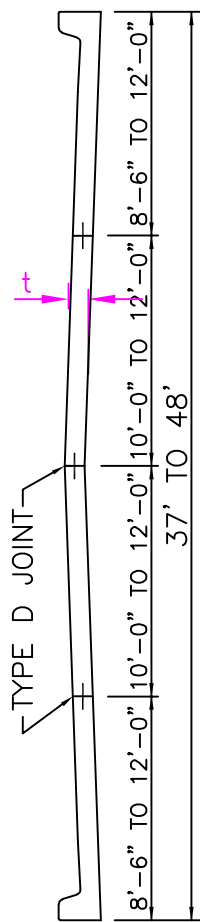
STR-010



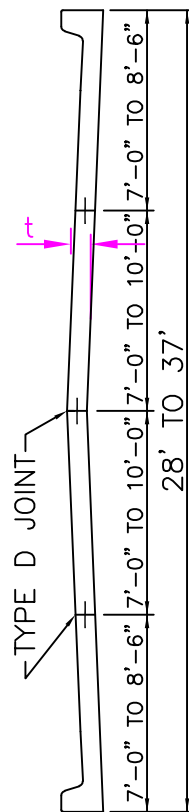
TYPE A  
EXPANSION JOINT



TYPE B  
TRANSVERSE CONSTRUCTION JOINT

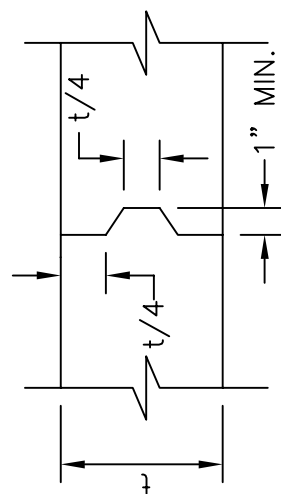


SECTION 37' TO 48' WIDE



SECTION 28' TO 37' WIDE

INTEGRAL CURB



TYPICAL KEYWAY DETAIL

### NOTES:

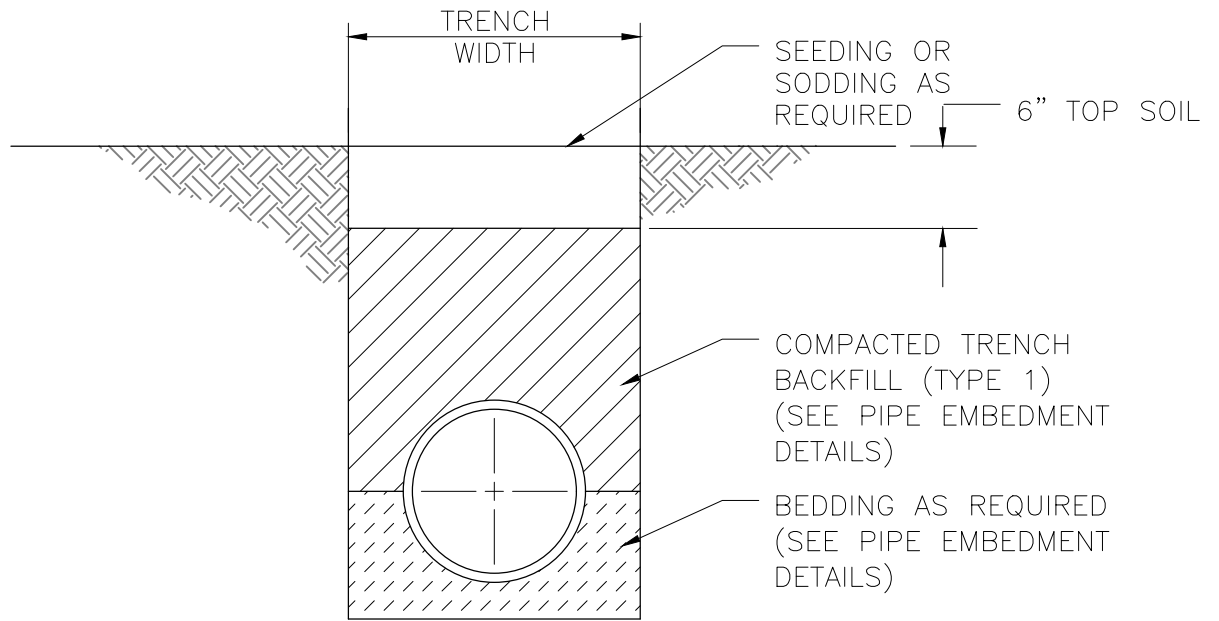
1. FILL ALL SAWED JOINTS WITH APPROVED SEALANT.
2. FOR MANHOLE INSTALLATIONS CONSTRUCT 4' x 4' x (t + 2) PCC PAD AT A 45 DEGREE ANGLE TO JOINTS.
3. CONSTRUCT CONTRACTION JOINTS AT 12' MAX. INTERVALS.
4. t = PAVEMENT THICKNESS, SEE TYPICAL STREET SECTIONS

## P.C.C. PAVEMENT SPECIAL SECTIONS

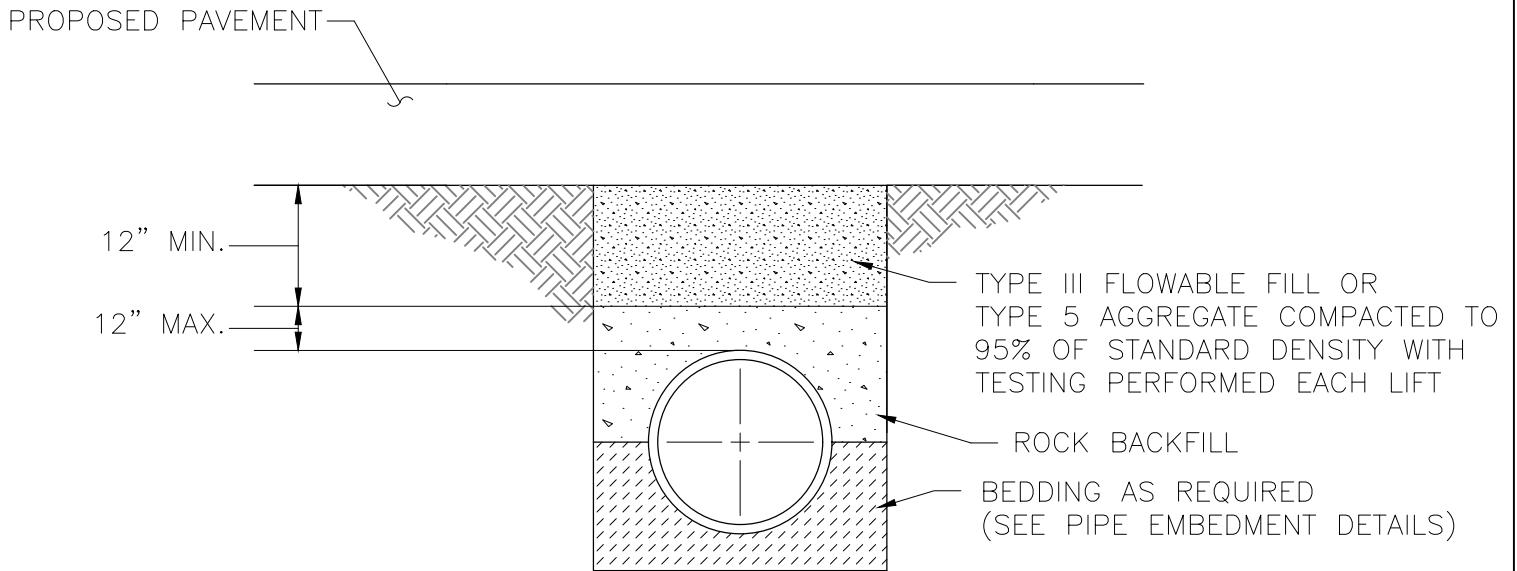


Grain Valley  
Come Home To Opportunity





OUTSIDE PAVED AREAS

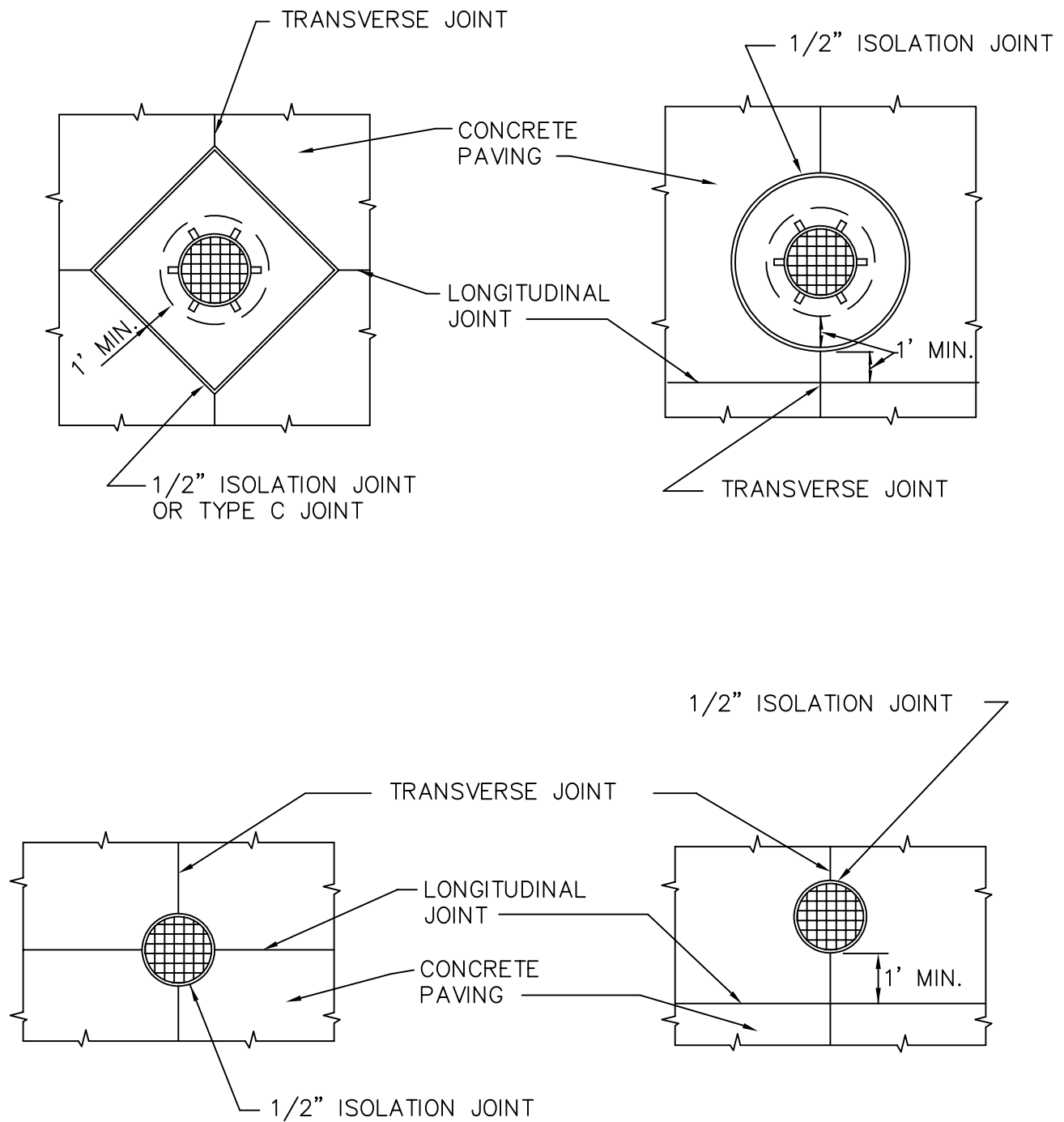


INSIDE PROPOSED PAVED AREAS

(TO ONE FOOT BEHIND CURB)  
FOR ANY TESTED ROAD BASE

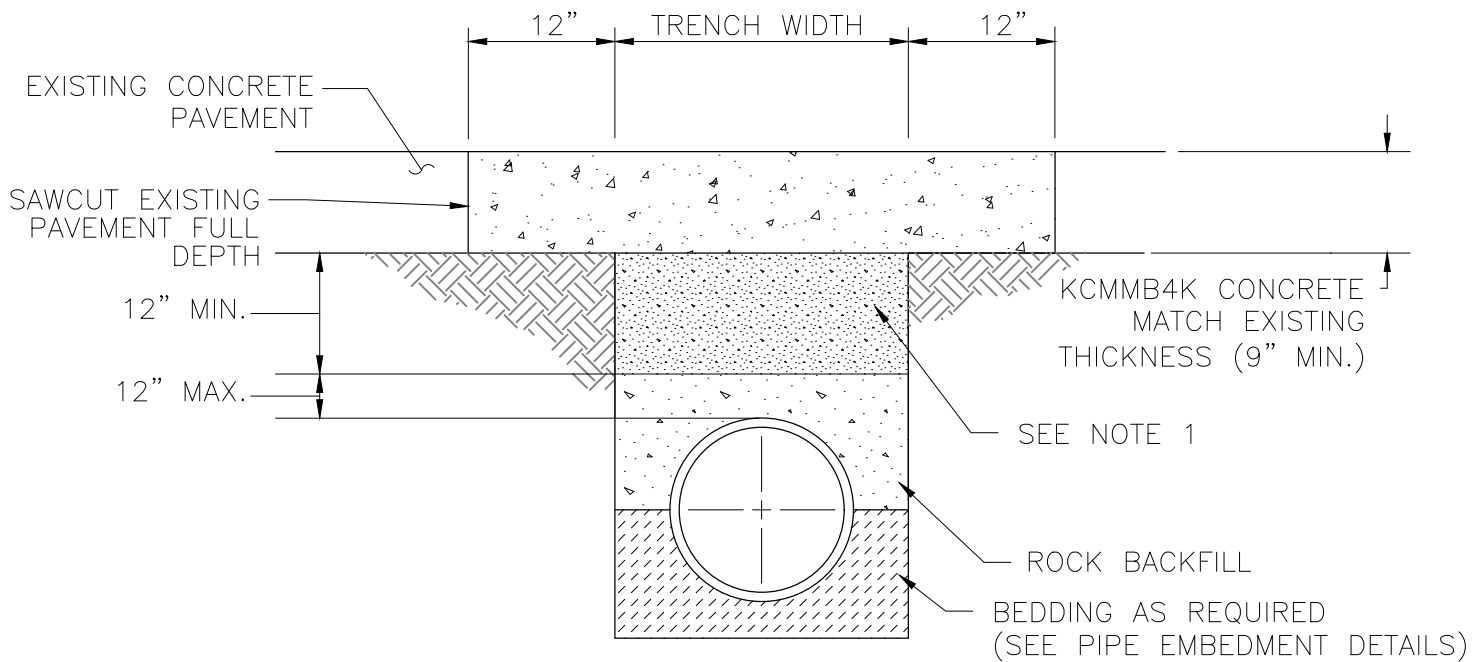
## TYPICAL TRENCH BACKFILL DETAIL





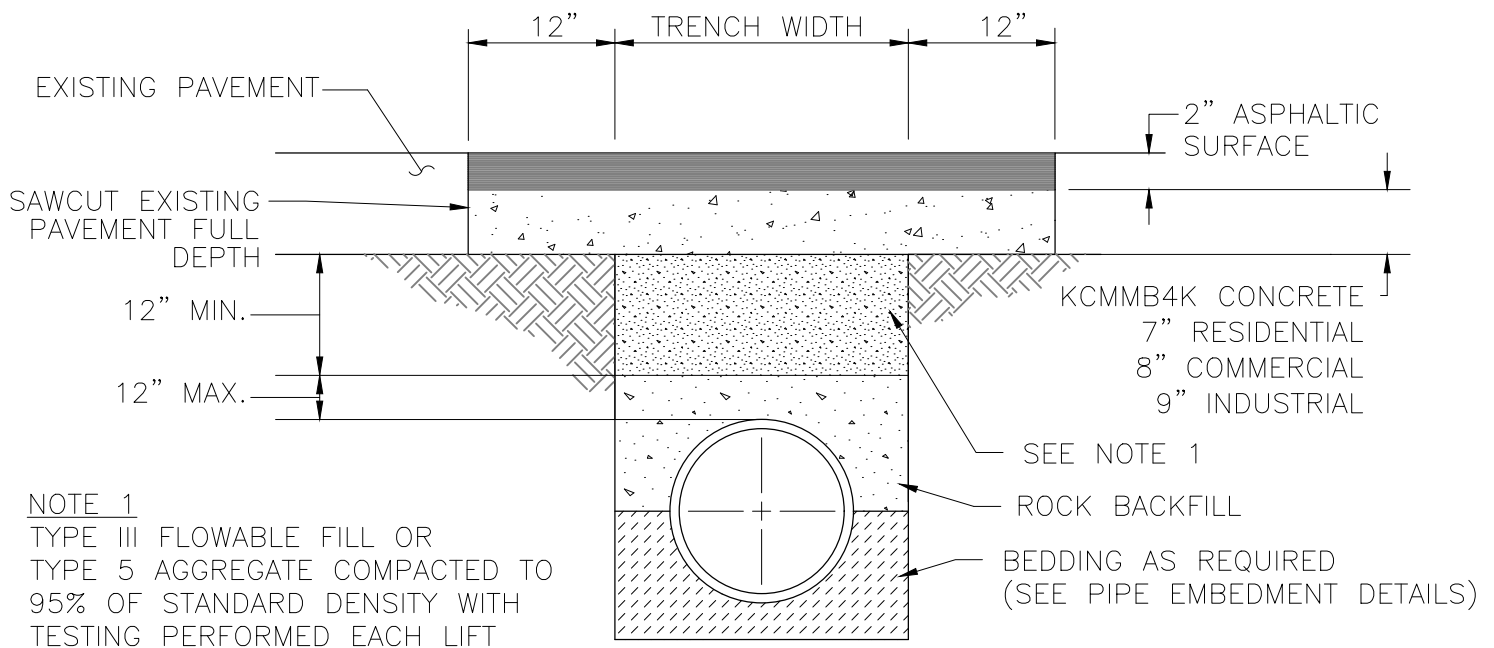
## CONCRETE PAVING ISOLATION JOINT DETAILS





### INSIDE EXISTING CONCRETE PAVED AREAS

(TO ONE FOOT BEHIND CURB)  
FOR ANY TESTED ROAD BASE  
OR ANY EXISTING ROAD



#### NOTE 1

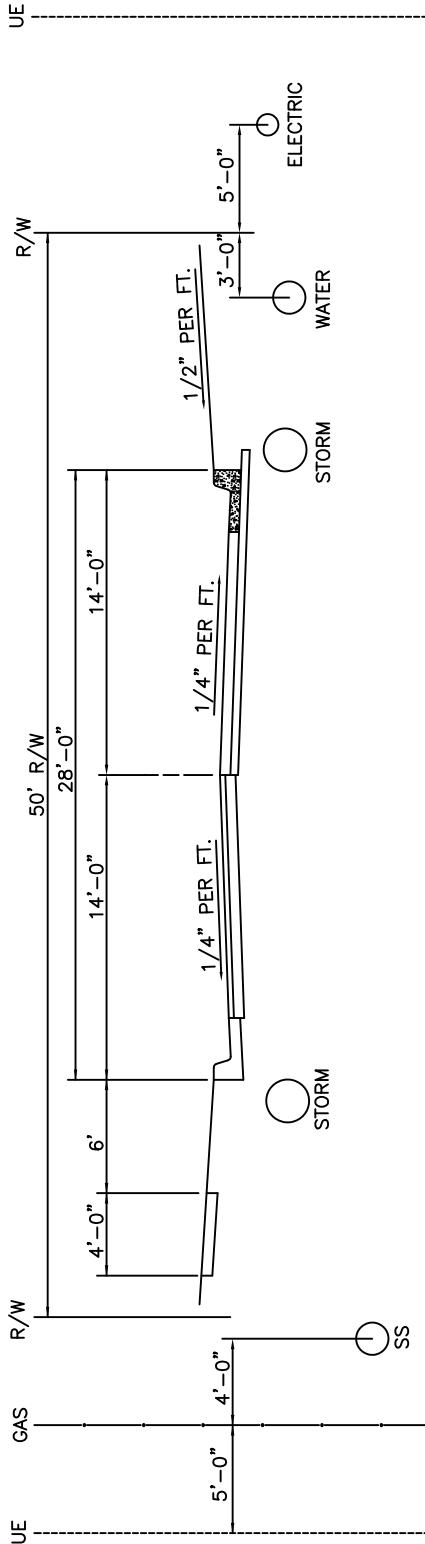
TYPE III FLOWABLE FILL OR  
TYPE 5 AGGREGATE COMPACTED TO  
95% OF STANDARD DENSITY WITH  
TESTING PERFORMED EACH LIFT

### INSIDE EXISTING ASPHALT PAVED AREAS

(TO ONE FOOT BEHIND CURB)  
FOR ANY TESTED ROAD BASE  
OR ANY EXISTING ROAD

## TYPICAL STREET REPAIR DETAIL





**UTILITIES - RESIDENTIAL STREET TYPICAL SECTION**





STORM SEWER

DETAIL

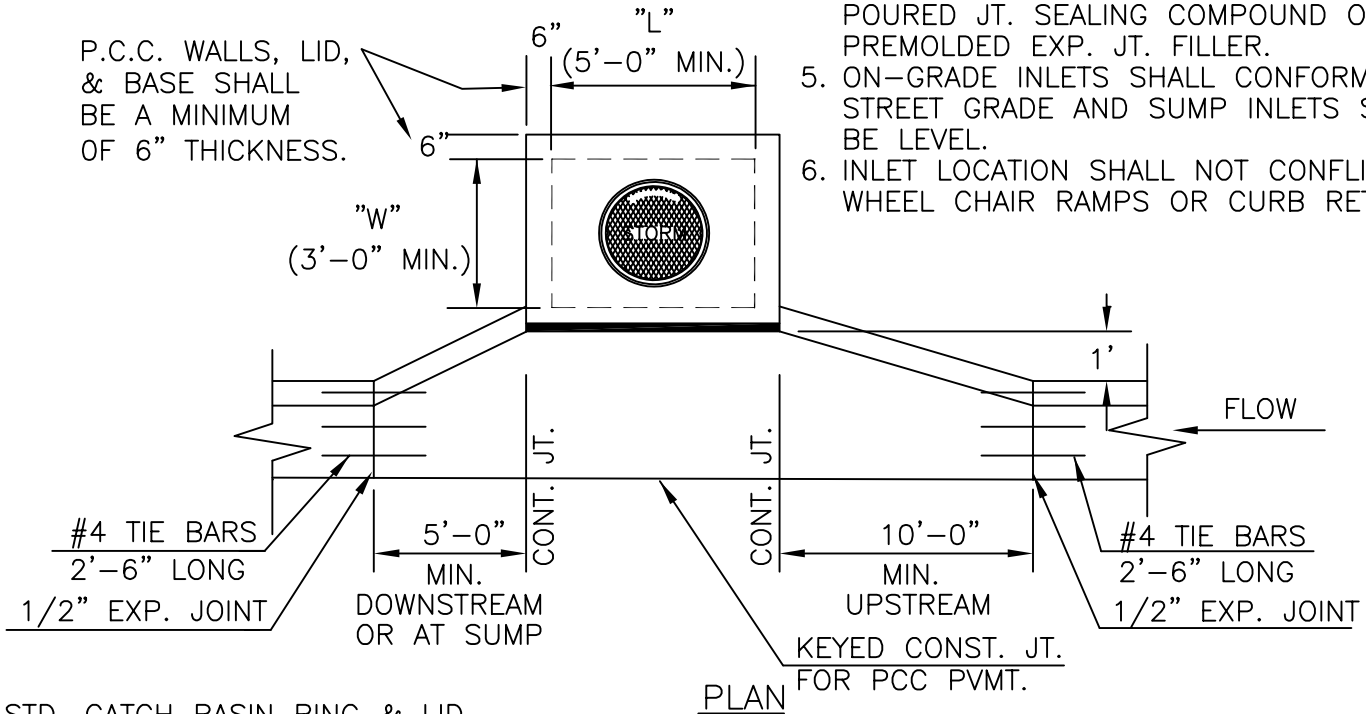
DRAWINGS



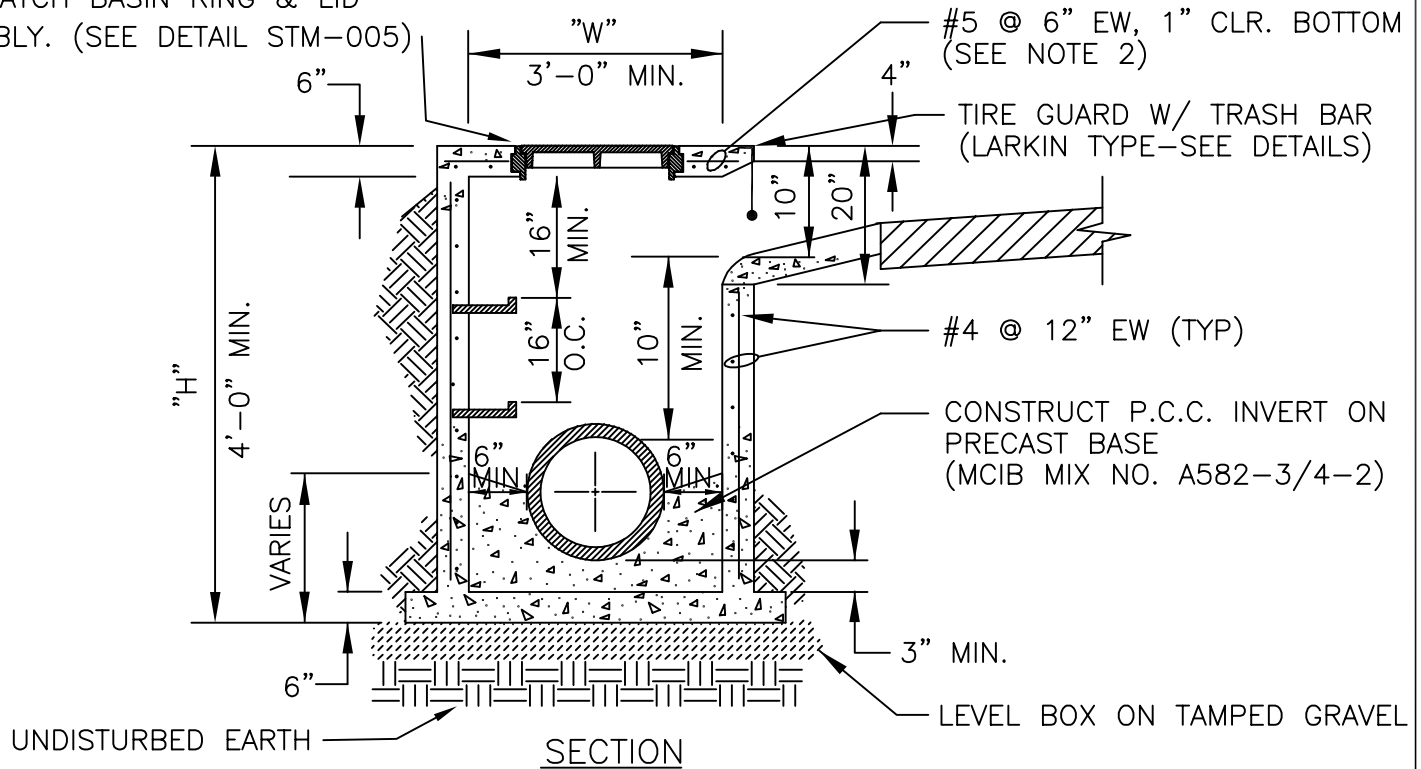
### **STORMWATER NOTES**

1. Stormwater design shall meet the requirements of Kansas City APWA and the BMP Manual published by Marc.
2. Design should maintain existing conditions, reduce peak flows and reduce pollutants.
3. Detention basins shall be designed:
  - a) to drain completely within 40 hours following a storm event
  - b) to allow maintenance such as mowing and weed control
  - c) to provide the following comprehensive control of post-development peak discharge rates:
    - 50% storm peak rate less than or equal to 0.5 cfs per site acre
    - 10% storm peak rate less than or equal to 2.0 cfs per site acre
    - 1% storm peak rate less than or equal to 3.0 cfs per site acre
4. Inlet piping to the detention basin should enter the basin within a foot of the bottom elevation of the pond and appropriate energy dissipation methods shall be employed to control erosion.
5. Outfalls from detention and retention basins shall include appropriate energy dissipation methods to prevent downstream erosion.
6. Drainage swales installed along rear lot lines shall provide adequate erosion control methods.
7. All outlets for stormwater into a riparian zone shall be through an appropriate method to spread flow, dissipate energy and reduce potential for erosion such as plunge pools and level spreaders.
8. All drainage swales within building lots shall employ underground drainage if the tributary area exceeds 2 acres per Kansas City APWA standards.
9. Water quality treatment shall be employed for detention and retention basins serving residential subdivisions and when BMPs are not employed on individual industrial and commercial tracts and lots. BMPs shall be designed to treat the first 1.5 inches of rainfall runoff.

- NOTES:**
1. REMOVE LIFTING HOOKS UPON PLACEMENT OF TOP SLAB AND GROUT AS NECESSARY TO REPAIR.
  2. TOP SLAB REINFORCEMENT SHALL ALSO INCLUDE 2 #5 @ 4" DIAG. 4 SIDES OF OPENING.
  3. TOP SLAB SHALL BE SET @ 1/4" PER FOOT SLOPE (MIN.) TO THE INLET THROAT.
  4. EXP. JTS. SHALL BE HOT OR COLD POURED JT. SEALING COMPOUND OR PREMOLDED EXP. JT. FILLER.
  5. ON-GRADE INLETS SHALL CONFORM TO STREET GRADE AND SUMP INLETS SHALL BE LEVEL.
  6. INLET LOCATION SHALL NOT CONFLICT WITH WHEEL CHAIR RAMPS OR CURB RETURNS.



STD. CATCH BASIN RING & LID ASSEMBLY. (SEE DETAIL STM-005)

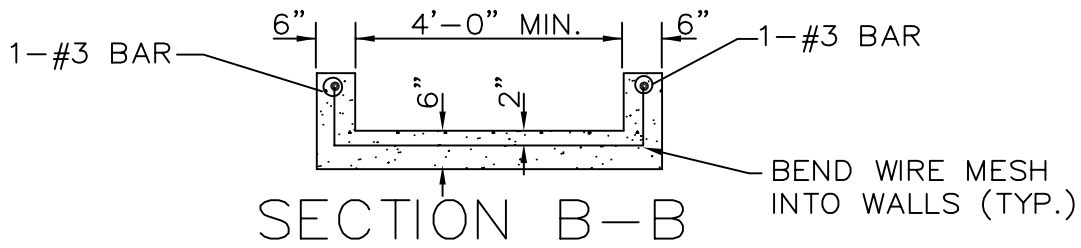


## CURB INLET DETAIL



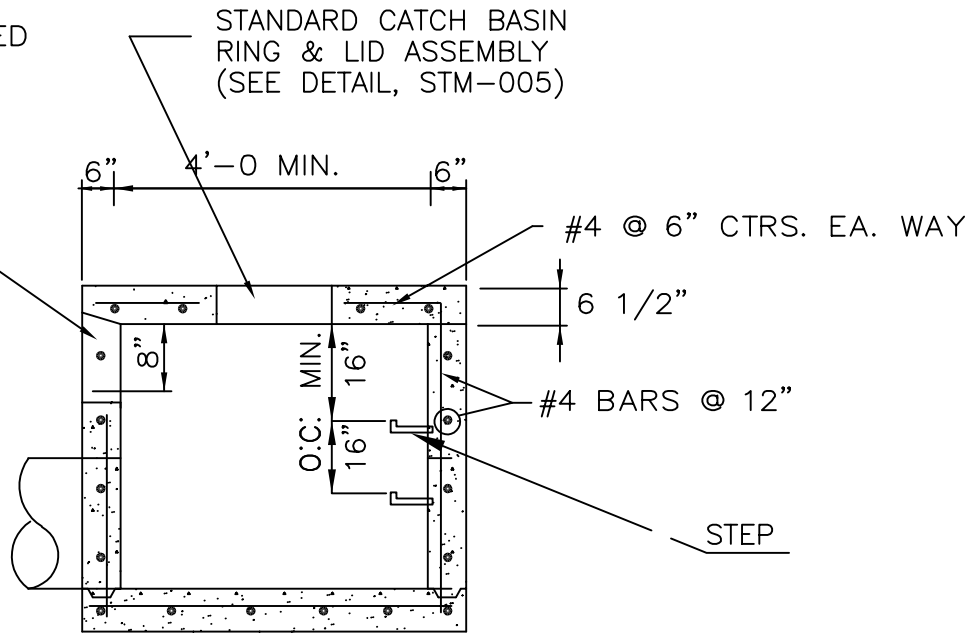




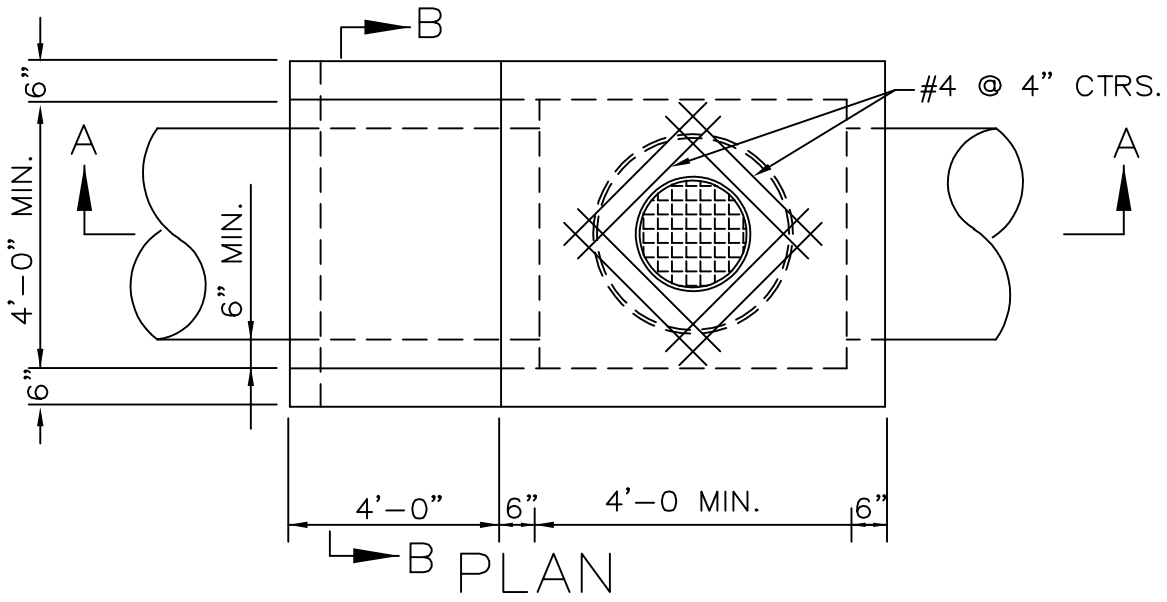


NOTE:  
THROAT AND THROAT  
WALL SHALL BE POURED  
MONOLITHIC.

STD. INLET  
OPENING  
W/ STEEL  
FRAME



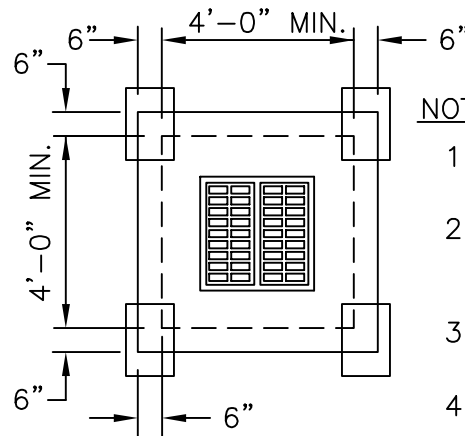
SECTION A-A



NOTE:  
OPENINGS TO BE LOCATED AS NOTED ON PLANS.

## STANDARD AREA INLET

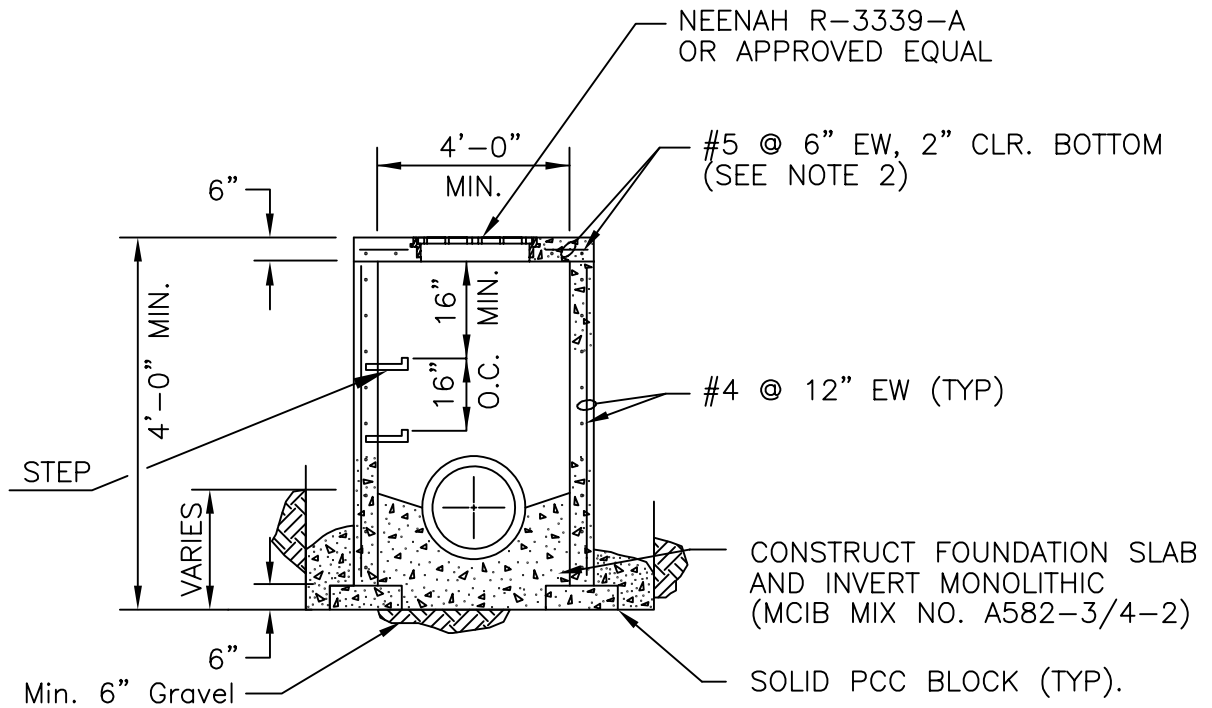




NOTES:

1. REMOVE LIFTING HOOKS UPON PLACEMENT OF TOP SLAB
2. TOP SLAB REINFORCEMENT SHALL ALSO INCLUDE 2 #5 @ 4" DIAG. 4 SIDES OF OPENING.
3. TOP SLAB SHALL BE SLOPED TO MATCH FINISHED GROUND LINE.
4. INSIDE RIGHT OF WAY SHALL HAVE TRAFFIC RATED (HS20MIN) TOP.

PLAN



SECTION

## STANDARD GRATE INLET



(2) OPEN PICKHOLES  
(SEE DETAILS)

1 1/2" FLAT FACE  
GOTHIC

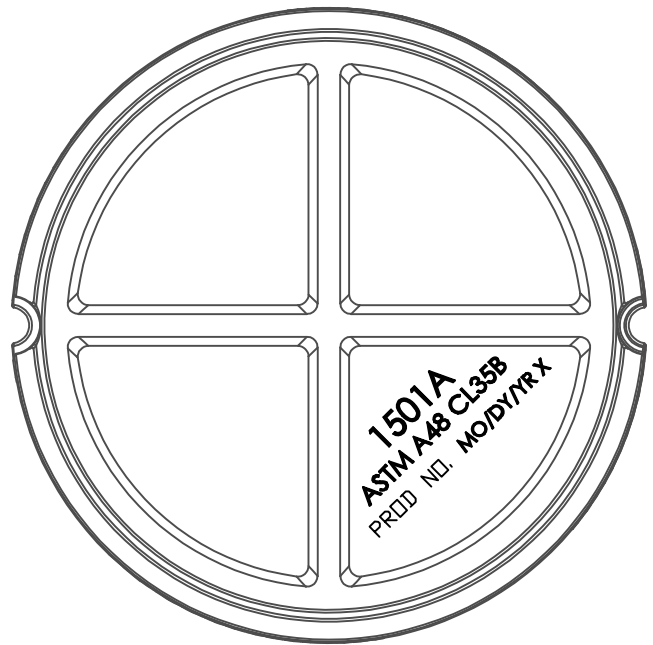


PLAN VIEW

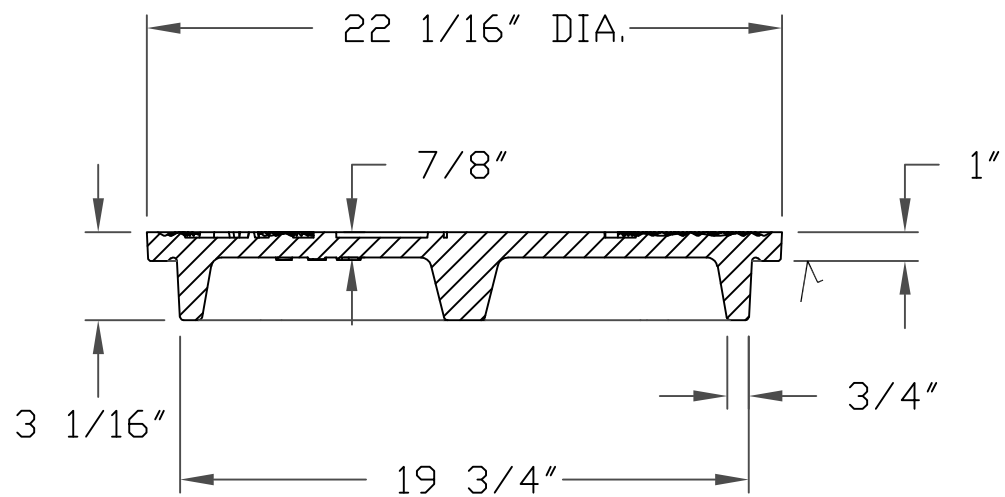
APPROVED RING AND LID

EJIW 1501

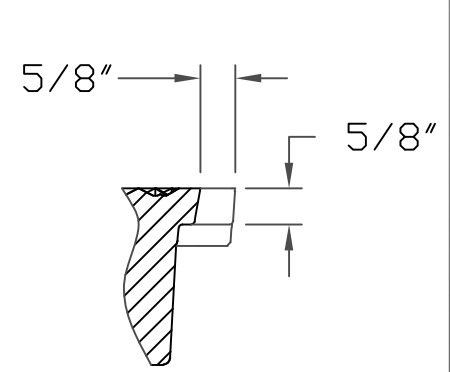
OR APPROVED OTHER



BOTTOM VIEW



SECTION VIEW

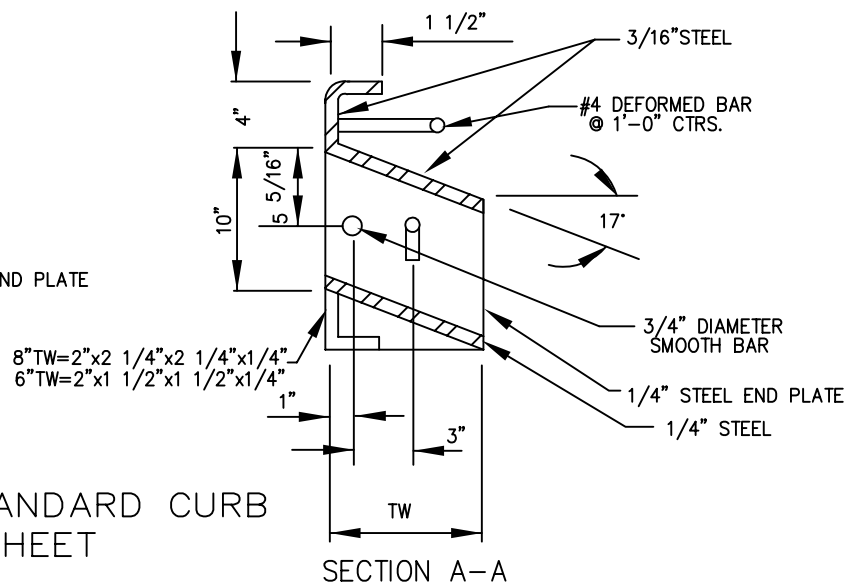
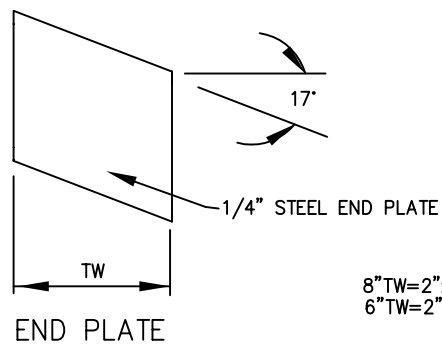
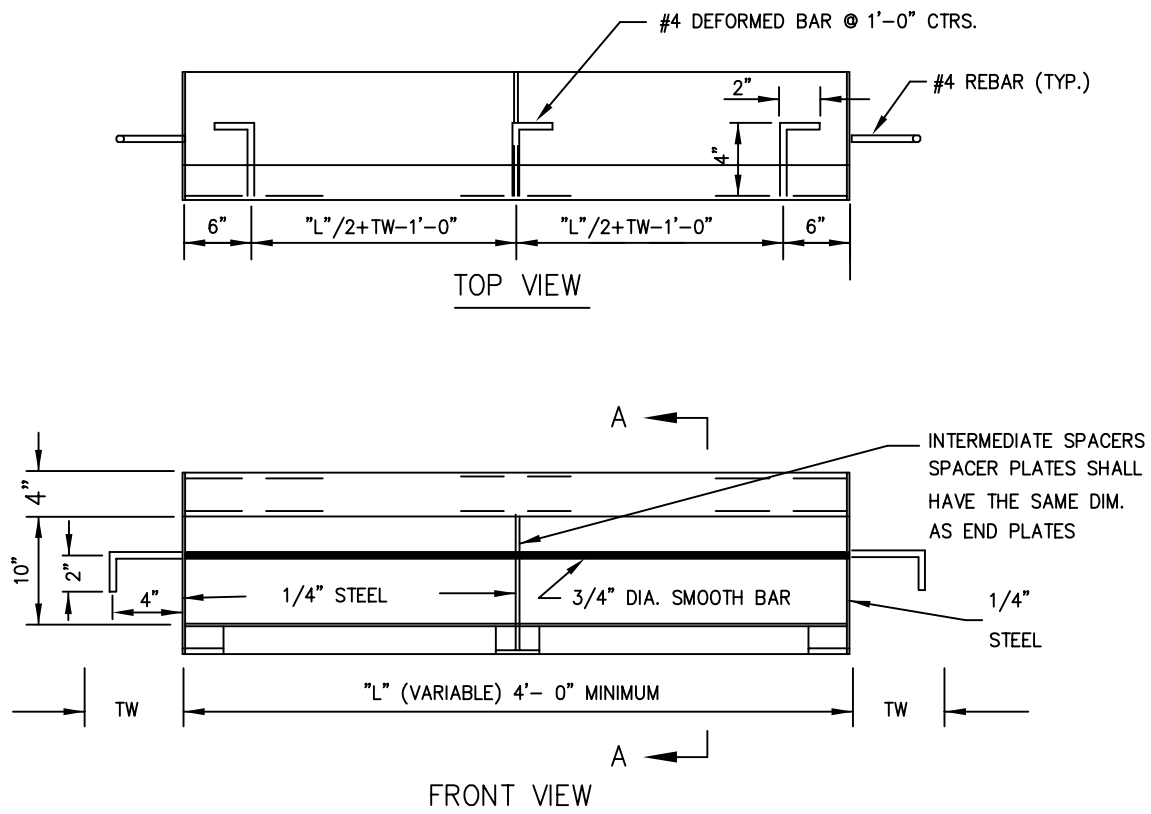


PICKHOLE DETAIL

# MANHOLE RING AND LID DETAIL



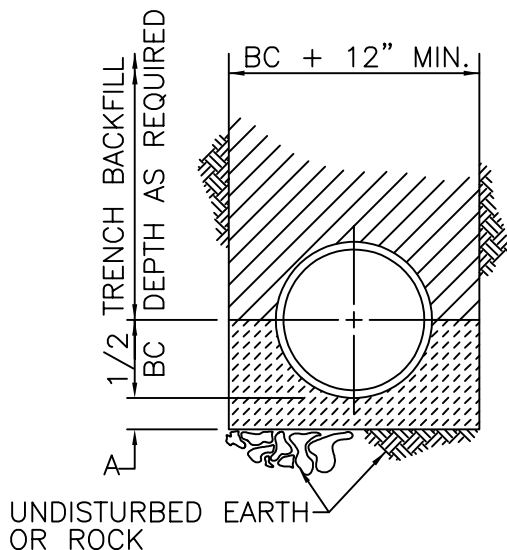
DATE:	6/2/20
SCALE:	NO SCALE



NOTE: SEE NOTES STANDARD CURB  
INLET DETAIL SHEET

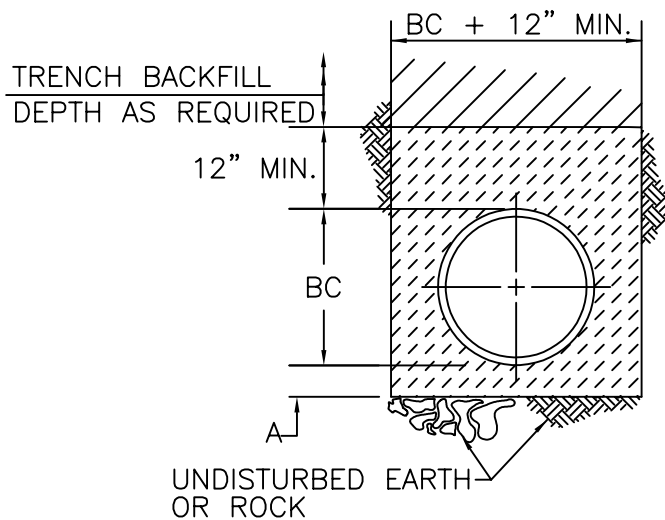
## STEEL FRAME DETAIL





RCP PIPE EMBEDMENT

(REQUIRED UNDER ROADWAY PAVED AREAS)



HDPE PIPE EMBEDMENT

**LEGEND**

BC	OUTSIDE DIA. OF PIPE
D	NOMINAL PIPE SIZE
A	EMBEDMENT BELOW PIPE
	TRENCH BACKFILL (TYPE 1)
	TAMPED GRANULAR BACKFILL (TYPE 3)
	GRANULAR BEDDING
	CONCRETE
	CLEAN CRUSHED STONE

PIPE EMBEDMENT NOTES:

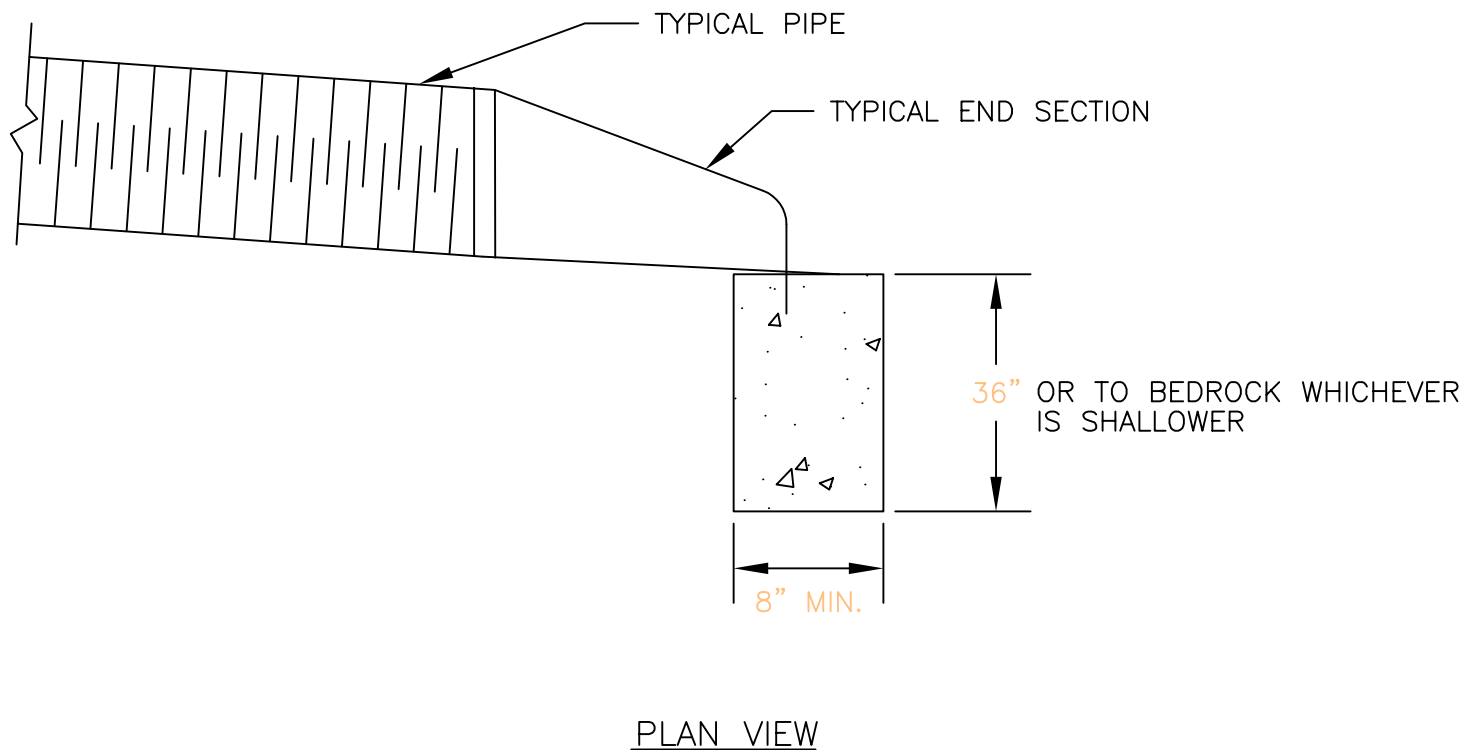
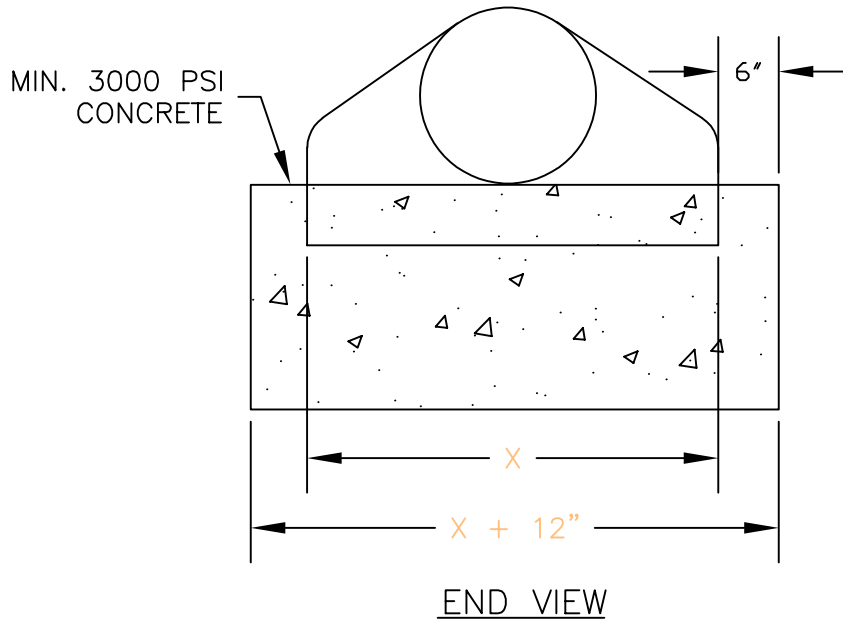
1. GRANULAR BEDDING SHALL BE CRUSHED ROCK OR PEA GRAVEL WITH NOT LESS THAN 95% PASSING 3/4" (95% PASSING 1" FOR 30" AND LARGER PIPE) AND NOT LESS THAN 95% RETAINED ON A 3/8"; TO BE PLACED IN NOT MORE THAN 6" LAYERS AND COMPACTED BY SLICING WITH A SHOVEL OR VIBRATING.
2. TAMPED GRANULAR BACKFILL (TYPE 3) SHALL BE GRANULAR MATERIAL CONFORMING TO THE REQUIREMENTS OF SECTION 1007.3.1 OF THE LATEST ISSUE OF THE MISSOURI STANDARD SPECIFICATIONS FOR HIGHWAY CONSTRUCTION.
3. TRENCH BACKFILL (TYPE 1) SHALL BE FINELY DIVIDED MATERIAL FREE FROM DEBRIS AND STONES, COMPACTED TO 95% MAXIMUM DENSITY.
4. CLEAN CRUSHED STONE SHALL BE GRANULAR MATERIAL CONFORMING TO THE GRADATION REQUIREMENTS OF SECTION 1005.1.4.1 OF THE LATEST ISSUE OF THE MISSOURI STANDARD SPECIFICATIONS FOR HIGHWAY CONSTRUCTION.

**TABLE OF EMBEDMENT DEPTHS BELOW PIPE**

D	A MIN SOIL	A MIN ROCK
0"—27"	4"	6"
30"—60"	6"	9"
66"—UP	8"	12"

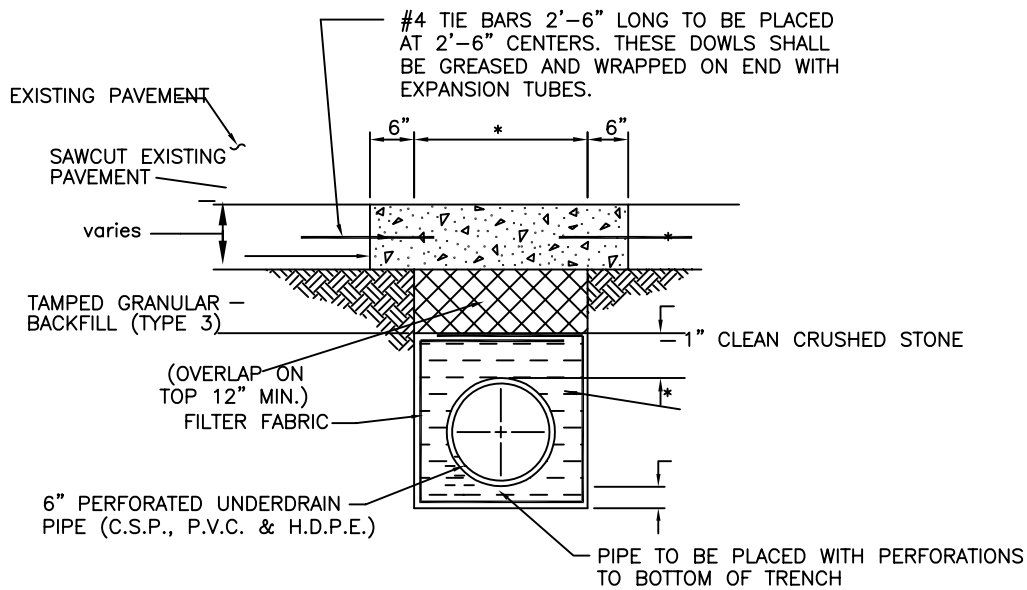
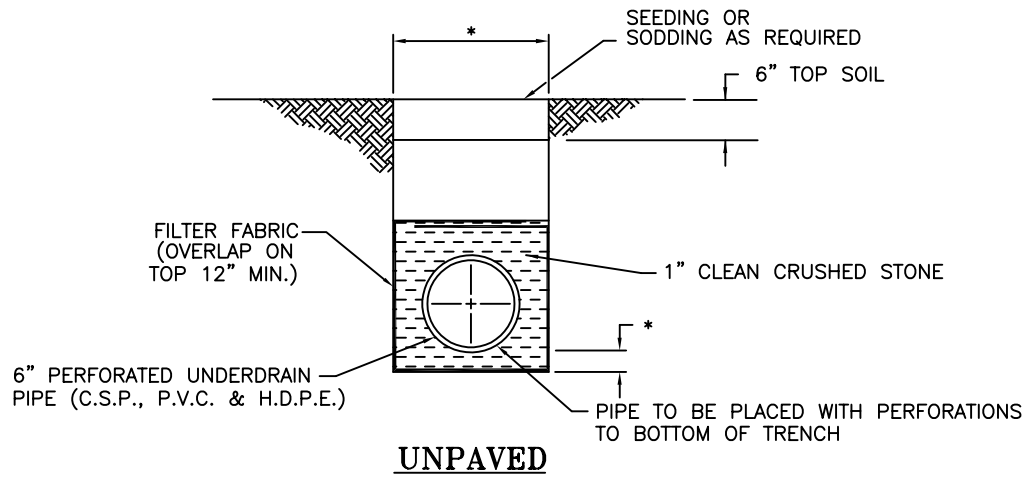
**STORM PIPE EMBEDMENT DETAILS**



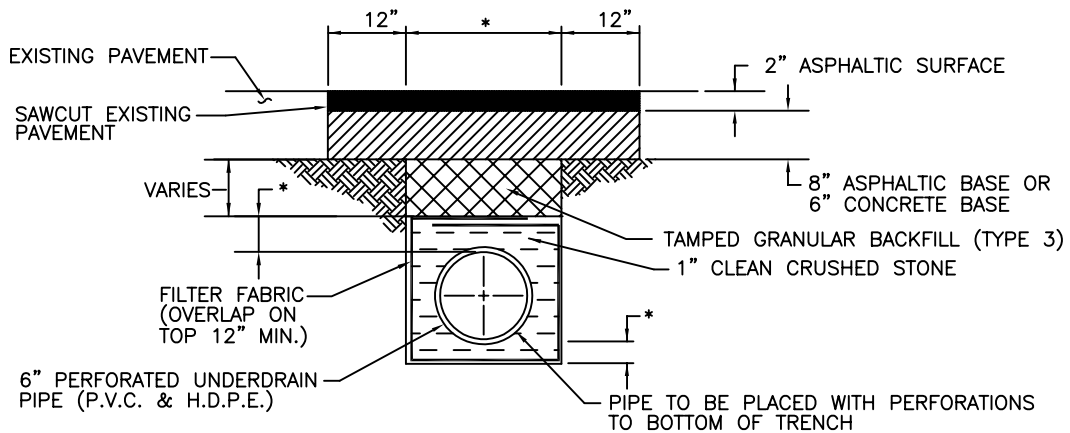


## TYPICAL TOE WALL DETAIL





### **CONCRETE PAVEMENT**

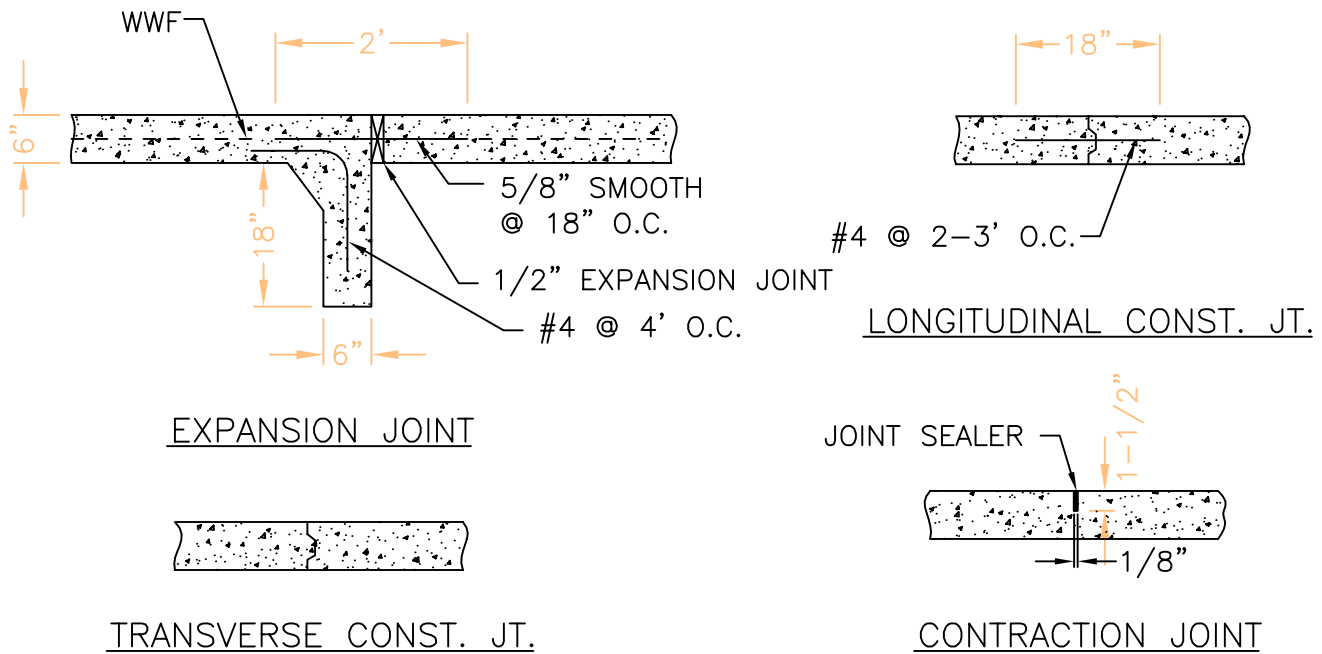
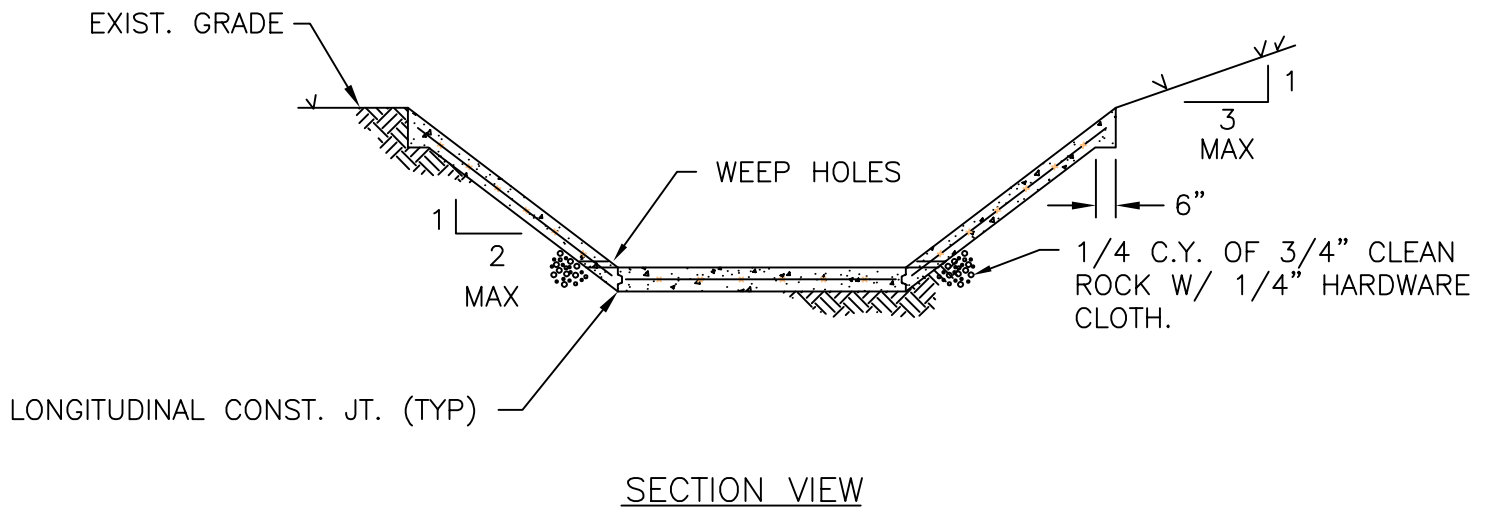


### **ASPHALT PAVEMENT**

## **UNDERDRAIN PIPE TRENCH DETAIL**

\* (SEE DETAIL STO-007 FOR TRENCH WIDTH AND EMBEDMENT DEPTHS)





### JOINT DETAILS

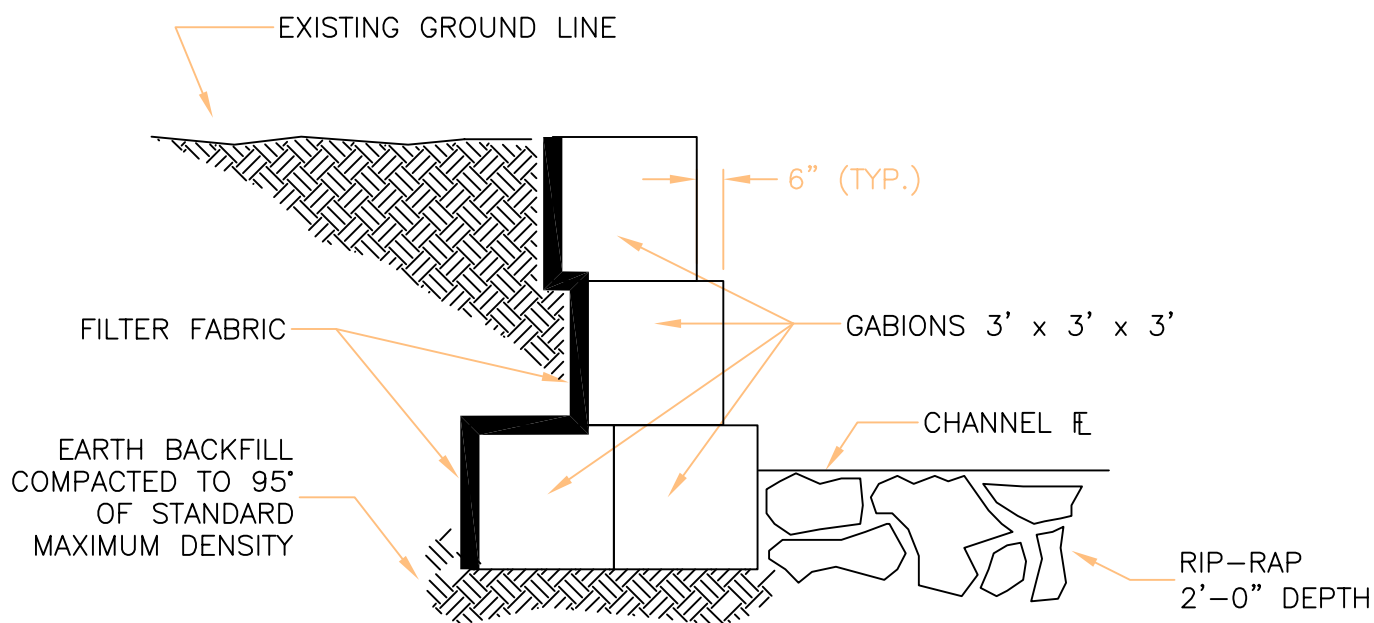
### NOTES:

1. EXPANSION JOINTS SHALL BE PLACED WHERE DITCH LINER ABUTS ANOTHER STRUCTURE, AT 250' CTRS. MAXIMUM AND AT POINTS OF CURVATURE.
2. TRANSVERSE CONTRACTION JOINTS SHALL BE PLACED AT 15' INTERVALS. IF A POUR IS DELAYED OVER 30 MIN. A TRANSVERSE CONSTRUCTION JOINT SHALL BE SUBSTITUTED FOR A CONTRACTION JOINT AND EXCESS CONCRETE WASTED.
3. DITCH LINER CONSTRUCTION TO BE 4" MINIMUM THICKNESS.
4. CONCRETE REINFORCEMENT TO BE 6"X6"-W3XW3 WELDED WIRE MESH.
5. 2" DIA. PLASTIC WEEP HOLES @ 30' CTRS. TO BE INSTALLED ON EACH SIDE OF DITCH LINING.
6. LONGITUDINAL CONTRACTION JOINTS SHALL BE PLACED AS SHOWN BUT NOT TO EXCEED 10' SPACING.

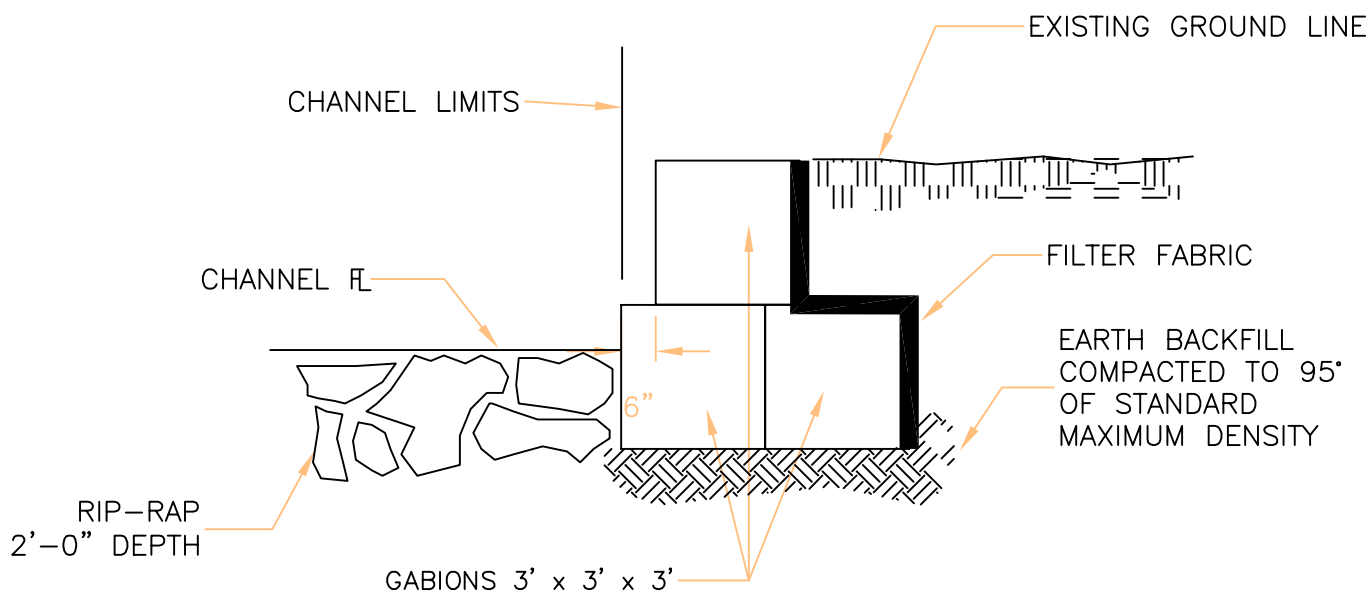
## CONCRETE PAVED DITCH





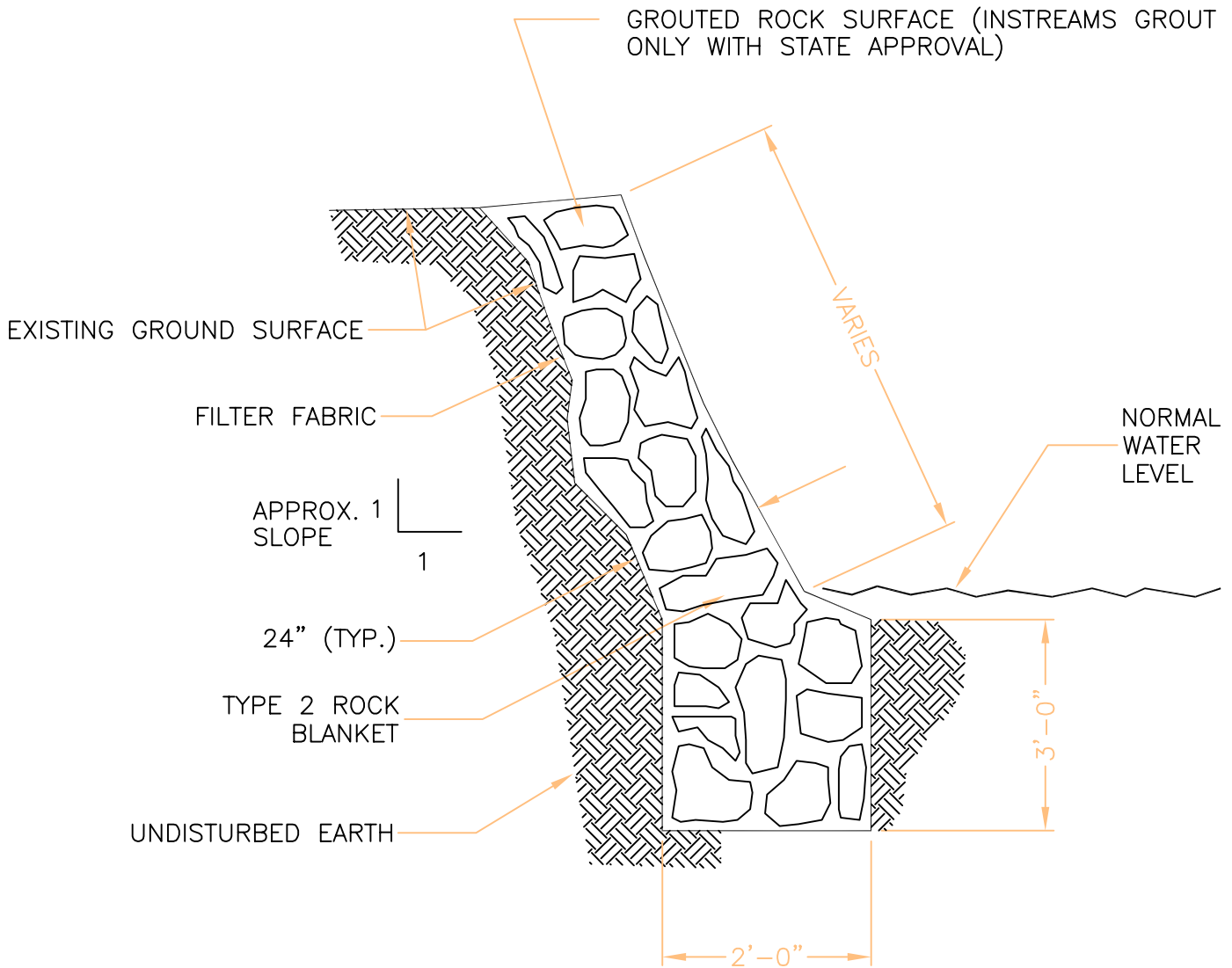


## TYPE 1 GABION PLACEMENT



## TYPE 2 GABION PLACEMENT

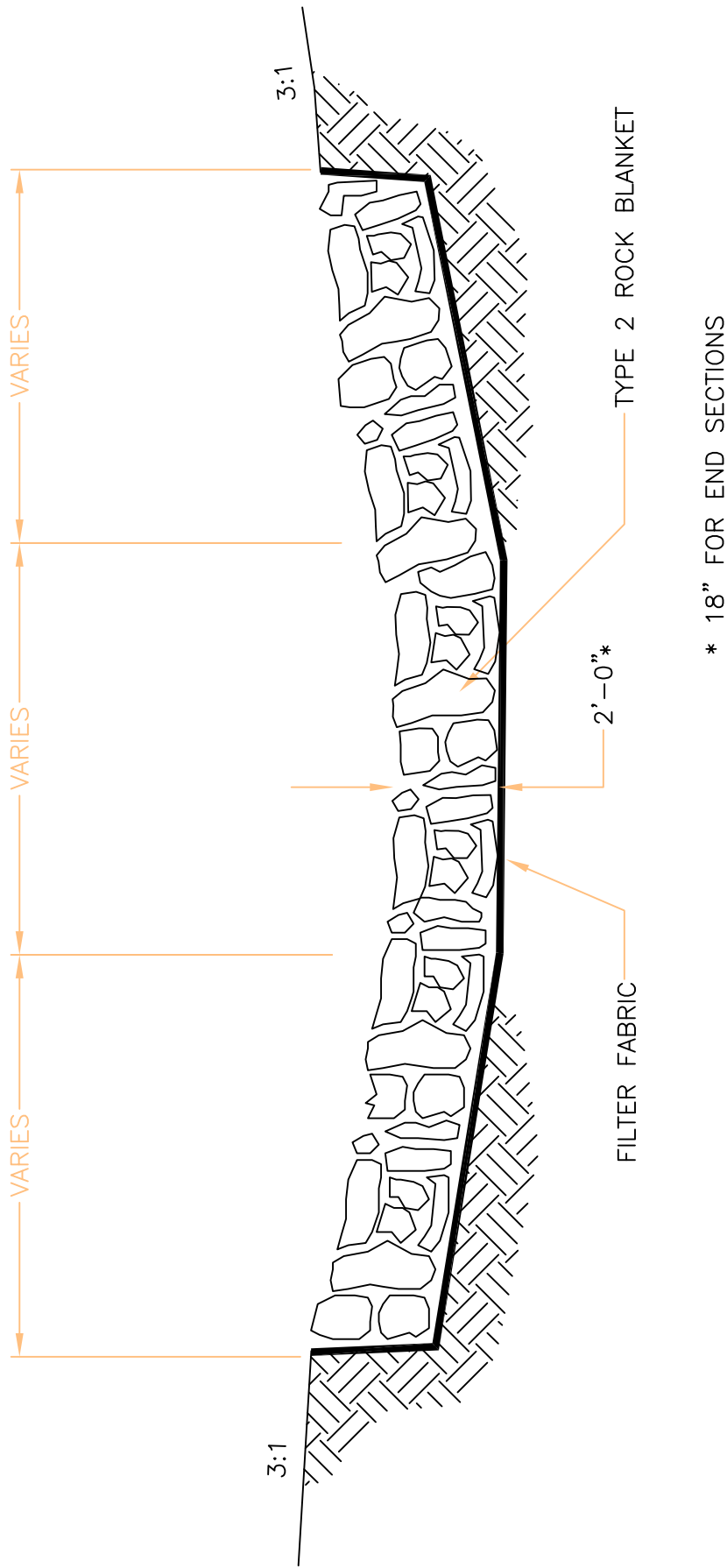




## CREEK BANK STABILIZATION DETAIL



REVISED DATE:	6/2/20
DATE:	1/31/03
SCALE:	NO SCALE



## TYPICAL RIP-RAP DITCH SECTION DETAIL





SANITARY SEWER

DETAIL

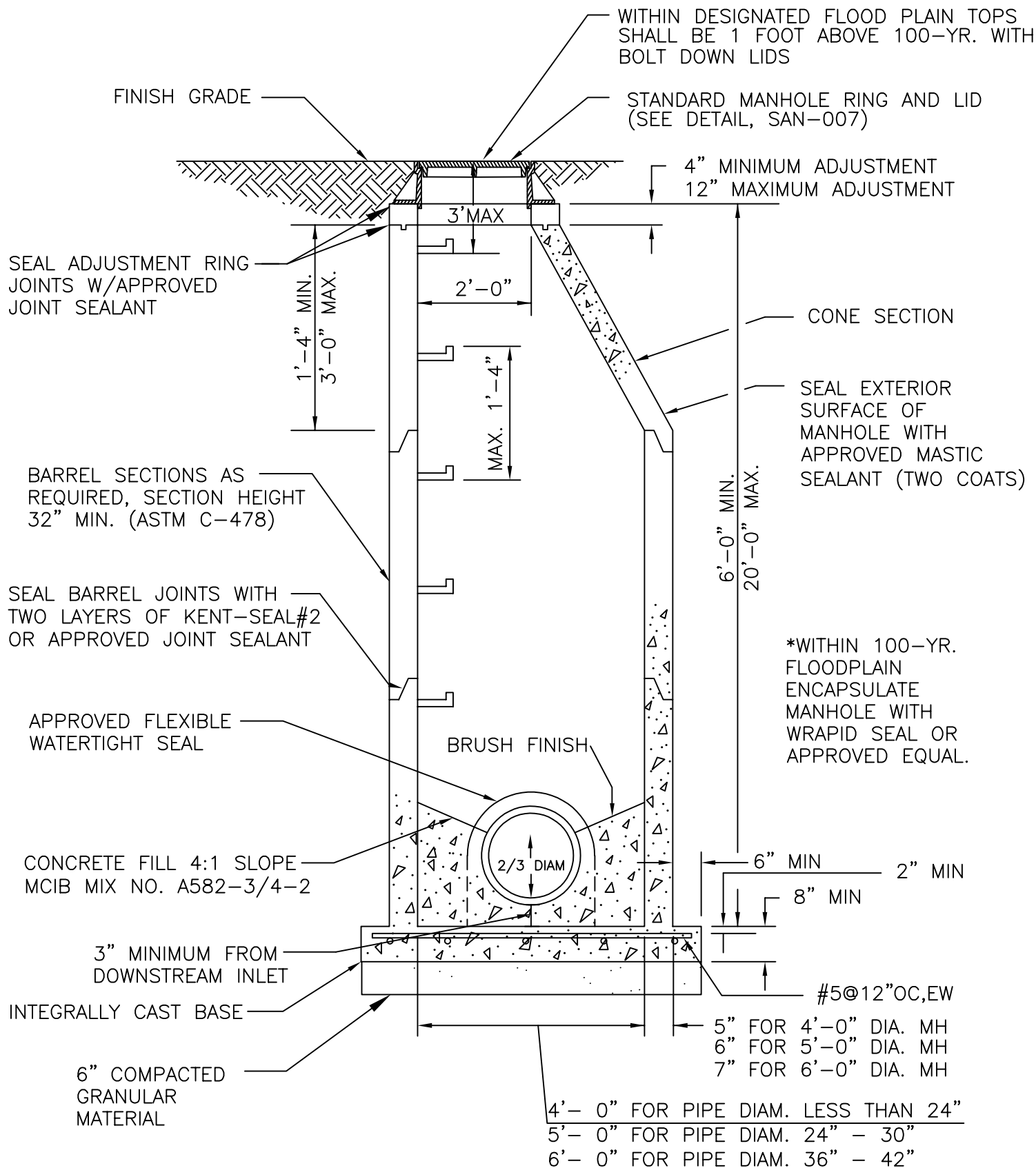
DRAWINGS



## **SANITARY SEWER NOTES**

1. All sanitary stub lines shall be laid on 2.00% grade unless approved otherwise.
2. The Contractor shall install and properly maintain a mechanical plug at all connection points with existing lines until such time that the new line is tested and approved.
3. Where sanitary sewer lines are to be installed over and across water lines, a minimum of 24 inches of clearance shall be provided. Where clearance is not provided, construct sanitary sewer line of ductile iron pipe for a distance of at least 10 feet in each direction from crossing, with no joint within 6 feet of crossing.
4. Performance testing in accordance with APWA Section 2508. Witness and acceptance by City is required before placing in service.
5. All service lines shall be schedule 40 PVC.
6. All pre-cast manholes shall meet or exceed standards and specifications as set forth in ASTM C-478.
7. All PVC pipe shall meet or exceed standards and specifications as set forth in ASTM D-3034.
8. All proposed and existing street crossings shall be tamped granular backfill (Type 3) from the bottom of the trench to a point that is 15" below the finished grade of the street. All existing street crossings shall be filled with flowable fill per detail STR-011.
9. Mandrel testing is required and shall be performed in accordance with APWA 2508.5, at a minimum of 30 days after installation.
10. All inspection of sanitary sewer construction shall be performed by the City of Grain Valley.

11. It is the responsibility of the contractor to have sanitary sewer lines air tested and sanitary sewer manholes vacuum tested for new construction and modifications to existing. Contractor shall provide city with test results upon completion of construction.
12. Areas with less than three (3) feet of depth from existing grade to proposed top of pipe shall be filled to an elevation of three (3) feet above the proposed top of pipe, compacted to 95% density +/-2% prior to trenching or laying of any pipe.
13. Sanitary sewer piping material shall be as follows:
  - 0 to 15' depth; SDR-35 PVC
  - 15' to 22' depth; SDR-26 PVC
  - 22' to 30' depth; SDR-21 PVC
  - greater than 30' depth; D.I.P.
  - 6" service laterals; SDR-35 PVC at 2.0% minimum.
14. All manholes, catch basins, utility valves, and meter pits shall be adjusted or rebuilt to grade as required.
15. Service lines shall be extended a minimum of 1 foot past the house side of all utility easements.
16. Insert Tee's or Saddles for service lines are not allowed except in special cases with prior City approval and City observation of installation.

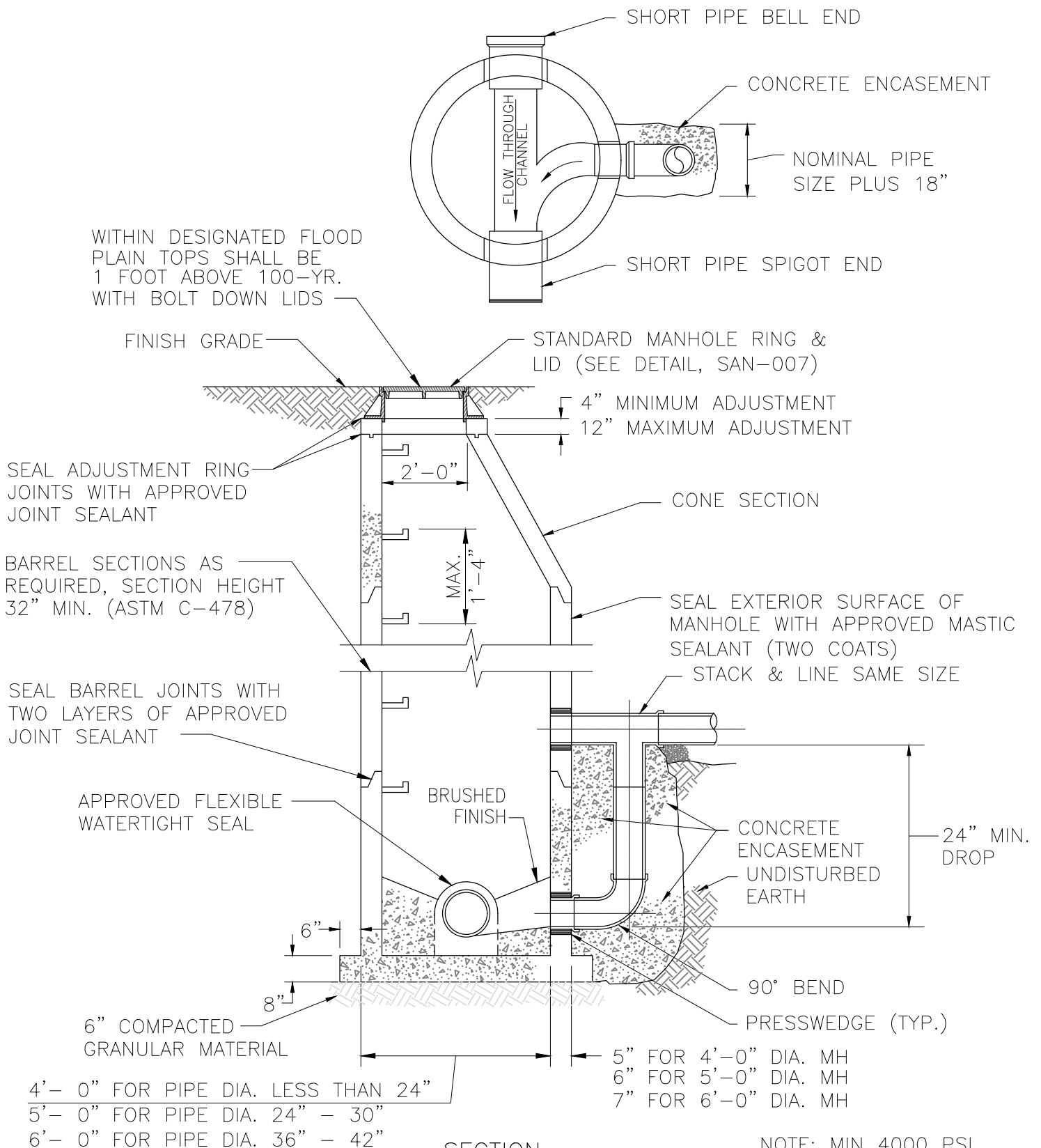


NOTE: MIN. 4000 PSI COMPRESSIVE STRENGTH

## STANDARD PRECAST MANHOLE







SECTION

## STANDARD DROP MANHOLE

(MUST BE USED FOR ALL DROPS OVER 8'-0")



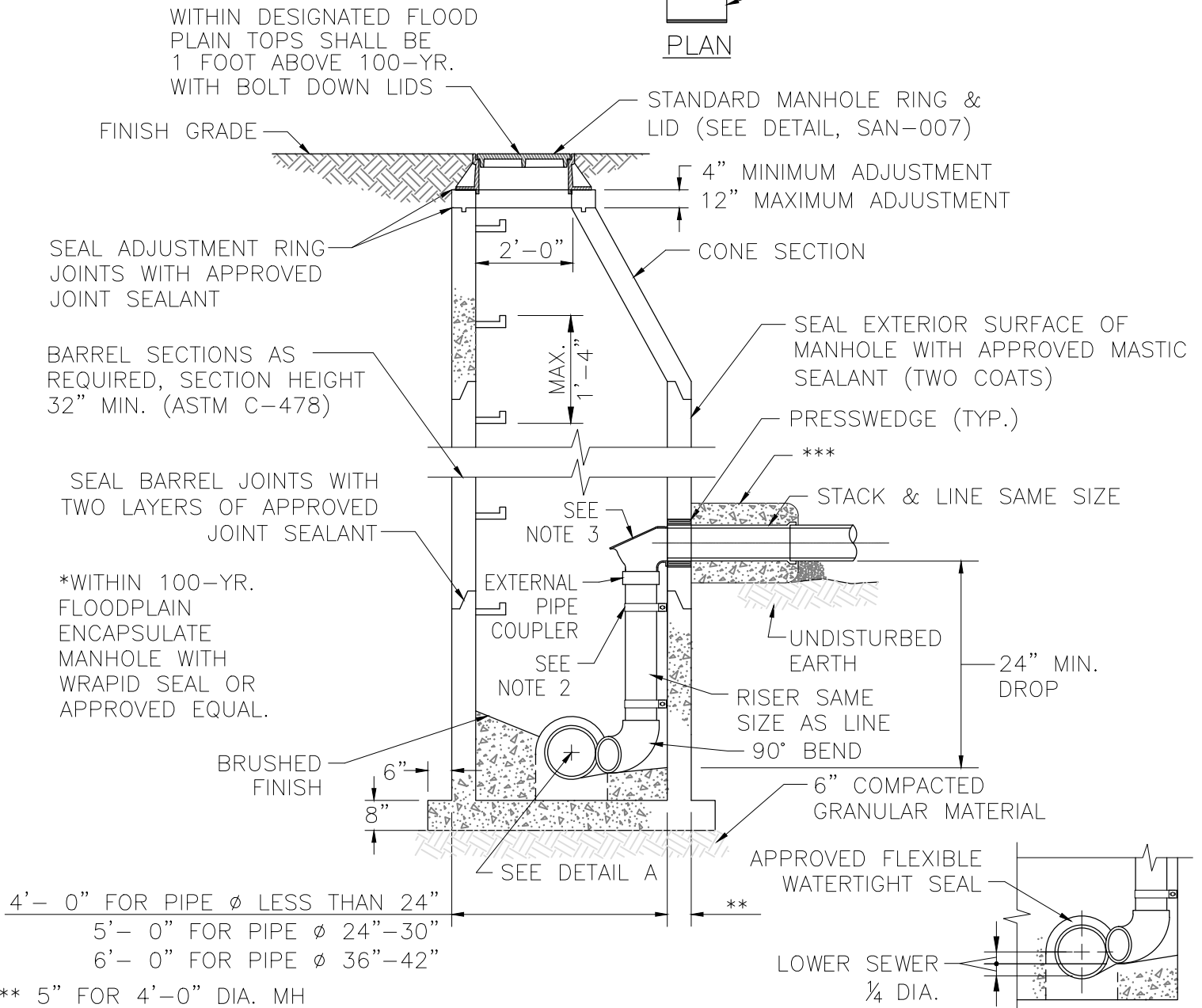
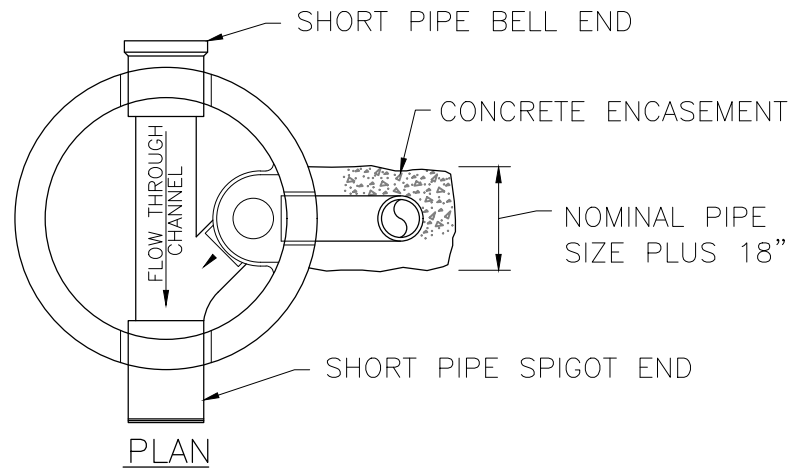
**Grain Valley**  
*Come Home To Opportunity*

DATE: 04/09/20  
SCALE: NO SCALE

SAN-002

# NOTES:

1. MIN 4000 PSI COMPRESSIVE STRENGTH.
2. RELINER STAINLESS STEEL STRAPS. ANCHOR TO MANHOLE WITH STAINLESS STEEL ANCHORS. TYPICAL AT 4'-0" O.C. (2 MIN.)
3. RELINER INSIDE DROP BOWL. ANCHOR TO MANHOLE WITH STAINLESS STEEL ANCHORS.



\*\* 5" FOR 4'-0" DIA. MH  
6" FOR 5'-0" DIA. MH  
7" FOR 6'-0" DIA. MH

\*\*\* 6" MIN. CONC.  
ENCASEMENT ALL AROUND  
TO FIRST PIPE JT.  
EXTENDING TO UNDISTURBED  
EARTH BELOW

## SECTION

## STANDARD DROP MANHOLE

(MAY BE USED FOR ALL DROPS UNDER 8'-0")

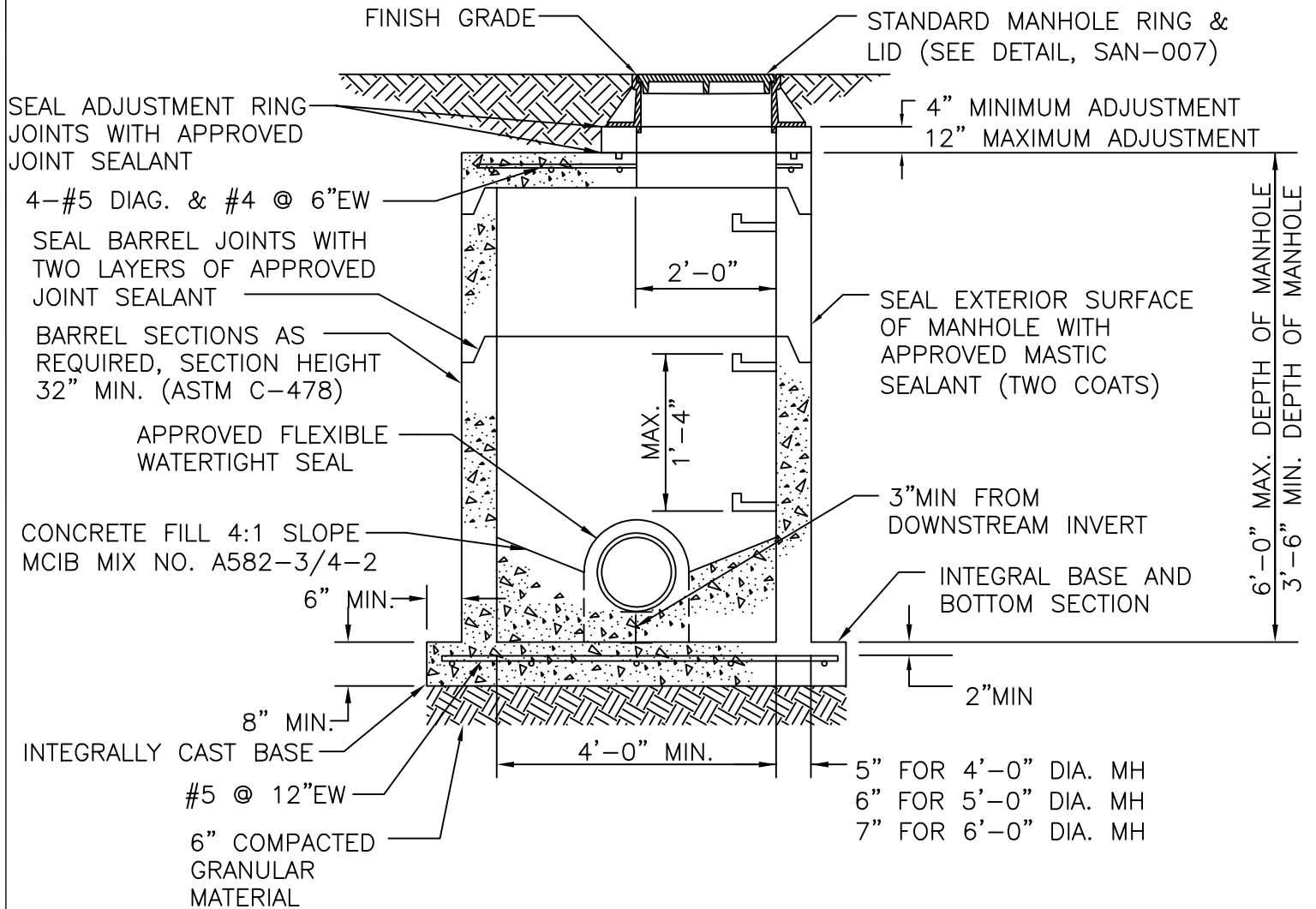


**Grain Valley**  
*Come Home To Opportunity*

## DETAIL A

DATE: 04/09/20  
SCALE: NO SCALE

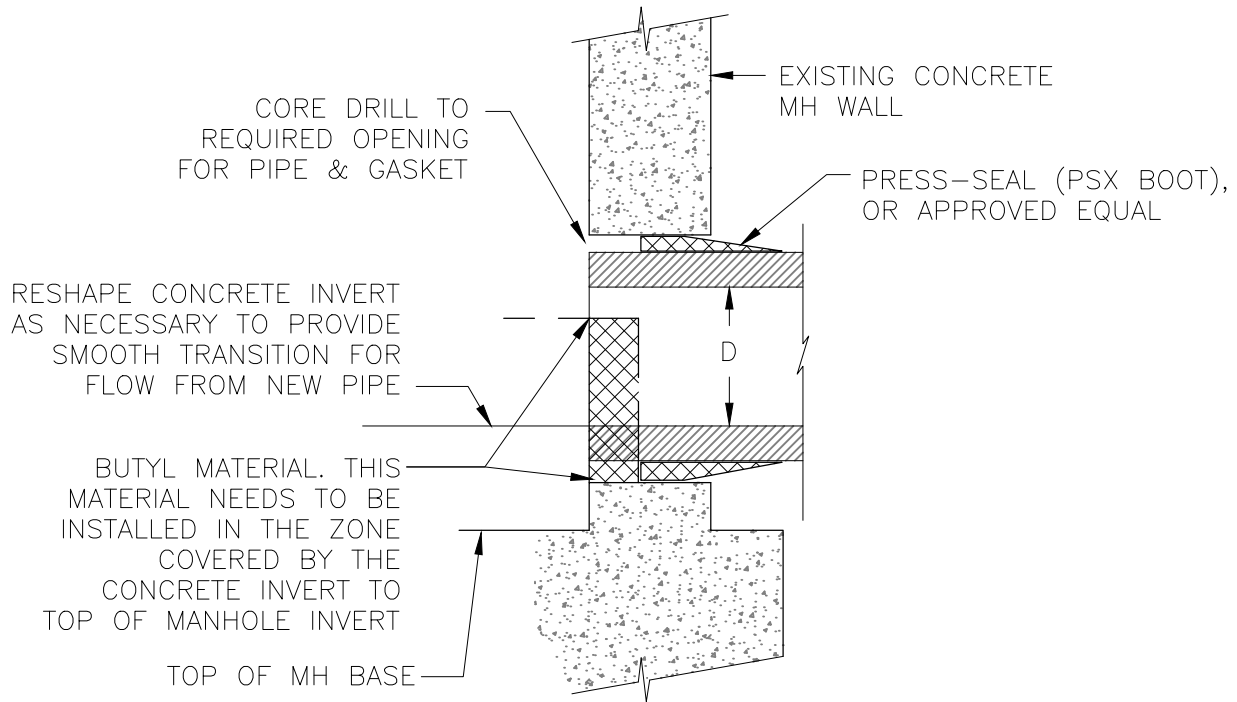
SAN-003



NOTE: MINIMUM 4000 PSI COMPRESSIVE STRENGTH

## STANDARD SHALLOW MANHOLE

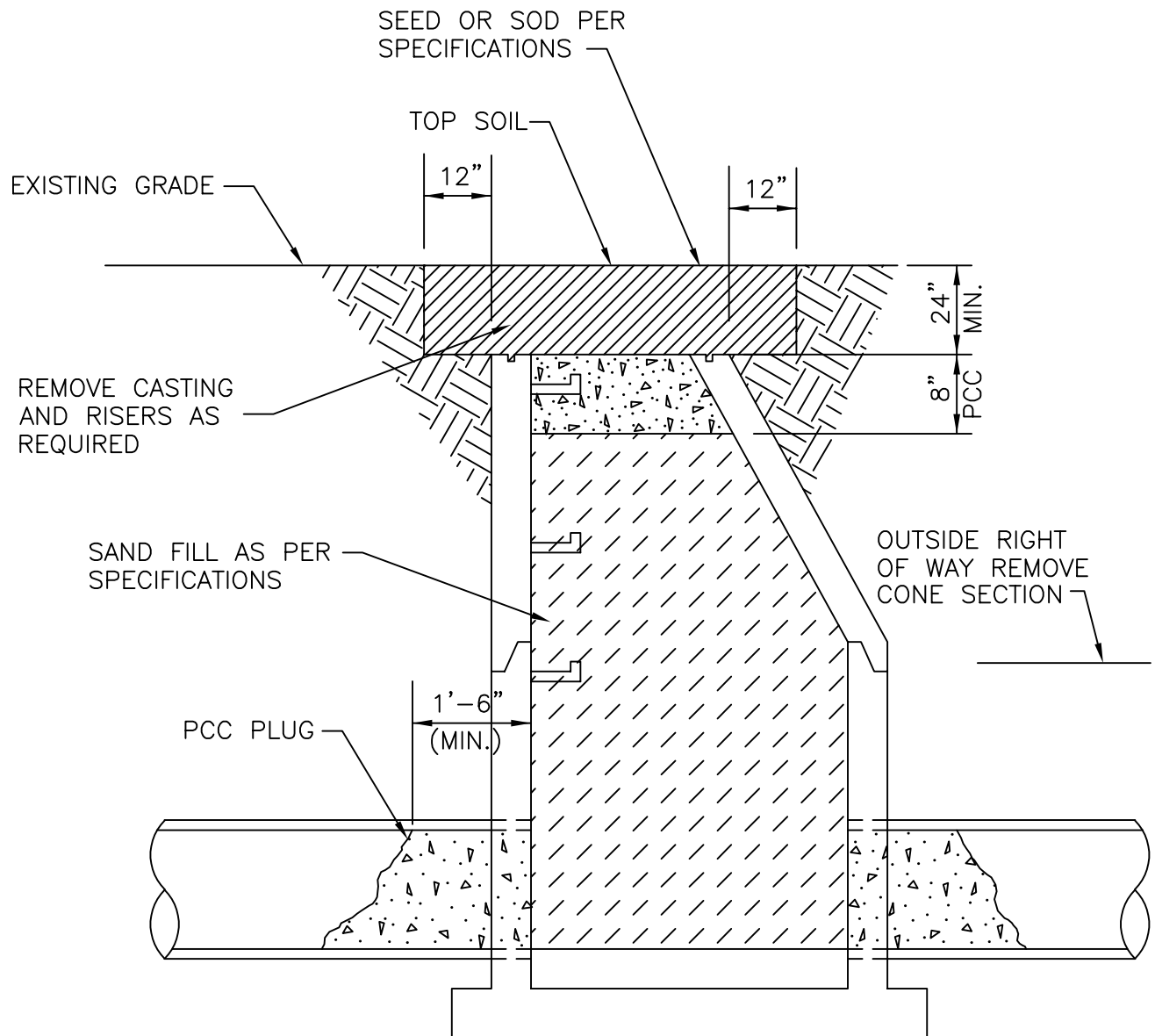




## CONNECTION TO EXISTING MANHOLE

NOTE: CONNECTIONS TO EXISTING BRICK OR BLOCK  
MANHOLES SHALL BE AS DIRECTED BY CITY ENGINEER.

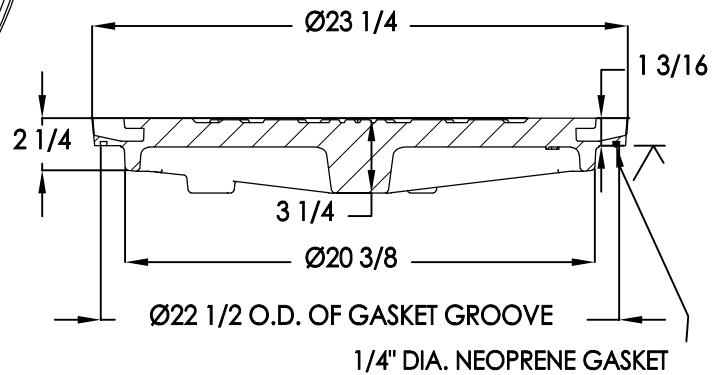
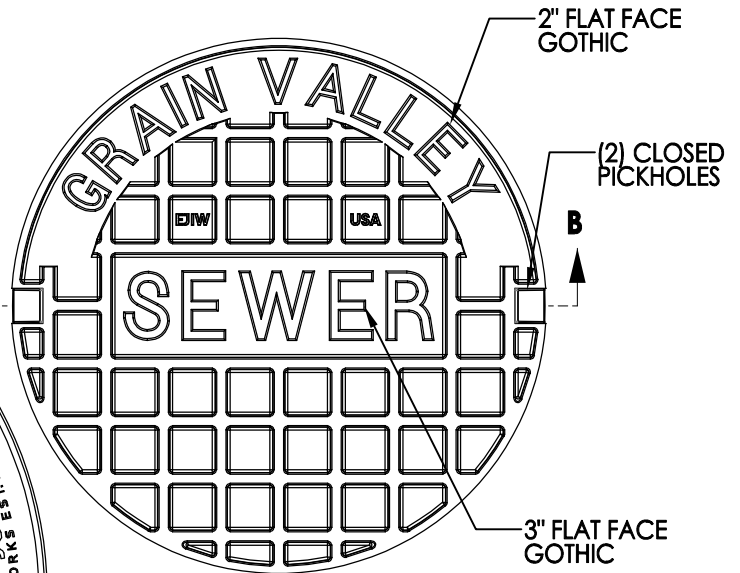
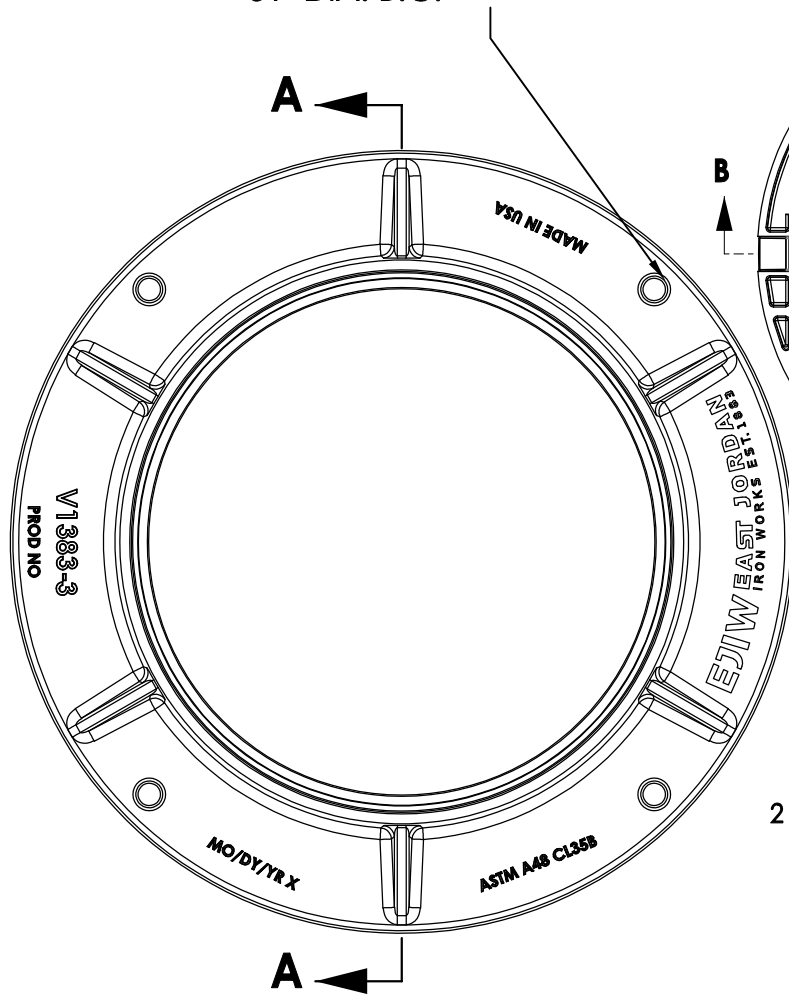




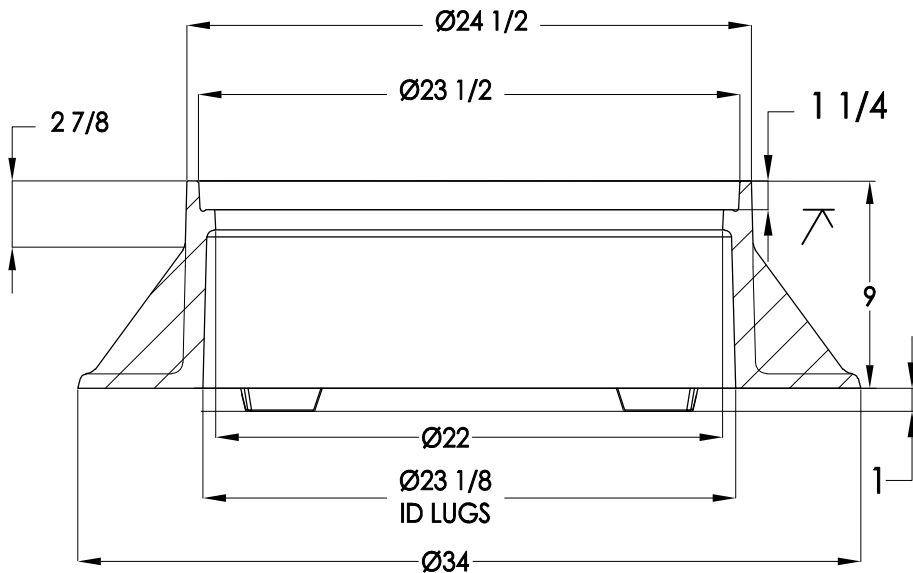
## MANHOLE ABANDONMENT DETAIL



(4) 1" DIA. BOLT HOLES  
EQUALLY SPACED ON A  
31" DIA. B.C.



### SECTION B-B



### SECTION A-A

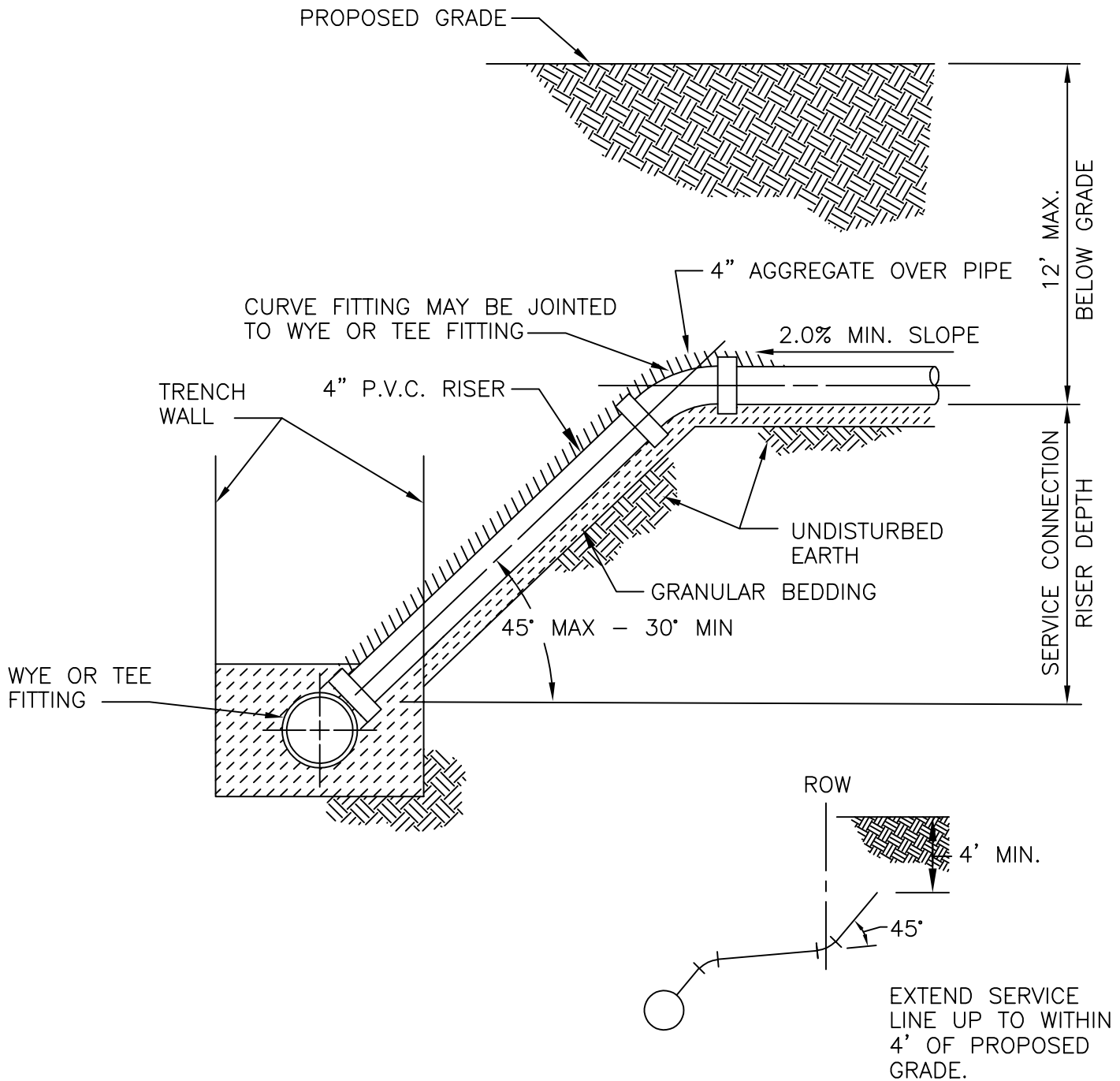
### APPROVED RING AND LID/FRAME

EJIW	V-1383
EJIW	V-1383-3
OR APPROVED OTHER	

## MANHOLE RING AND LID/FRAME DETAIL



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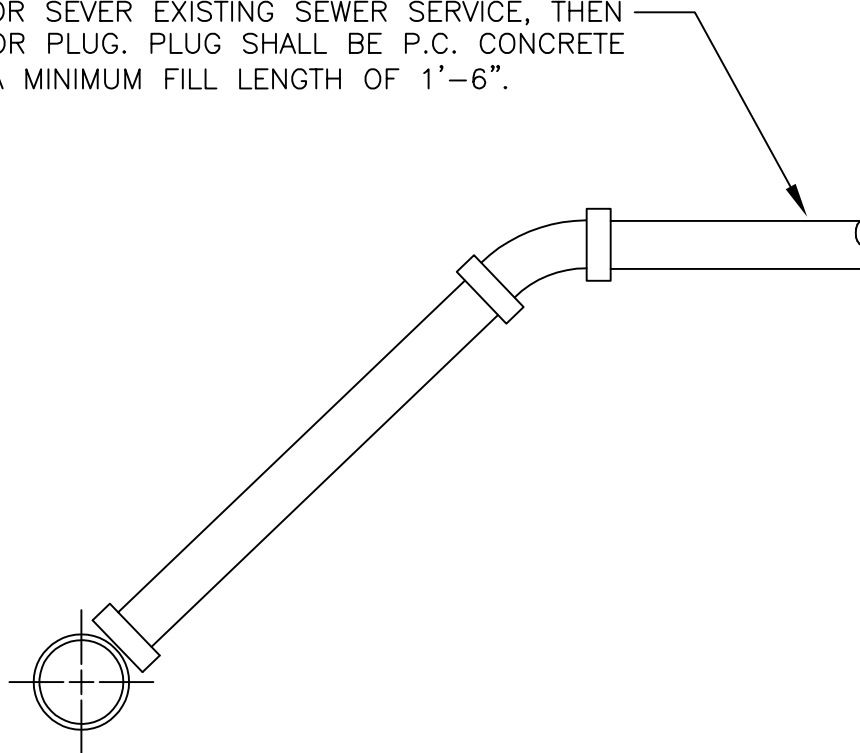


## SEWER SERVICE CONNECTION DETAIL



DATE:	6/2/20
SCALE:	NO SCALE

CUT OR SEVER EXISTING SEWER SERVICE, THEN  
CAP OR PLUG. PLUG SHALL BE P.C. CONCRETE  
FOR A MINIMUM FILL LENGTH OF 1'-6".



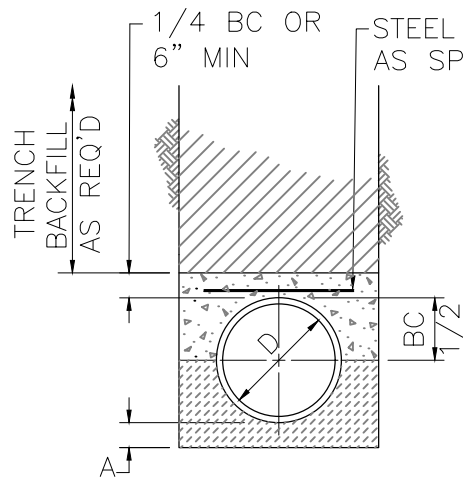
\*IF EXISTING IS CLAY TILE  
MUST REMOVE TO MAIN AS  
APPROVED BY PUBLIC WORKS  
DIRECTOR.

## SEWER SERVICE DEMOLITION DETAIL

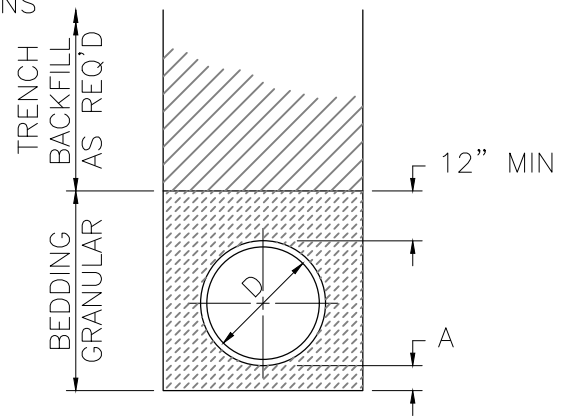


DATE:	6/2/20
SCALE:	NO SCALE





TYPICAL ARCH ENCASEMENT



TYPICAL PIPE BEDDING

LEGEND	
BC	OUTSIDE DIA. OF PIPE
D	NOMINAL PIPE SIZE
A	EMBEDMENT BELOW PIPE
	TRENCH BACKFILL
	TAMPED GRANULAR BACKFILL (TYPE 3)
	GRANULAR BEDDING
	CONCRETE
	CLEAN CRUSHED STONE

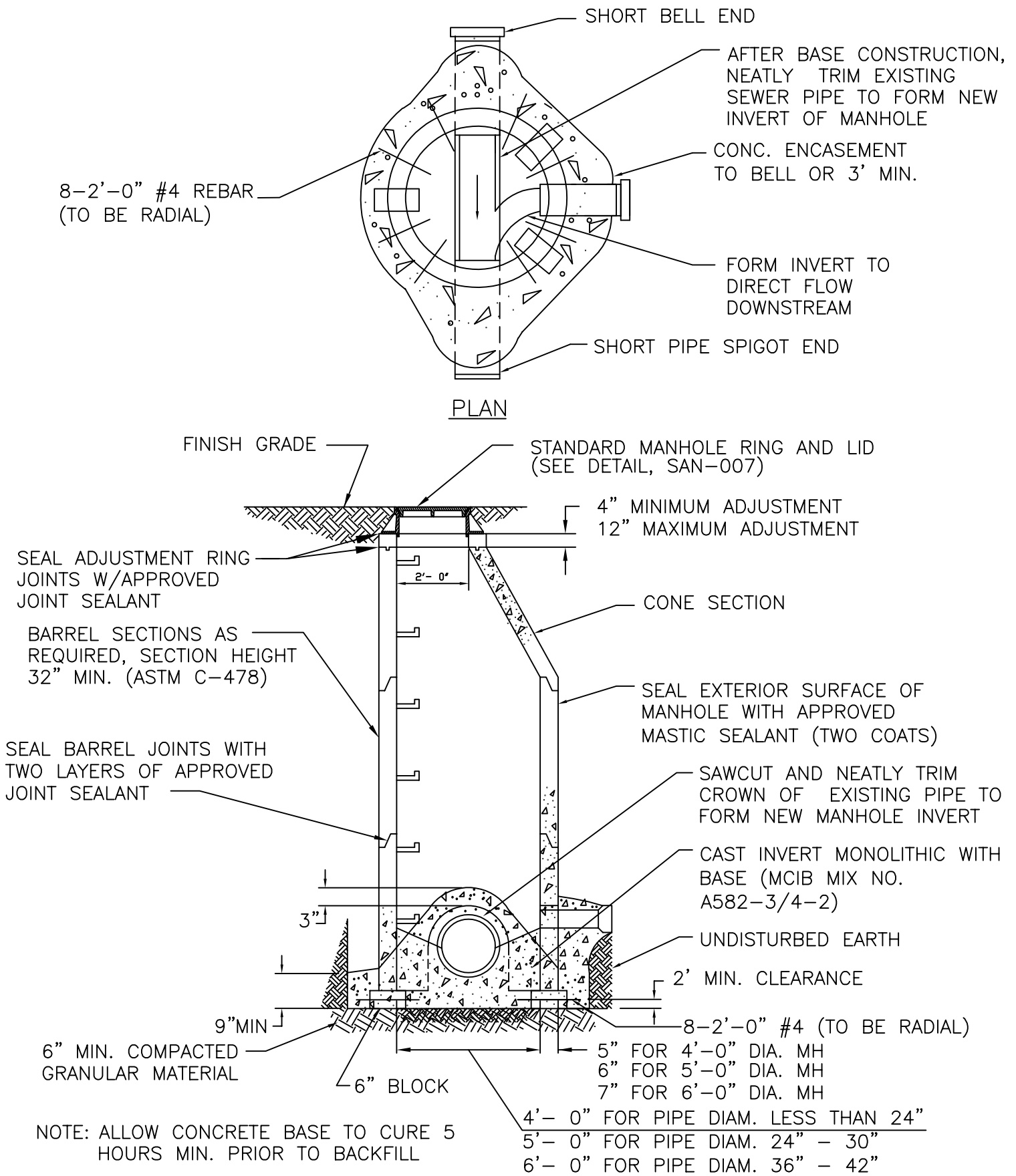
TABLE OF EMBEDMENT DEPTHS BELOW PIPE		
D	A MIN SOIL	A MIN ROCK
0"–27"	4"	6"
30"–60"	6"	9"
66"–UP	8"	12"

PIPE EMBEDMENT NOTES:

1. GRANULAR BEDDING SHALL BE CRUSHED ROCK OR PEA GRAVEL WITH NOT LESS THAN 95% PASSING 3/4" (95% PASSING 1" FOR 30" AND LARGER PIPE) AND NOT LESS THAN 95% RETAINED ON A 3/8"; TO BE PLACED IN NOT MORE THAN 6" LAYERS AND COMPACTED BY SLICING WITH A SHOVEL OR VIBRATING.
2. TAMPED GRANULAR BACKFILL (TYPE 5) SHALL BE GRANULAR MATERIAL CONFORMING TO THE REQUIREMENTS OF SECTION 1007.3 OF THE 2019 MISSOURI STANDARD SPECIFICATIONS FOR HIGHWAY CONSTRUCTION.
3. TRENCH BACKFILL (TYPE 1) SHALL BE FINELY DIVIDED MATERIAL FREE FROM DEBRIS AND STONES, COMPACTED TO 95% MAXIMUM DENSITY.
4. FLOWABLE FILL IS REQUIRED UNDER EXISTING OR PROPOSED PAVEMENT. ALL MATERIAL SHALL BE COMPACTED TO 95% IN THE RIGHT OF WAY AND 90% OUTSIDE OF THE RIGHT OF WAY.

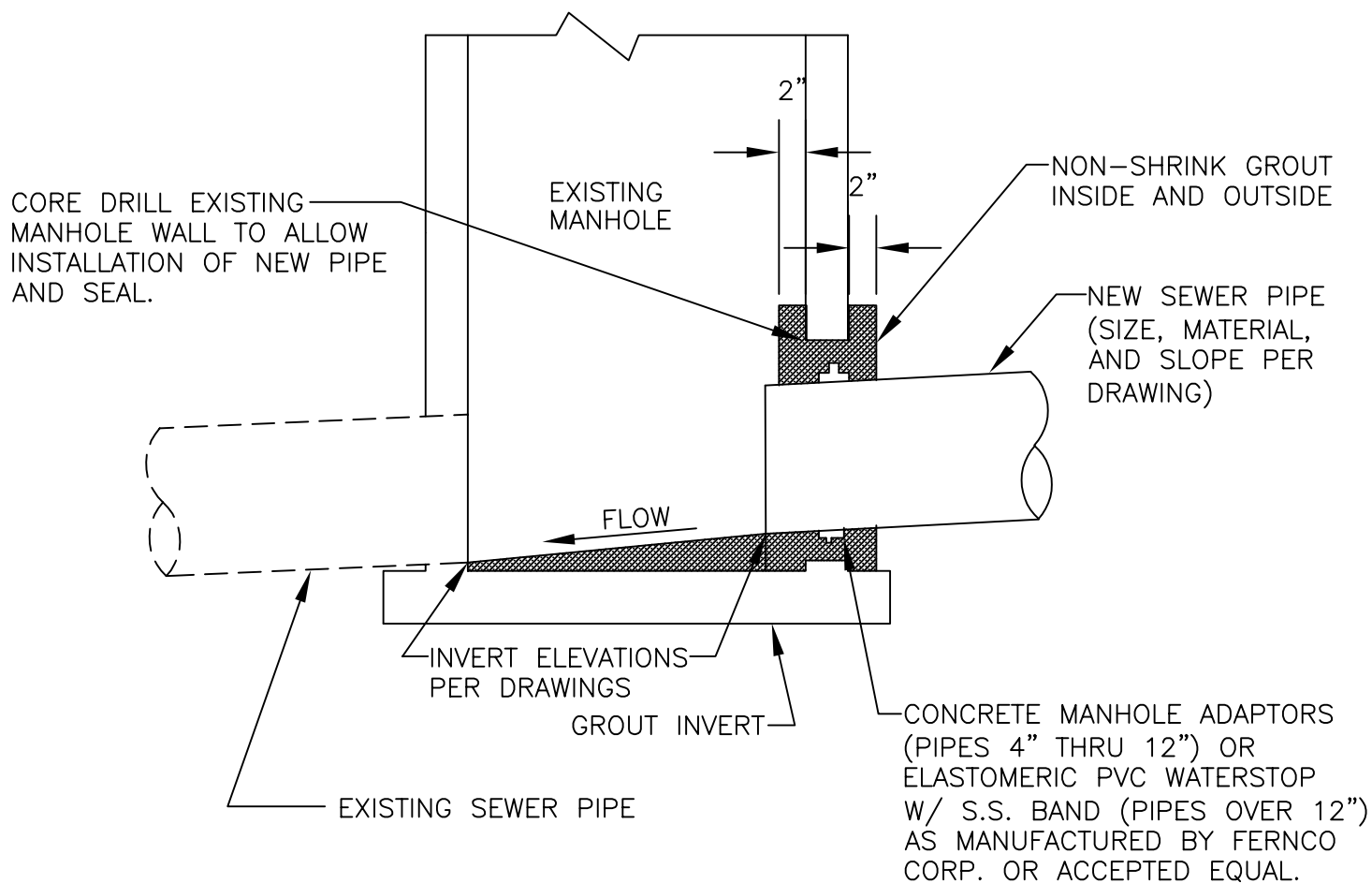
PIPE EMBEDMENT DETAILS





## STANDARD PRECAST MANHOLE-EXIST. SEWER

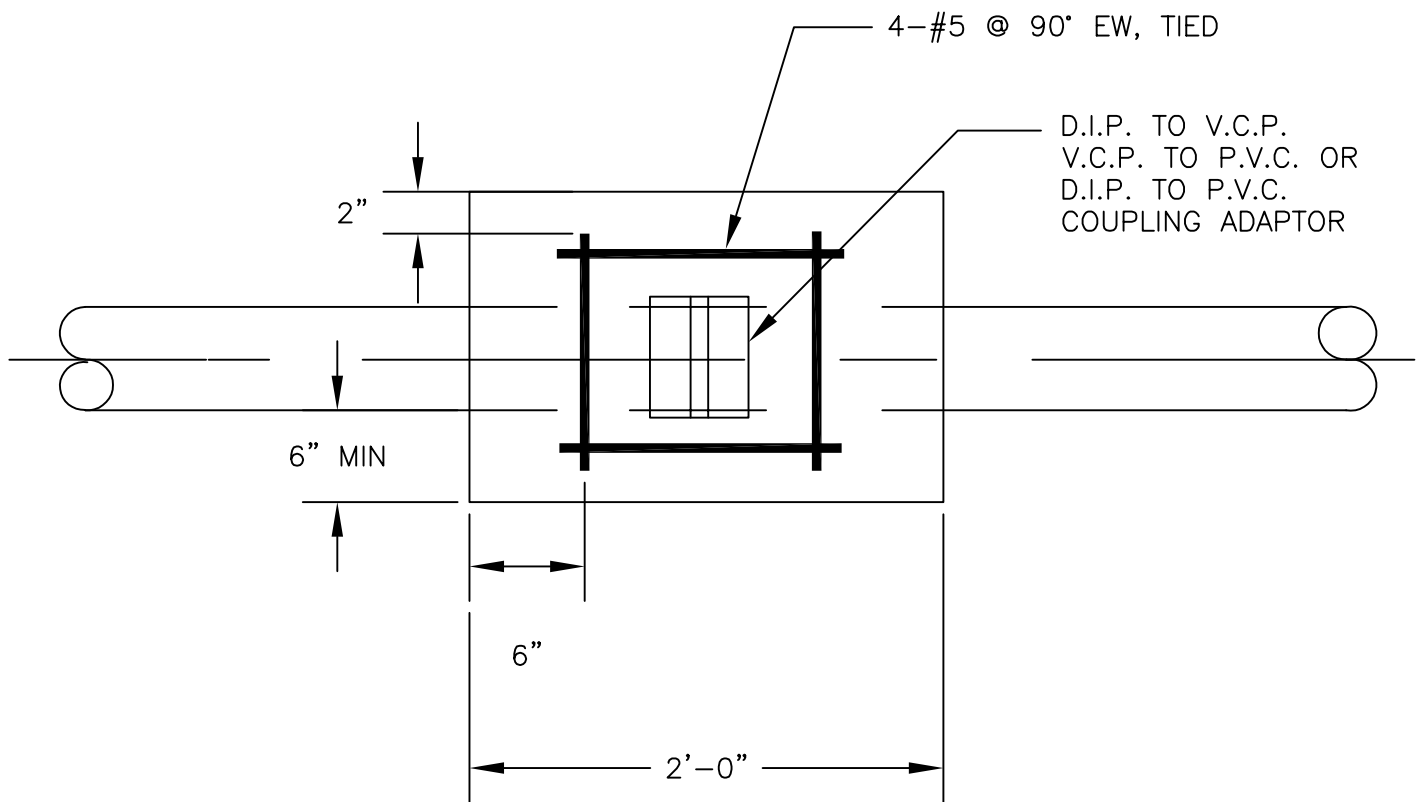




1. DRILL AND BOOT  
ACCEPTED OPTION
2. MANHOLE MUST BE  
VACUUM TESTED

## TYPICAL CONNECTION TO EXISTING MANHOLE

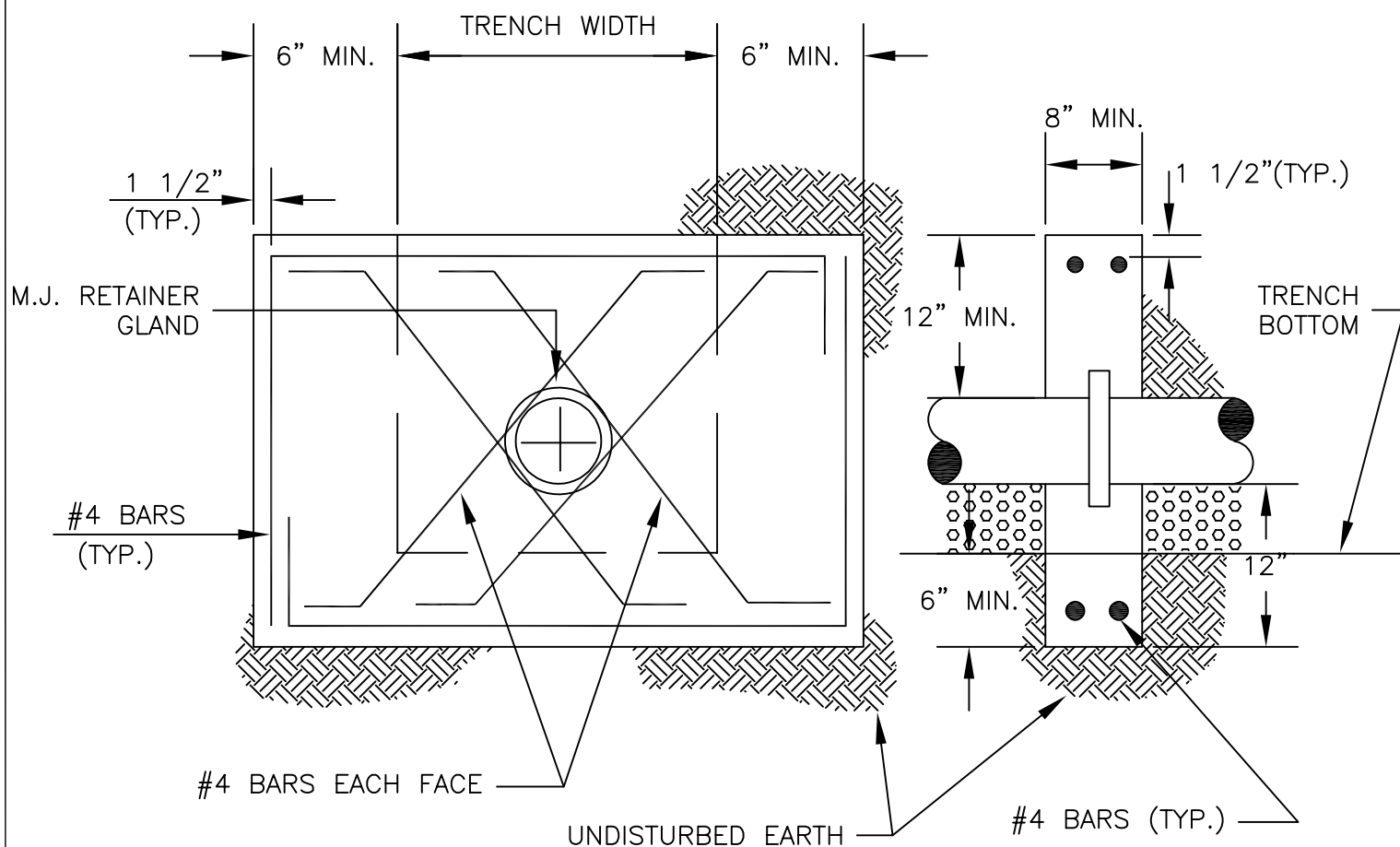




## CONCRETE COLLAR DETAIL

(FOR JOINTING TWO DIFFERENT TYPES OF PIPE)



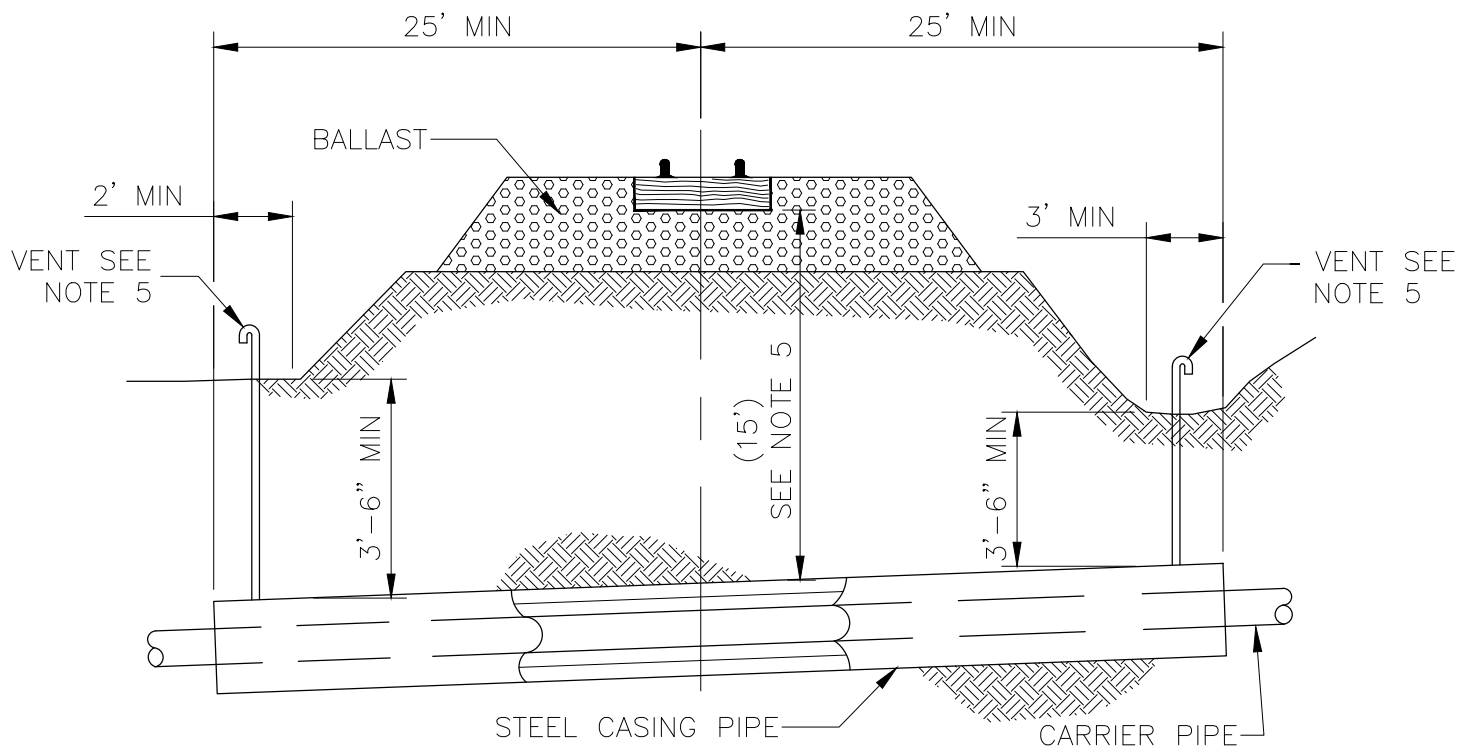


NOTE:

CONCRETE THRUST COLLAR TO BE INSTALLED ON GRAVITY SEWER LINES LAID AT 20% SLOPES OR GREATER, AT INTERVALS INDICATED ON SEWER PROFILE DRAWINGS.

## CONCRETE THRUST COLLAR DETAIL





CASING PIPE SIZE AND TYPE  
PER PLANS. (FURNISHED AND  
INSTALLED BY OTHERS)

RACI CASING SPACERS  
OR APPROVED EQUAL

SEWER PIPE

HIGH DENSITY  
POLYETHYLENE CASING  
SPACERS RACI TYPE  
F60 6'-0" O.C.

CARRIER PIPE SIZE AND TYPE  
PER PLANS. (FURNISHED AND  
INSTALLED BY OTHERS)

CASING

CASING PIPE DIA.	MIN. WALL THK. (IN.)
UNDER 14"	0.188
14" & 16"	0.219
18"	0.250
20"	0.281
22"	0.312
24"	0.344
26"	0.375
28" & 30"	0.406
32"	0.438
34" & 36"	0.469

NOTES:

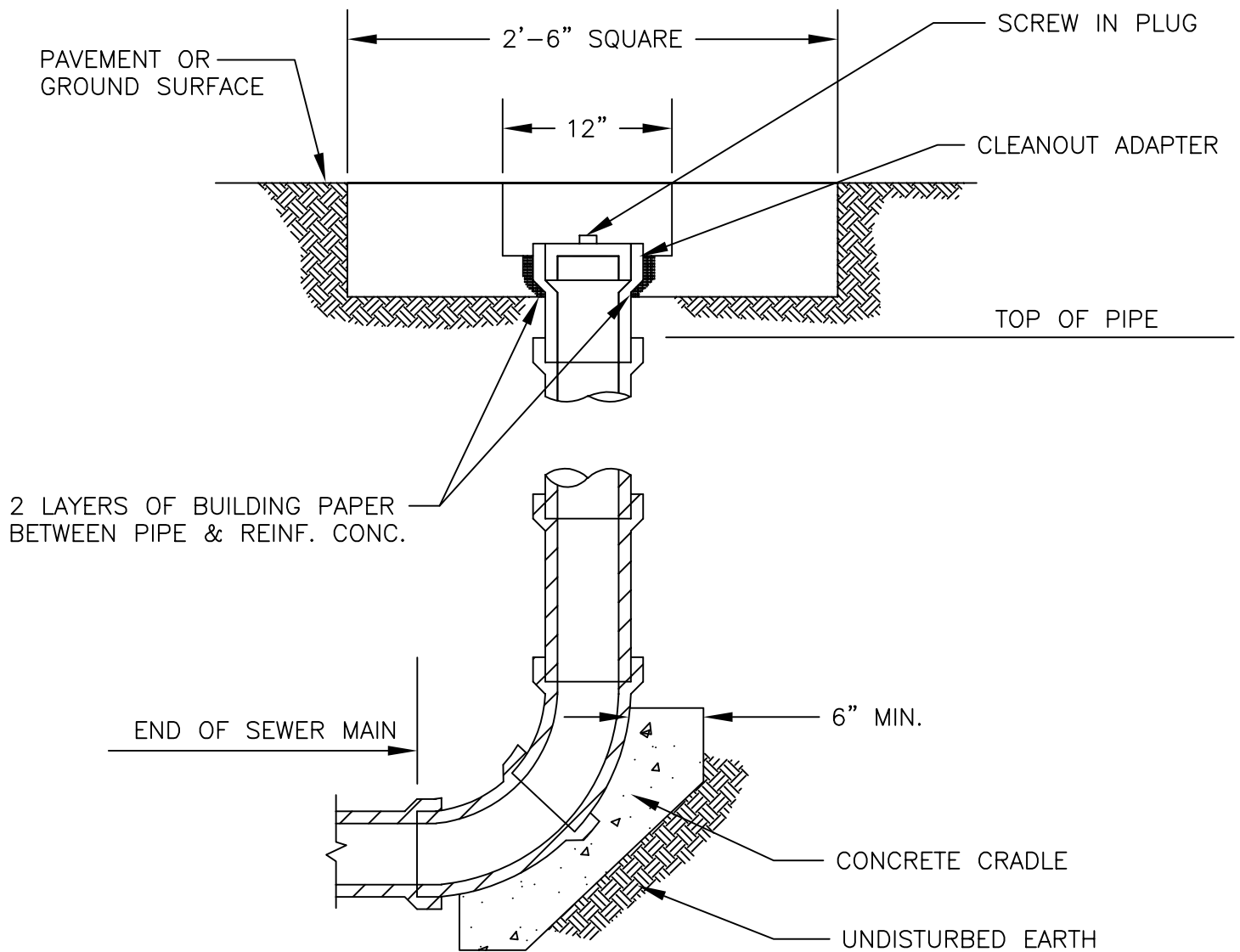
1. STEEL CASING PIPE TO HAVE A MIN. YIELD STRENGTH OF 35,000 PSI. WHEN CASING IS INSTALLED WITHOUT BENEFIT OF A PROTECTIVE COATING, AND SAID CASING IS NOT CATHODICALLY PROTECTED, THE WALL THICKNESS SHOWN SHALL BE INCREASED TO THE NEAREST STANDARD SIZE WHICH IS A MIN. OF 0.063 IN. GREATER THAN THE THICKNESS SHOWN.
2. EACH END OF CASING TO BE SEALED WITH A BRICK AND MORTAR BULKHEAD.
3. ANNULAR SPACE BETWEEN CARRIER PIPE AND STEEL CASING SHALL BE FILLED WITH SAND.
4. CASING SHALL BE INSTALLED SIMULTANEOUSLY WITH BORING OPERATION. ALL AREAS DISTURBED DURING CONSTRUCTION SHALL BE COMPACTED, FERTILIZED, SEEDED, AND MULCHED PER SPECIFICATIONS.
5. REFER TO KANSAS CITY SOUTHERN UTILITY CROSSING APPLICATION GUIDELINES FOR CASING PIPE DEPTH, VENT PIPE SIZE AND SPACING.

RAILROAD BORING DETAIL



DATE: 04/09/20  
SCALE: NO SCALE

SAN-015



## STANDARD CLEANOUT DETAIL (LAMP)



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# SPECIFICATION TIME REQUIRED FOR A 1.0 PSIG PRESSURE DROP FOR SIZE AND LENGTH OF PIPE INDICATED FOR Q=0.0015\*

PIPE DIAMETER (IN)  MINIMUM TIME (MIN:SEC)  LENGTH FOR MINIMUM TIME (FT)  TIME FOR LONGER LENGTHS				SPECIFIED MINIMUM FOR LENGTH (L) SHOWN (MIN:SEC:MLSEC)						
				100 FT	150 FT	200 FT	250 FT	300 FT	350 FT	400 FT
4	3:46	597	.380L	3:46	3:46	3:46	3:46	3:46	3:46	3:46
6	5:40	398	.854L	5:40	5:40	5:40	5:40	5:40	5:40	5:42
8	7:34	298	1.520L	7:34	7:34	7:34	7:34	7:36	8:52	10:08
10	9:26	239	2.374L	9:26	9:26	9:26	9:53	11:52	13:51	15:49
12	11:20	199	3.418L	11:20	11:20	11:24	14:15	17:05	19:56	22:47
15	14:10	159	5.342L	14:10	14:10	17:48	22:15	26:42	31:09	35:36
18	17:00	133	7.692L	17:00	19:13	25:38	32:03	38:27	44:52	51:16
21	19:50	114	10.470L	19:50	26:10	34:54	43:37	52:21	61:00	69:48
24	22:40	99	13.674L	22:47	34:11	45:34	56:58	68:22	79:46	91:10
27	25:30	88	17.306L	28:51	43:16	57:41	72:07	86:32	100:57	115:22
30	28:20	80	21.366L	35:37	53:25	71:13	89:02	106:50	124:38	142:26
33	31:10	72	25.852L	43:05	64:38	86:10	107:43	129:16	150:43	172:21
36	34:00	66	30.768L	51:17	76:55	102:34	128:12	153:50	179:29	205:07
42	39:48	57	41.883L	69:48	104:42	139:37	174:30	209:24	244:19	279:13
48	45:34	50	54.705L	91:10	136:45	182:21	227:55	273:31	319:06	364:42
54	51:02	44	69.236L	115:24	173:05	230:47	288:29	346:11	403:53	461:34
60	56:40	40	85.476L	142:28	213:41	284:55	356:09	427:23	498:37	569:50

TESTING FOR PVC





WATER

DETAIL

DRAWINGS

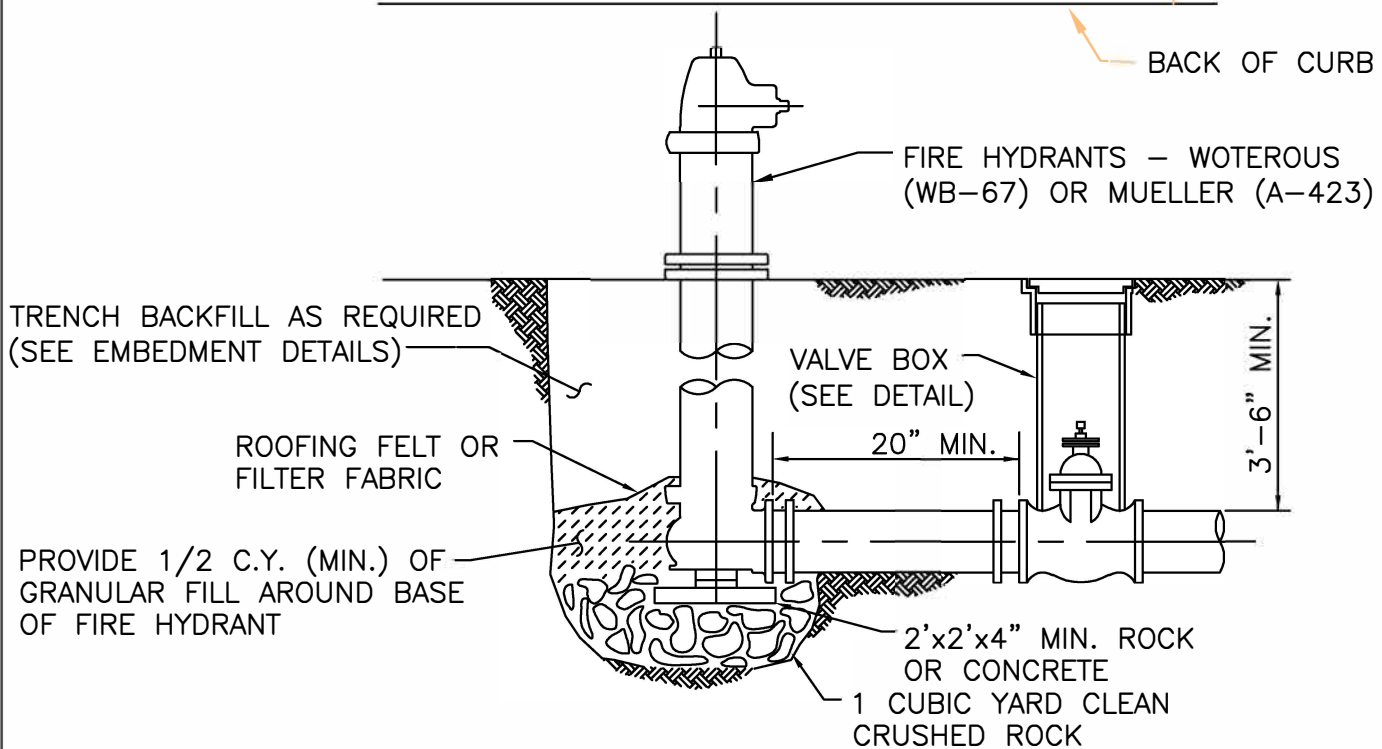
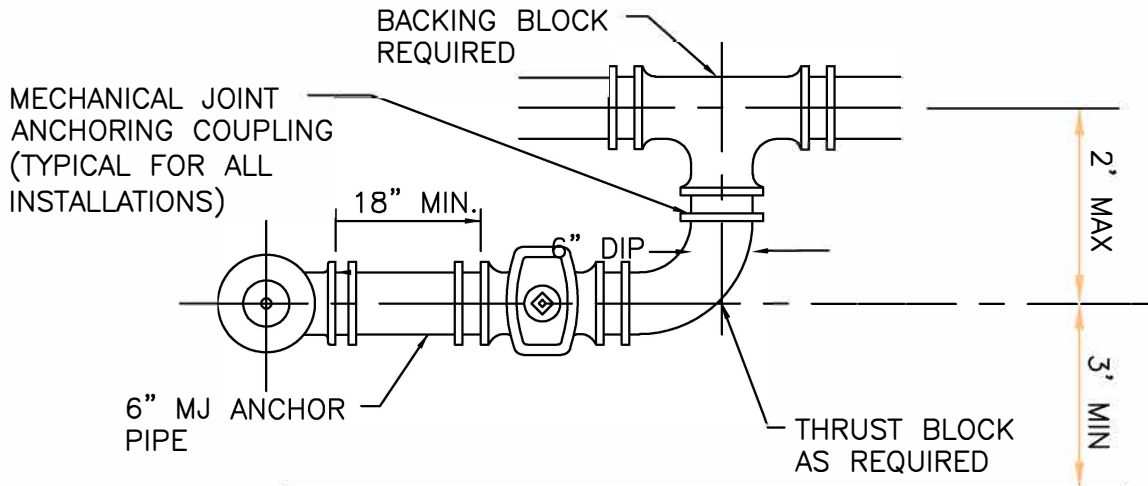
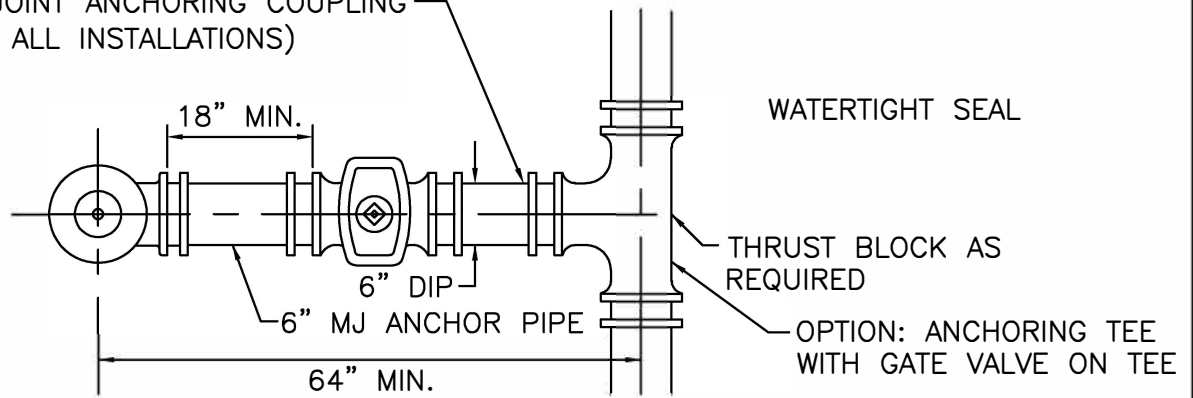


### **Water Notes**

1. All ductile iron pipe shall be class 50 ductile iron pipe complete with all accessories conforming to ASA specifications A21.8. The joints shall be the bolted, gasketed joint type "U.S. Pipe & Foundry Tyton" or "American Cast Iron Pipe Company Fastite" or approved equal.
2. All PVC pipe shall comply with AWWA C-900 class DR 18 only, for 150 PSI service.
3. All water lines shall have a minimum of 42 inches of cover.
4. Fire hydrants shall be Waterous Pacer WB67 or Mueller A243 with nonrising stem. Hydrants shall have a 5 ¼" valve with a 4 ½" pumper nozzle, and 2, 2 ½" hose nozzles, left hand opening, or approved equal by the City of Grain Valley.
5. Gate valves shall be resilient type conforming to AWWA C-509 with mechanical joint end connections.
6. Valve boxes shall be approved by the City of Grain Valley, Missouri. All boxes to be installed out of the roadway.
7. Water line to be installed five feet back of curb unless noted.
8. All construction of water lines on this project shall be in accordance with Specifications and Procedural Requirements of the City of Grain Valley, Missouri and with the requirements of the Missouri Department of Health and Missouri Department of Natural Resources.
9. All bends in water lines shall have thrust blocking or field loc gaskets as required.
10. Restrained type joints utilized in place of backing and thrust blocks shall require manufacturing computations for number of restrained joints required for 150 PSI testing.

11. Water lines shall be hydrostatically tested for backing and leakage at 150 PSI per AWWA C-600. Disinfection (Chlorination) shall be done in accordance with AWWA C-651. City shall witness the above and shall receive acceptable results of bacteriologic tests before the line is placed in service. Hydrostatic testing requires 150 PSI for 2 hours.
12. The Contractor shall furnish and install all fittings required to provide proper horizontal and vertical alignment for new water mains, connections to existing water mains and installation of fire hydrants at the proper location and elevation.
13. The Contractor shall furnish and install all temporary blow-off assemblies, fittings, thrust blocking, and restraining devices required for temporary connections for flushing, pressure testing, chlorination, and de-chlorination of the new water mains. Prior to placing new mains into service the Contractor shall remove any corporation cocks used for testing or chlorination and replace them with tapered brass plugs.
14. Scheduling of water main shut offs and connection to existing mains shall be at the discretion of the City Public Works Department.
15. All fire hydrant branches shall be restrained using approved restraining devices. Hydrants shall be installed so that the centerline of the outlet nozzle is between eighteen and twenty-one inches (18"-21") above finished grade, or curb were applicable.
16. Sections of water main requiring multiple bends, such as cul-de-sacs, shall be restrained with approved joint restraining devices and straddle blocks.
17. Covers, lids, and standpipes on all abandoned valves shall be removed to at least two feet (2') below grade and the area shall be properly backfilled. In paved areas removal of valve lid and filling of valve box with concrete may be allowed at Public Works Department discretion.
18. The Contractor shall verify the outside diameter (O.D.) of the existing water main prior to scheduling connection. Provide transition couplings as required.
19. All existing water services being disconnected shall be disconnected at the corporation stop.
20. All proposed and existing street crossings shall be tamped granular backfill (Type 3) from the bottom of the trench to a point that is 15" below the finished grade of the street. All existing street crossings shall be filled with flowable fill per detail STR-011.

MECHANICAL JOINT ANCHORING COUPLING  
(TYPICAL FOR ALL INSTALLATIONS)



NOTE: FIRE HYDRANT AND  
VALVE ASSEMBLY SHALL BE  
CLEAR OF SIDEWALK  
PLACEMENT.

## FIRE HYDRANT DETAIL

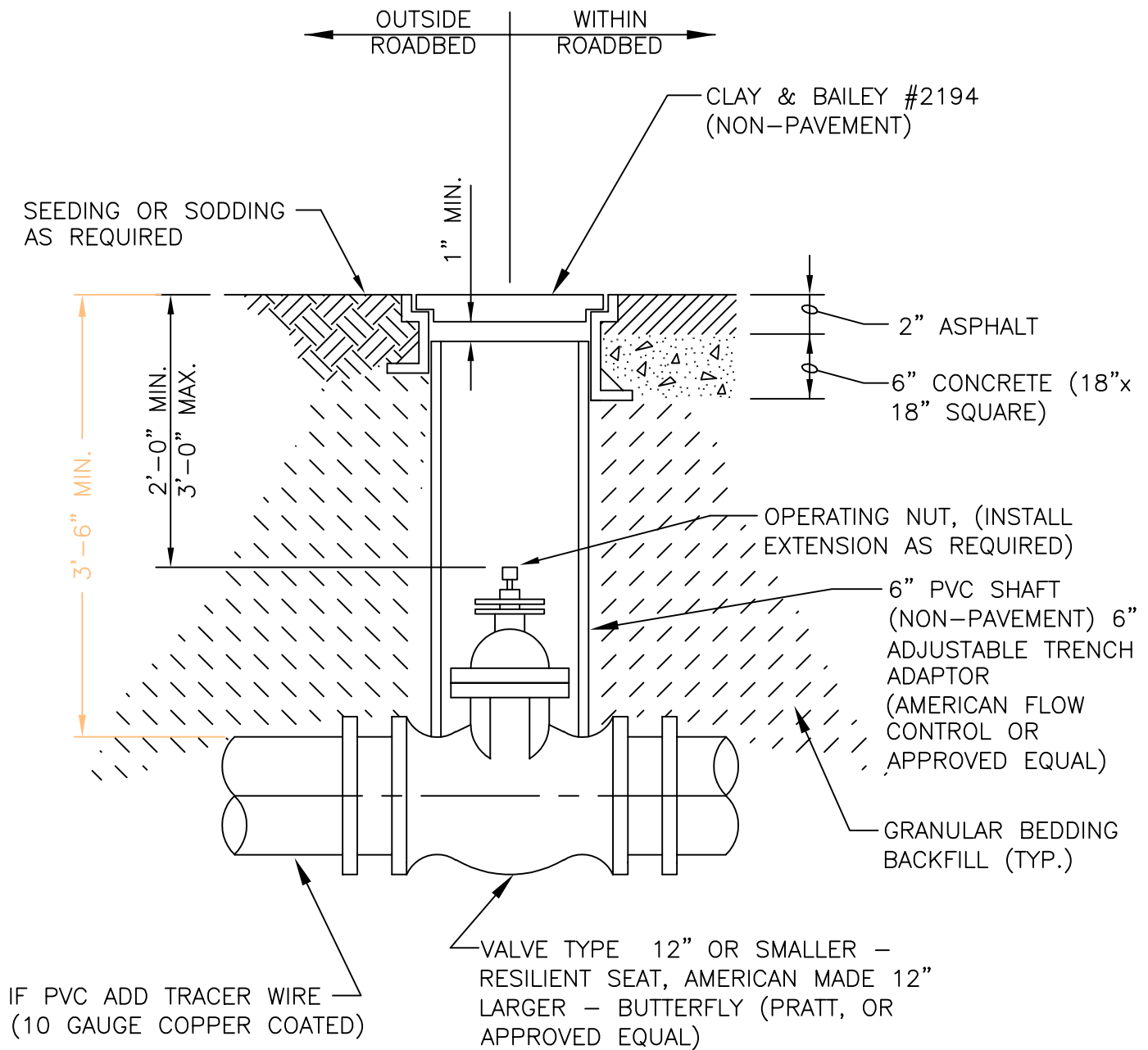


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DATE: 6/2/2020

SCALE: NO SCALE

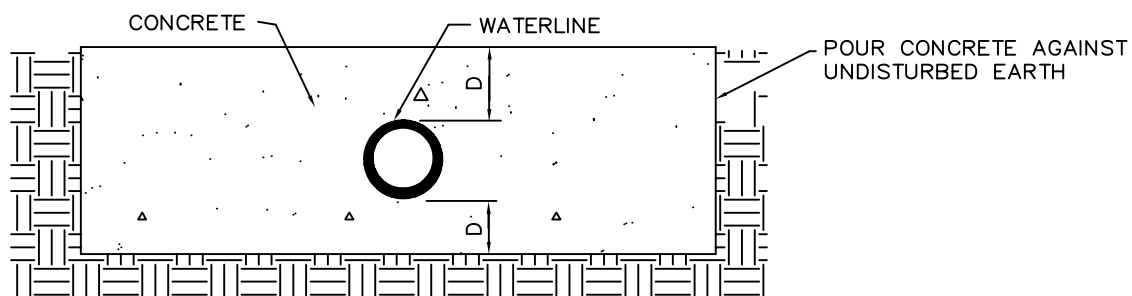
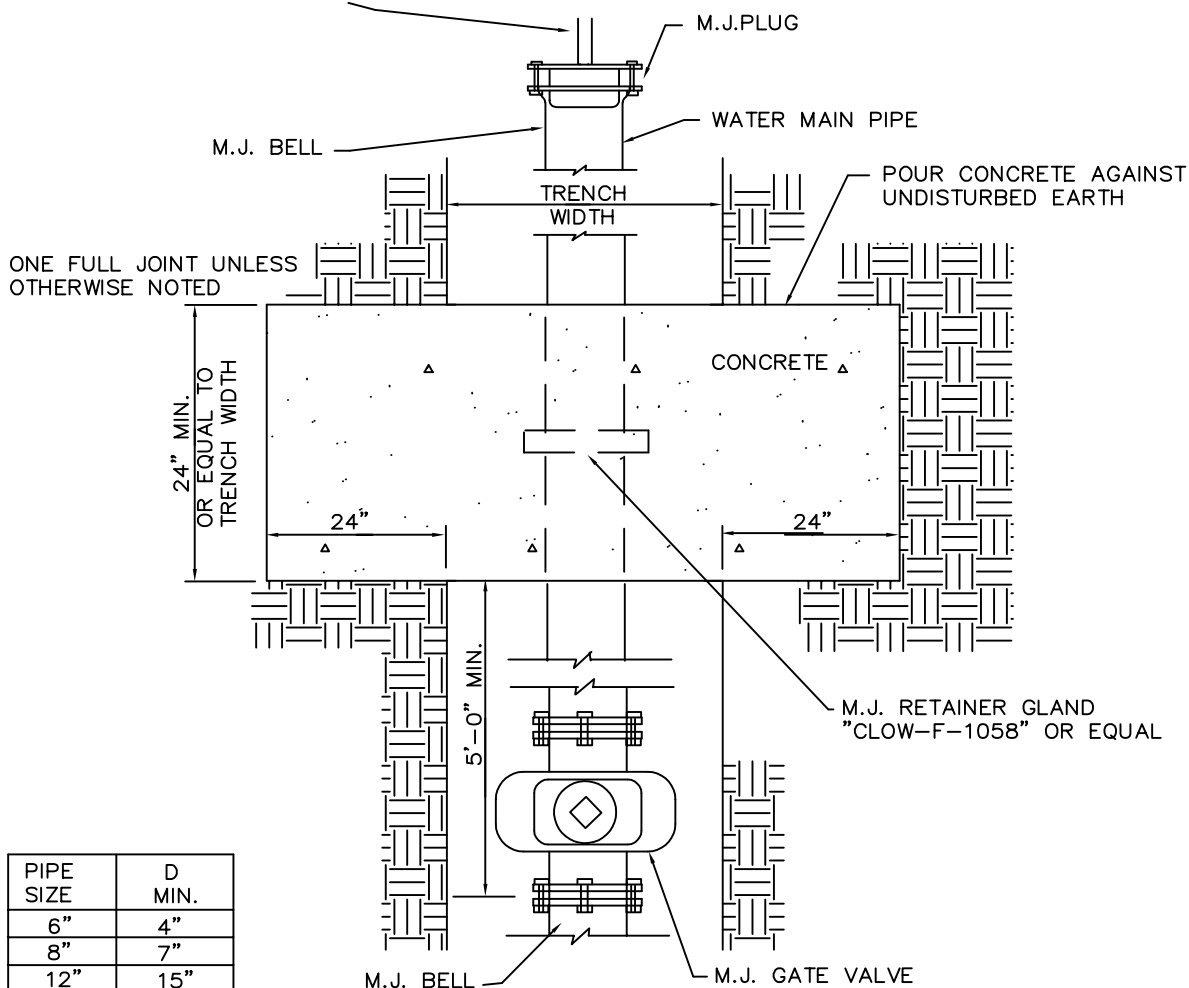
WAT-001



## VALVE BOX DETAIL



FLUSING ASSEMBLY REQUIRED  
 INSTALL ABOVE GROUND WITH 45° DISCHARGE  
 UNLESS SPECIFIED OTHERWISE



## DEAD END LINE ASSEMBLY

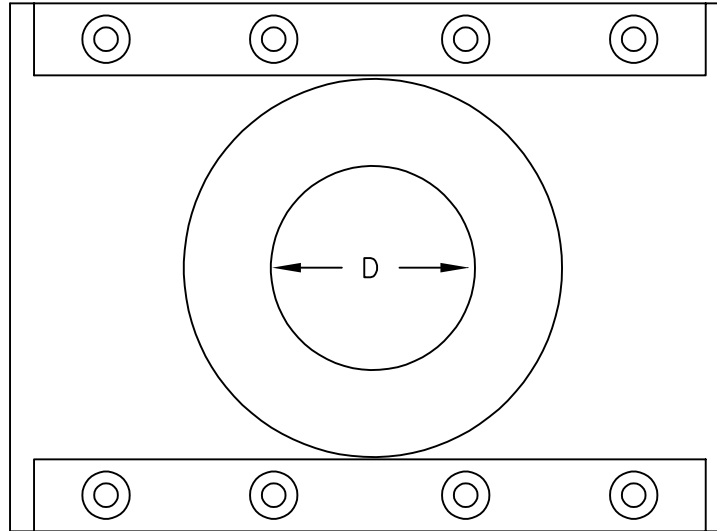


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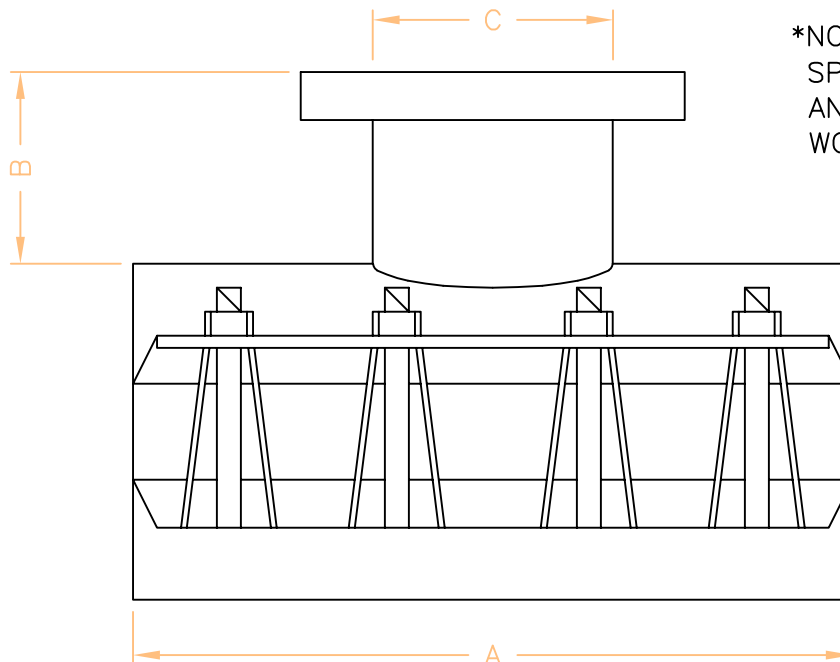
# SMITH-BLAIR TAPPING SLEEVES 662 & 663 OR EQUAL

FLANGE SIZE	STANDARD				SIZE ON		NUMBER OF BOLTS
	A	B	C	D	C	D	
4"	15"	5"	5-1/16"	4-11/16"	NONE	NONE	8
6"	15"	5"	7-1/16"	6-11/16"	7-1/16"	6.00	8
8"	20"	5"	9-1/16"	8-11/16"	9-1/16"	8.00	10

\* AVAILABLE IN 6" - 12" NOMINAL PIPE SIZES.



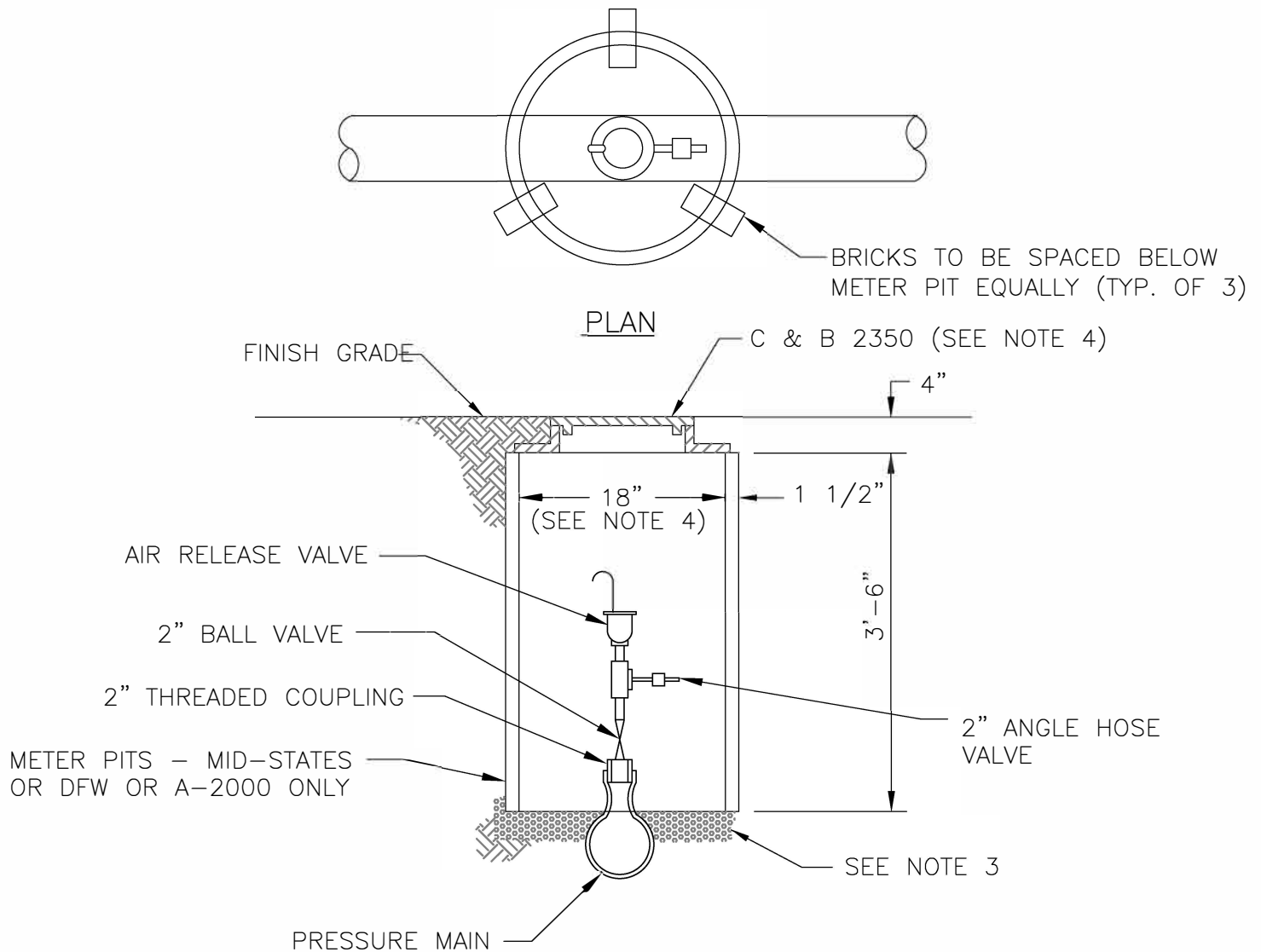
PLAN



SECTION

## STAINLESS STEEL TAPPING SLEEVES





NOTES:

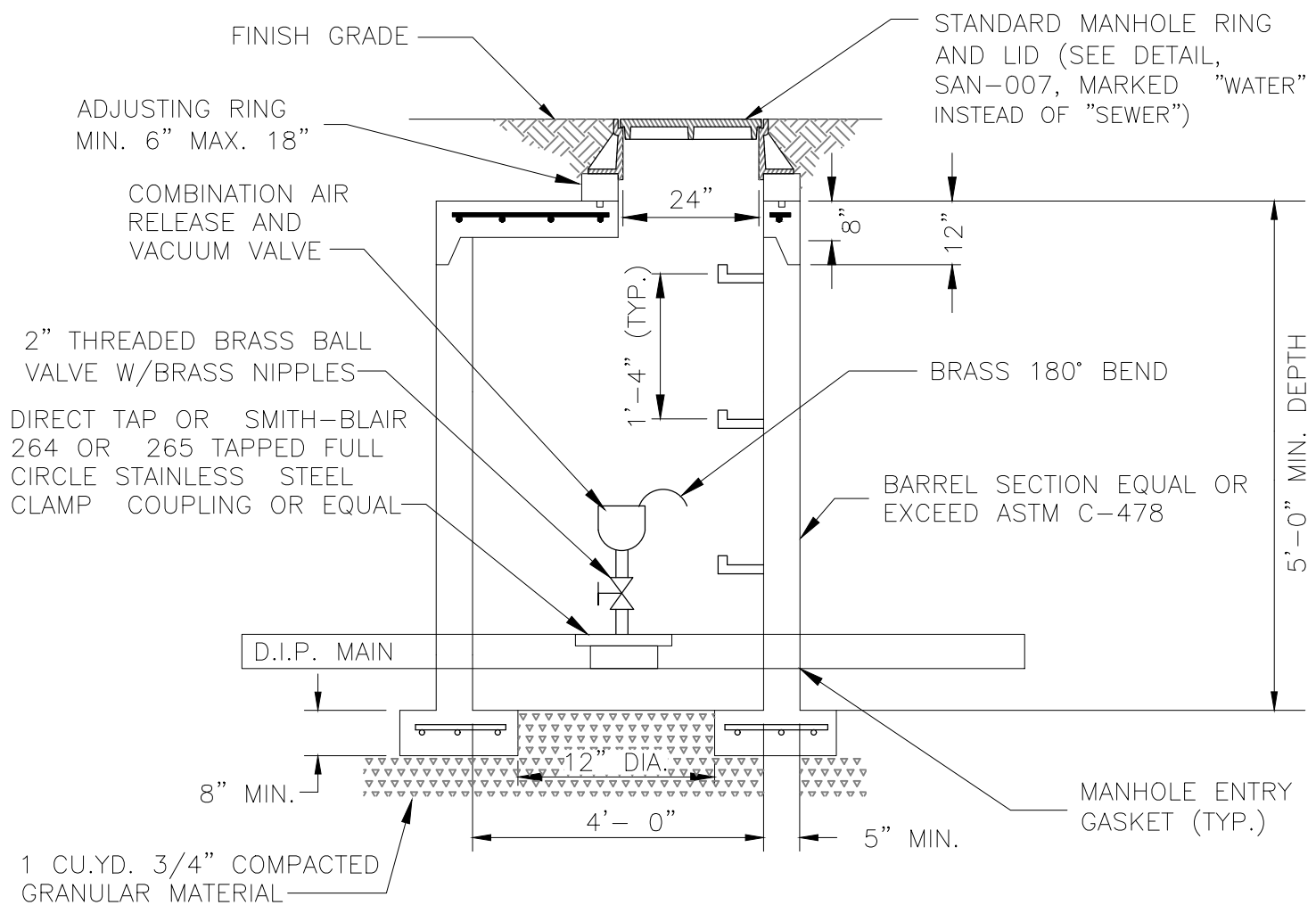
1. METER WELL TO BE SE PLUMB.
2. NOT FOR DRIVEWAY INSTALLATION.
3. METER WELL TO BE SET ON 4" GRAVEL BEDDING.
4. USE 18" WELL W/ CLAY & BAILEY 2350 COVER

SECTION

AIR RELIEF VALVE DETAIL







NOTES:

1. CLASS 52 D.I.P.
2. WATER LINE COMBINATION AIR & VACUUM VALVE COMPLETE W/ACCESSORIES FOR FLUSHING SHALL BE 2" APCO MODEL #145C OR ACCEPTED EQUAL.
3. VAULT SHALL BE STANDARD PRECAST SHALLOW TYPE MANHOLE.

## COMBINATION AIR & VACUUM VALVE ASSEMBLY



DATE:	04/09/20
SCALE:	NO SCALE

WAT-006

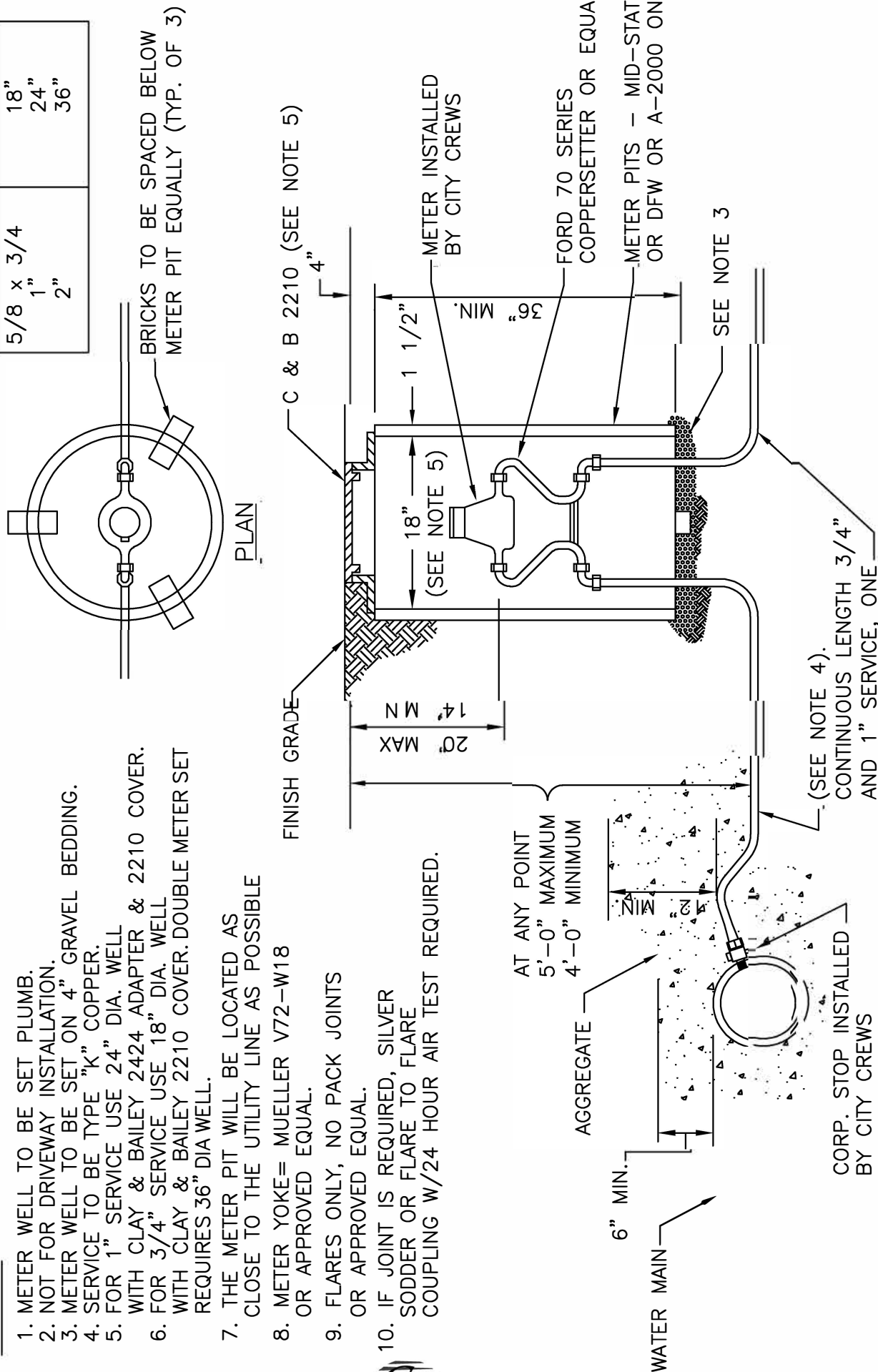
DATE:	6 / 2 / 20
SCALE:	NO SCALE



NOTES:

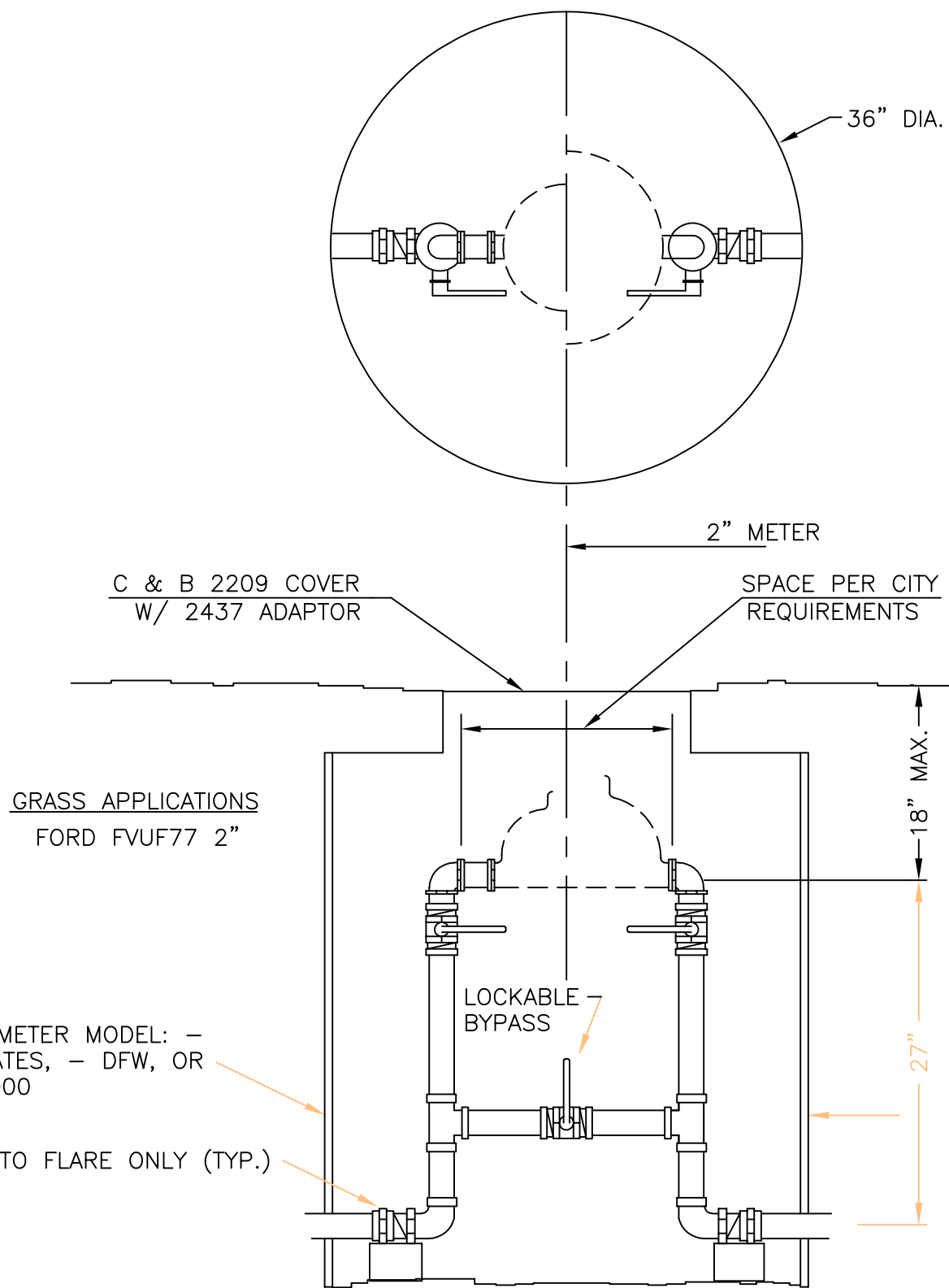
1. METER WELL TO BE SET PLUMB.
2. NOT FOR DRIVEWAY INSTALLATION.
3. METER WELL TO BE SET ON 4" GRAVEL BEDDING.
4. SERVICE TO BE TYPE "K" COPPER.
5. FOR 1" SERVICE USE 24" DIA. WELL WITH CLAY & BAILEY 2424 ADAPTER & 2210 COVER.
6. FOR 3/4" SERVICE USE 18" DIA. WELL WITH CLAY & BAILEY 2210 COVER. DOUBLE METER SET REQUIRES 36" DIA WELL.
7. THE METER PIT WILL BE LOCATED AS CLOSE TO THE UTILITY LINE AS POSSIBLE
8. METER YOKE= MUELLER V72-W18 OR APPROVED EQUAL.
9. FLARES ONLY, NO PACK JOINTS OR APPROVED EQUAL.
10. IF JOINT IS REQUIRED, SILVER SODDER OR FLARE TO FLARE COUPLING W/24 HOUR AIR TEST REQUIRED

LINE SIZE	METER WELL
5/8 x 3/4	18"
1"	24"
2"	36"



## SECTION **3/4" & 1" SERVICE METER WELL**

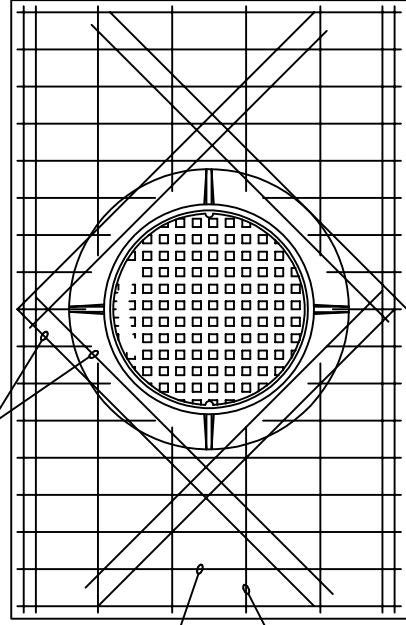
NOTE: ALL FITTINGS SHALL BE FLANGED.



2" SERVICE METERS



2 #5 DIAGONAL TOP & BOTTOM (SEE NOTE 7)



TOP SLAB

METER SIZE	L	W	A	B	C	D	E	F	G	H	J	K	M
3"	150	72	11	8	12	4.5	52	42	*	*	24	23	26
4"	171	72	13	9	12	4.5	52	42	*	*	24	21	28
6"	202	72	16	10.5	9	8	61	51	*	*	24	20	29

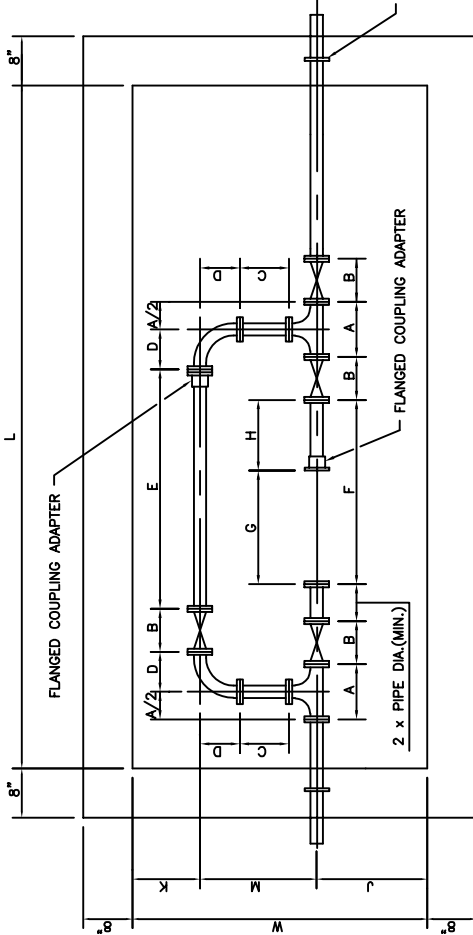
\* VARIES BY MANUFACTURER

NOMINAL DIMENSIONS FOR SINGLE METER PITS

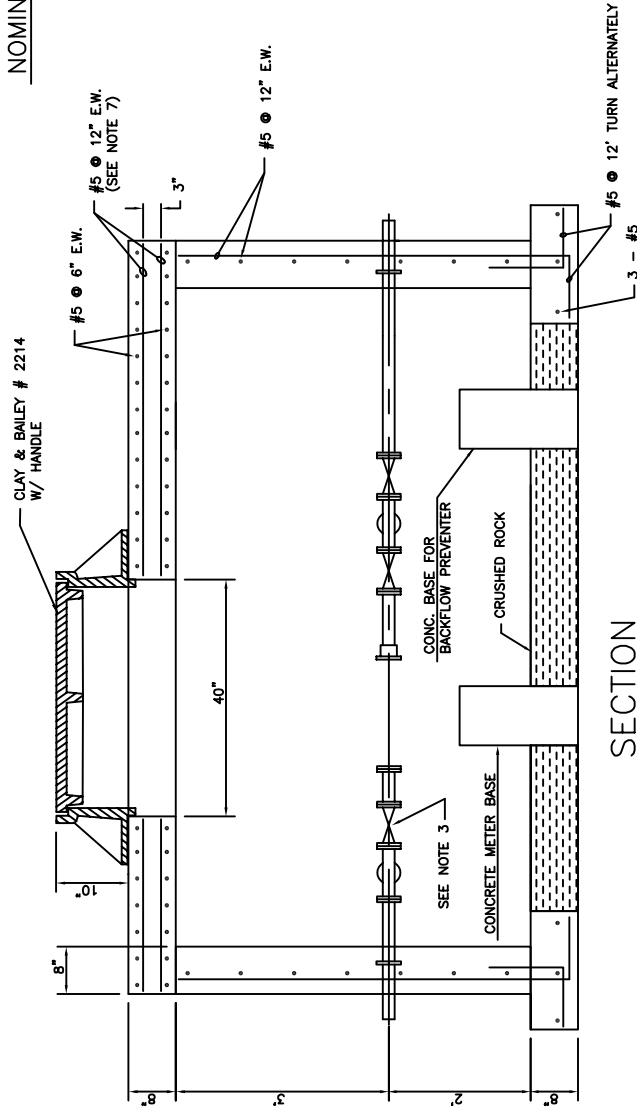
ALL DIMENSIONS ARE IN INCHES

NOTES:

1. POUR FOOTING ON FIRM UNDISTURBED EARTH.
2. ALL PIPING IN METER PIT SHALL BE D.I.P. OR C.I.P.
3. VALVES SHALL BE GATE TYPE; BYPASS VALVE SHALL BE O.S. & Y.
4. WALLS TO BE DOUBLE FORMED.
5. ALL RE-BARS TO HAVE 3/4" COVER.
6. CONCRETE SHALL BE M.C.I.B. 500-1-4.
7. TOP LAYER OF SLAB REINFORCEMENT MAY BE ELIMINATED IN CURBED NON-TRAFFIC AREAS.
8. 3" OR GREATER SIZE METER, TO HAVE UPSTREAM STRAINER.
9. SUMP PUMP MAY BE REQUIRED PER CITY TO MAINTAIN DRY PIT.

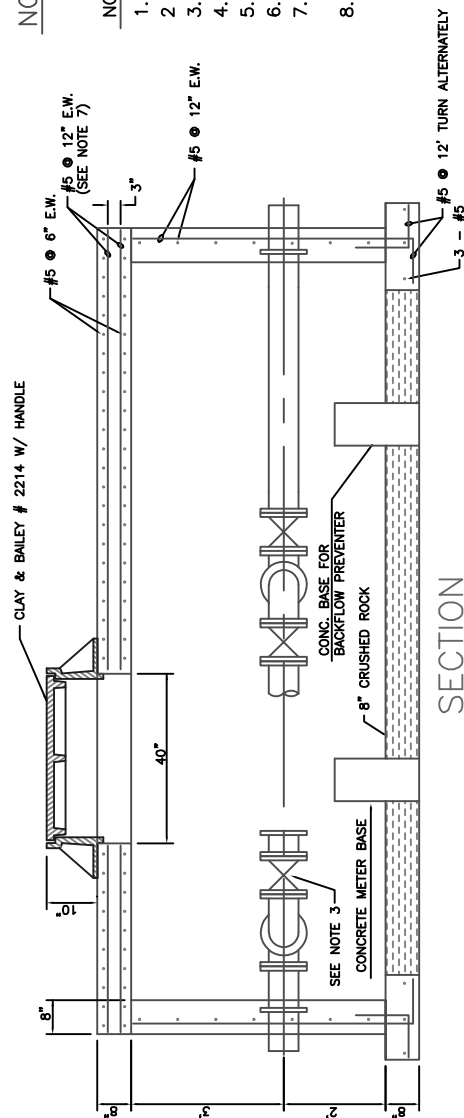
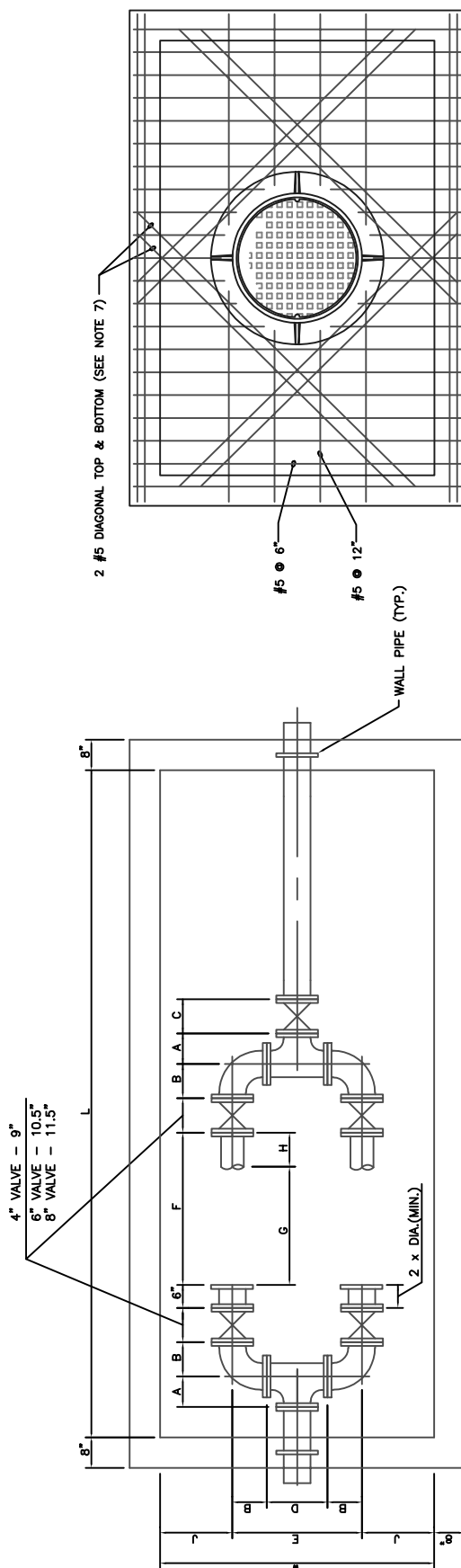


PLAN



SECTION

# METERING PIT & SETTING W/BYPASS FOR SINGLE 3" THRU 6" METERS



INLET & METER SIZE	L	W	A	B	C	D	E	F	G	H	J
6" 2-4"	183	72	8	8	9	16	34	42	*	*	9
8" 2-6"	216	84	9	12	11	18	41	48	*	*	21

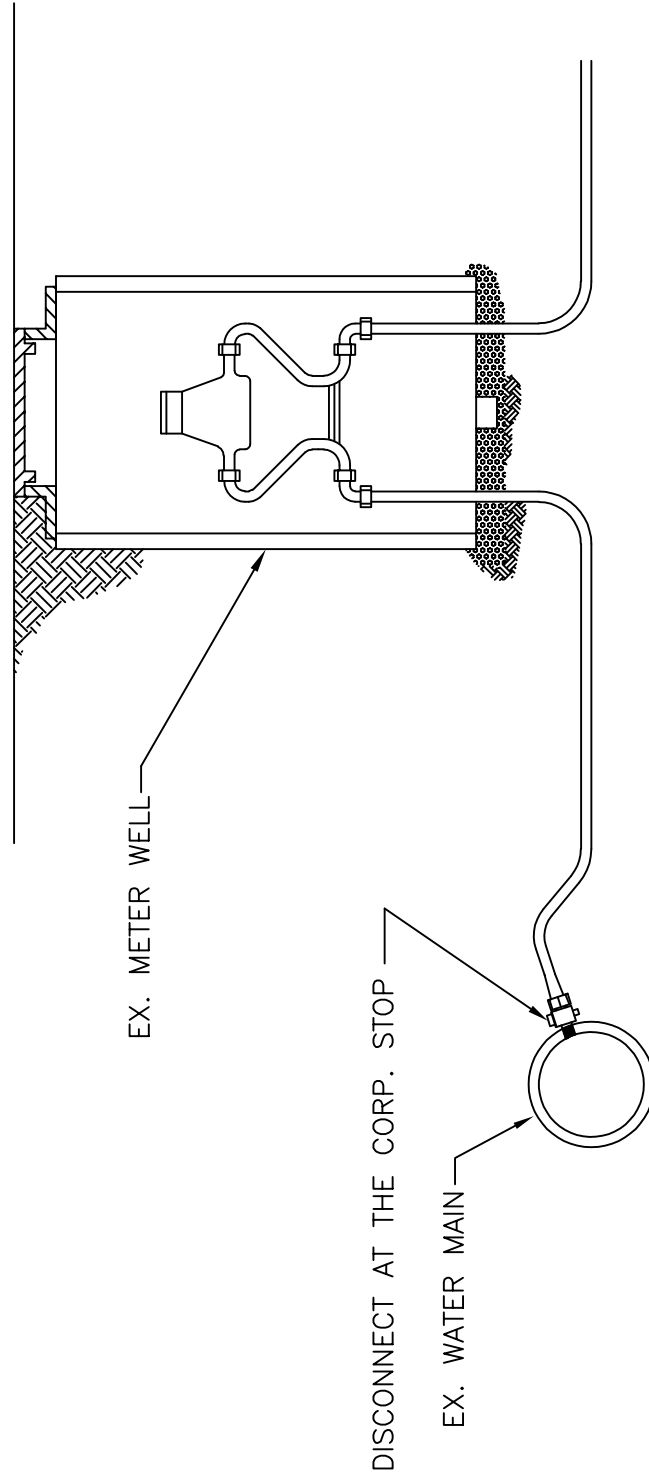
\* VARIES BY MANUFACTURER

NOMINAL DIMENSIONS FOR DOUBLE METER PITS  
ALL DIMENSIONS ARE IN INCHES

NOTES:

1. POUR FOOTING ON FIRM UNDISTURBED EARTH.
- 2 ALL PIPING IN METER PIT SHALL BE D.I.P.
3. VALVES SHALL BE GATE TYPE; BYPASS VALVE SHALL BE O.S. & Y.
4. WALLS TO BE DOUBLE FORMED.
5. ALL RE-BARS TO HAVE 3/4" COVER.
6. CONCRETE SHALL BE M.C.I.B. 500-1-4.
7. TOP LAYER OF SLAB REINFORCEMENT MAY BE ELIMINATED IN CURBED NON-TRAFFIC AREAS.
8. 3" OR GREATER METER, TO HAVE UPSTREAM STRAINER.

METERING PIT & SETTING W/BYPASS  
FOR DOUBLE 3" THRU 6" METERS



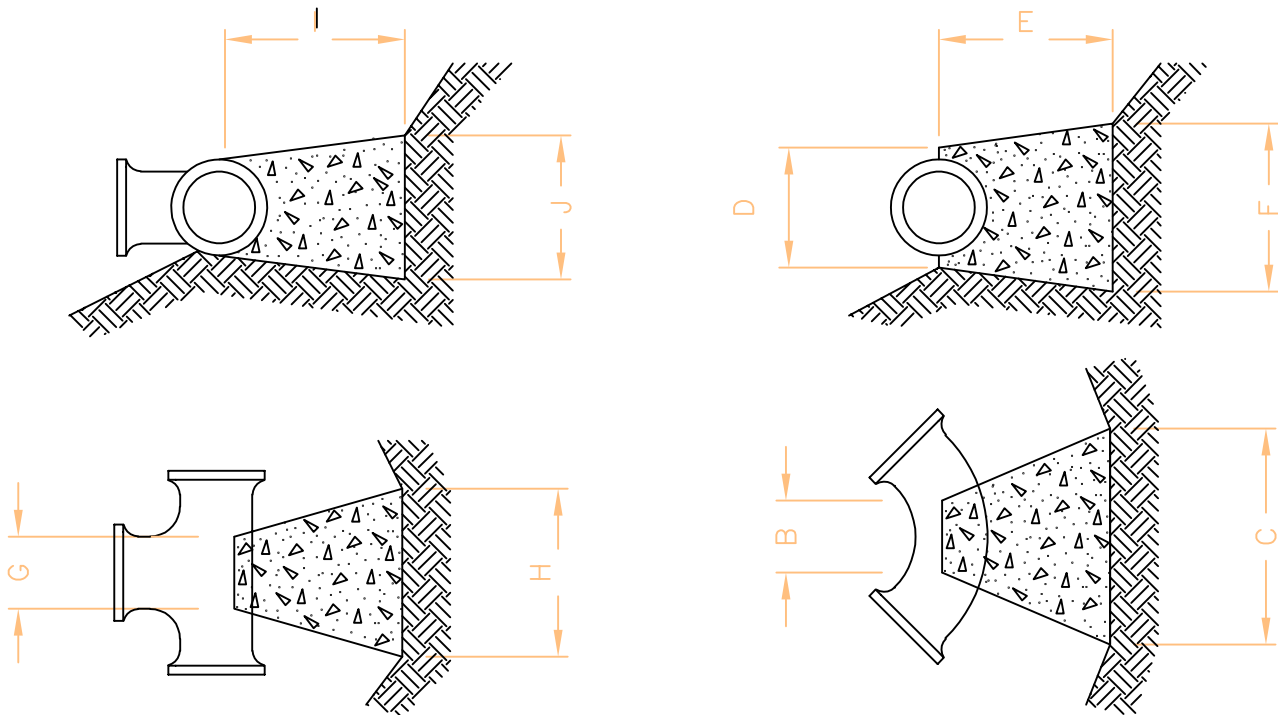
# SERVICE METER WELL DISCONNECTION DETAIL



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DATE:	6/2/20
SCALE:	NO SCALE

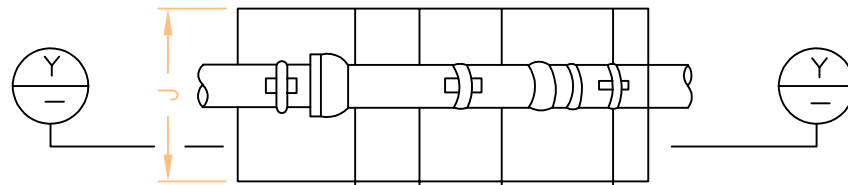
BENDS LESS THAN 45°	B	C	D	E	F		BENDS 45° THRU 90°	B	C	D	E	F
6"	8"	18"	12"	24"	12"		6"	8"	30"	12"	24"	30"
8"	8"	24"	12"	24"	18"		8"	8"	36"	12"	24"	36"
10"	8"	24"	12"	24"	18"		10"	8"	42"	12"	24"	42"
12"	8"	36"	18"	24"	24"		12"	12"	54"	18"	30"	48"
16"	12"	36"	18"	24"	30"		16"	18"	60"	18"	30"	48"
24"	18"	42"	30"	30"	36"		24"	24"	72"	30"	36"	54"
TEES	G	H	I	J			TEES	G	H	I	J	
6"x 6"x 6"	12"	24"	24"	18"			16"x 16"x 6"	12"	24"	24"	18"	
8"x 8"x 6"	12"	24"	24"	18"			16"x 16"x 8"	12"	24"	24"	24"	
8"x 8"x 8"	12"	24"	24"	24"			16"x 16"x 12"	12"	36"	24"	36"	
10"x 10"x 6"	12"	24"	24"	18"			16"x 16"x 16"	18"	48"	30"	48"	
10"x 10"x 8"	12"	24"	24"	24"			24"x 24"x 8"	12"	24"	24"	24"	
10"x 10"x 10"	12"	24"	24"	30"			24"x 24"x 10"	12"	30"	24"	30"	
12"x 12"x 6"	12"	24"	24"	18"			24"x 24"x 12"	18"	36"	24"	36"	
12"x 12"x 8"	12"	24"	24"	24"			24"x 24"x 16"	18"	48"	30"	48"	
12"x 12"x 12"	12"	36"	24"	36"			24"x 24"x 24"	24"	60"	36"	60"	



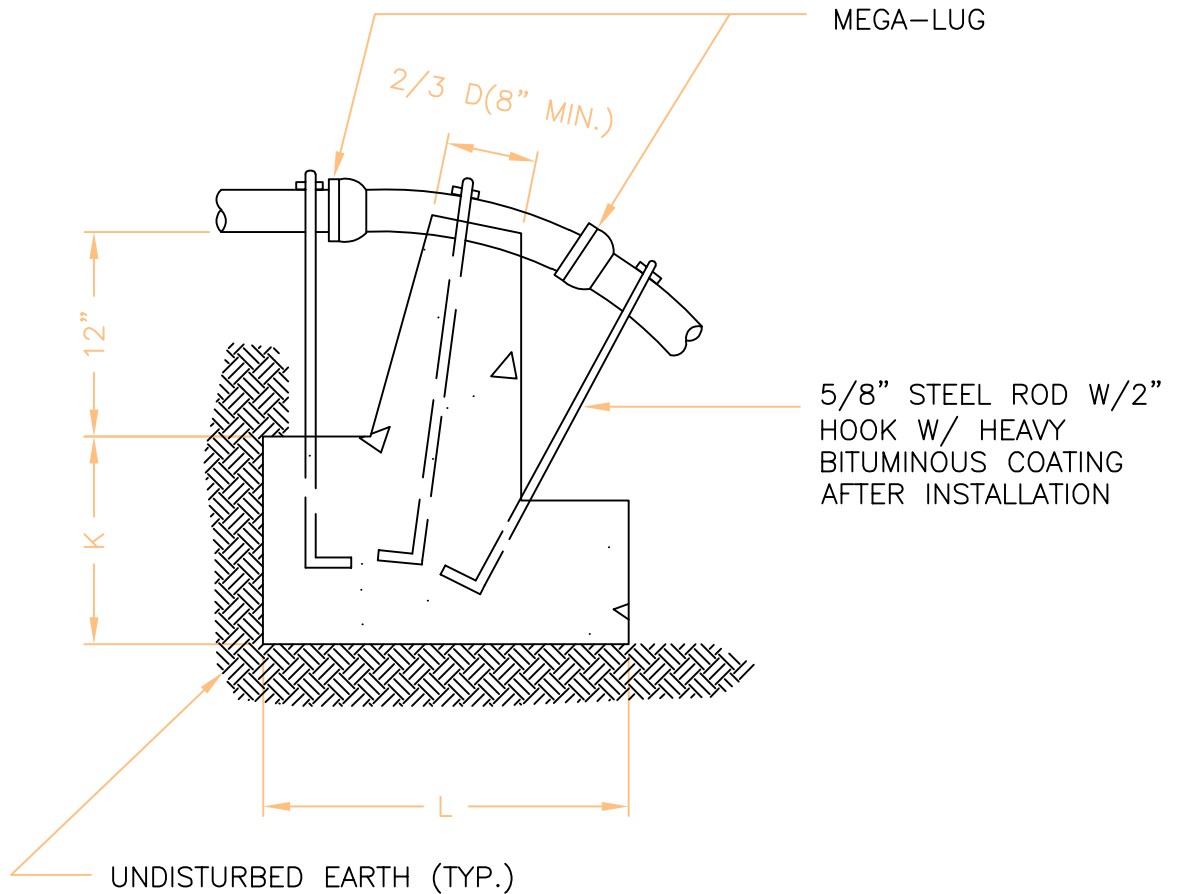
NOTE: ALL MECHANICAL FITTINGS SHALL BE ANCHORED TO PIPE.

## THRUST BLOCK DETAIL





PLAN



SECTION Y-Y

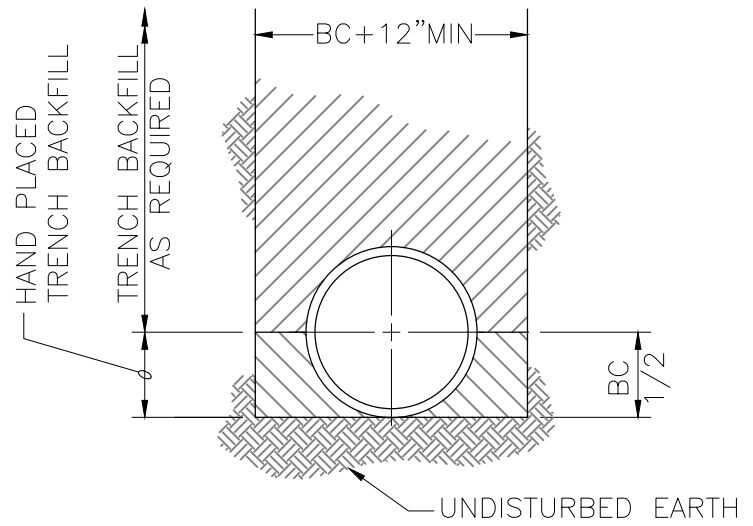
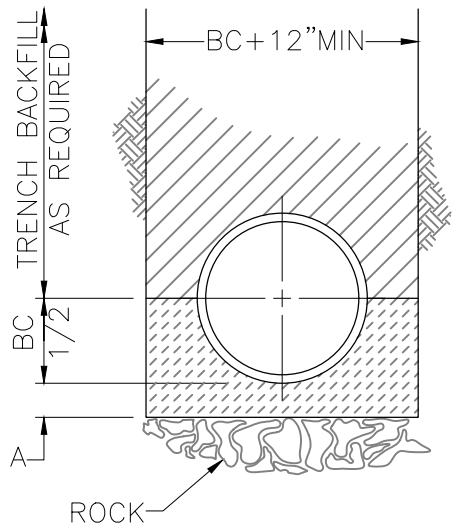


PIPE SIZE	J	K	L
6" & SMALLER	2'-6"	2'-6"	3'-0"
8"	3'-0"	2'-9"	4'-0"

## VERTICAL BEND THRUST BLOCK DETAIL







WATERLINE PIPE EMBEDMENT (IN ROCK)

WATERLINE PIPE EMBEDMENT (IN SOIL)

LEGEND	
BC	OUTSIDE DIA. OF PIPE
D	NOMINAL PIPE SIZE
A	EMBEDMENT BELOW PIPE
	TRENCH BACKFILL
	TAMPED GRANULAR BACKFILL (TYPE 3)
	GRANULAR BEDDING
	CONCRETE
	CLEAN CRUSHED STONE

TABLE OF EMBEDMENT DEPTHS BELOW PIPE		
D	A MIN SOIL	A MIN ROCK
0"—27"	0"	6"
30"—60"	0"	9"
66"—UP	0"	12"

TRENCH EMBEDMENT NOTES:

1. GRANULAR BEDDING SHALL BE CRUSHED ROCK OR PEA GRAVEL WITH NOT LESS THAN 95% PASSING 3/4" (95% PASSING 1" FOR 30" AND LARGER PIPE) AND NOT LESS THAN 95% RETAINED ON A 3/8"; TO BE PLACED IN NOT MORE THAN 6" LAYERS AND COMPACTED BY SLICING WITH A SHOVEL OR VIBRATING.
2. TAMPED GRANULAR BACKFILL (TYPE 5) SHALL BE GRANULAR MATERIAL CONFORMING TO THE REQUIREMENTS OF SECTION 1007.3 OF THE 2019 MISSOURI STANDARD SPECIFICATIONS FOR HIGHWAY CONSTRUCTION.
3. TRENCH BACKFILL (TYPE 1) SHALL BE FINELY DIVIDED MATERIAL FREE FROM DEBRIS AND STONES, COMPACTED TO 95% MAXIMUM DENSITY.
4. FLOWABLE FILL OR TYPE 5 AGGREGATE COMPACTED TO 95% OF STANDARD DENSITY WITH TESTING EACH LIFT IS REQUIRED UNDER EXISTING OR PROPOSED PAVEMENT. ALL MATERIAL SHALL BE COMPACTED TO 95% IN THE RIGHT OF WAY AND 90% OUTSIDE OF THE RIGHT OF WAY.

WATERLINE PIPE EMBEDMENT DETAILS

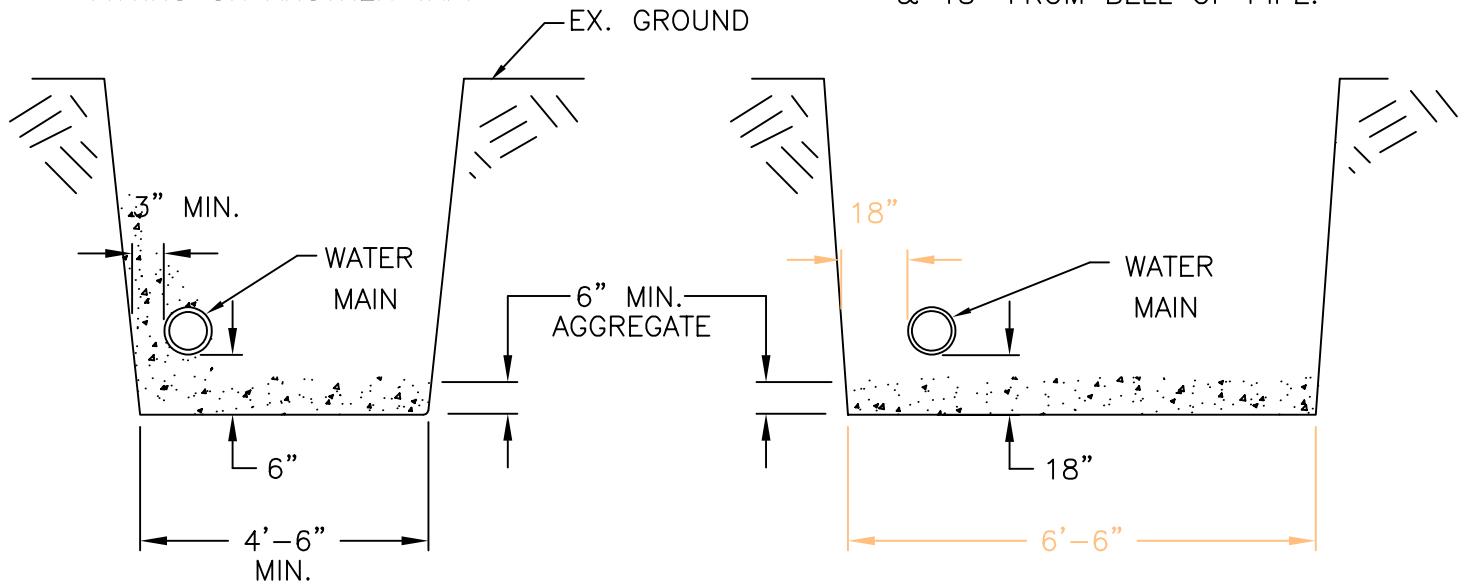


## CORPORATION TAPS

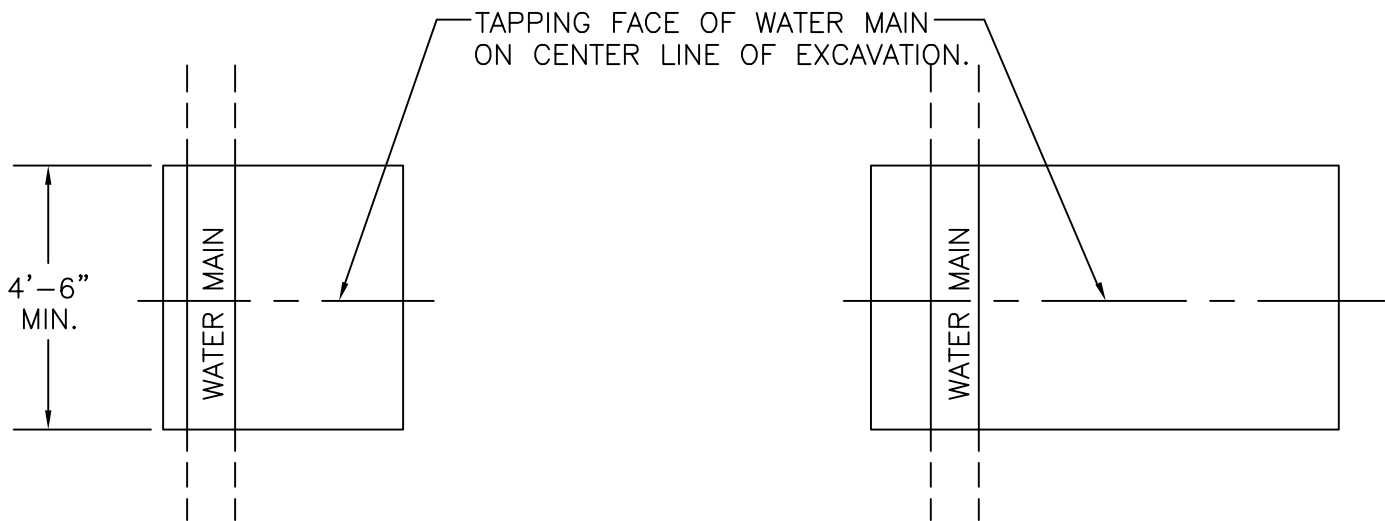
NOTE: A CORPORATION TAP SHALL NOT BE CLOSER THAN 18" TO A BELL FITTING OR ANOTHER TAP.

## TAPPING VALVES

NOTE: TAPS SHALL NOT BE LESS THAN 3' FROM SPIGOT END & 18" FROM BELL OF PIPE.



SECTION VIEWS



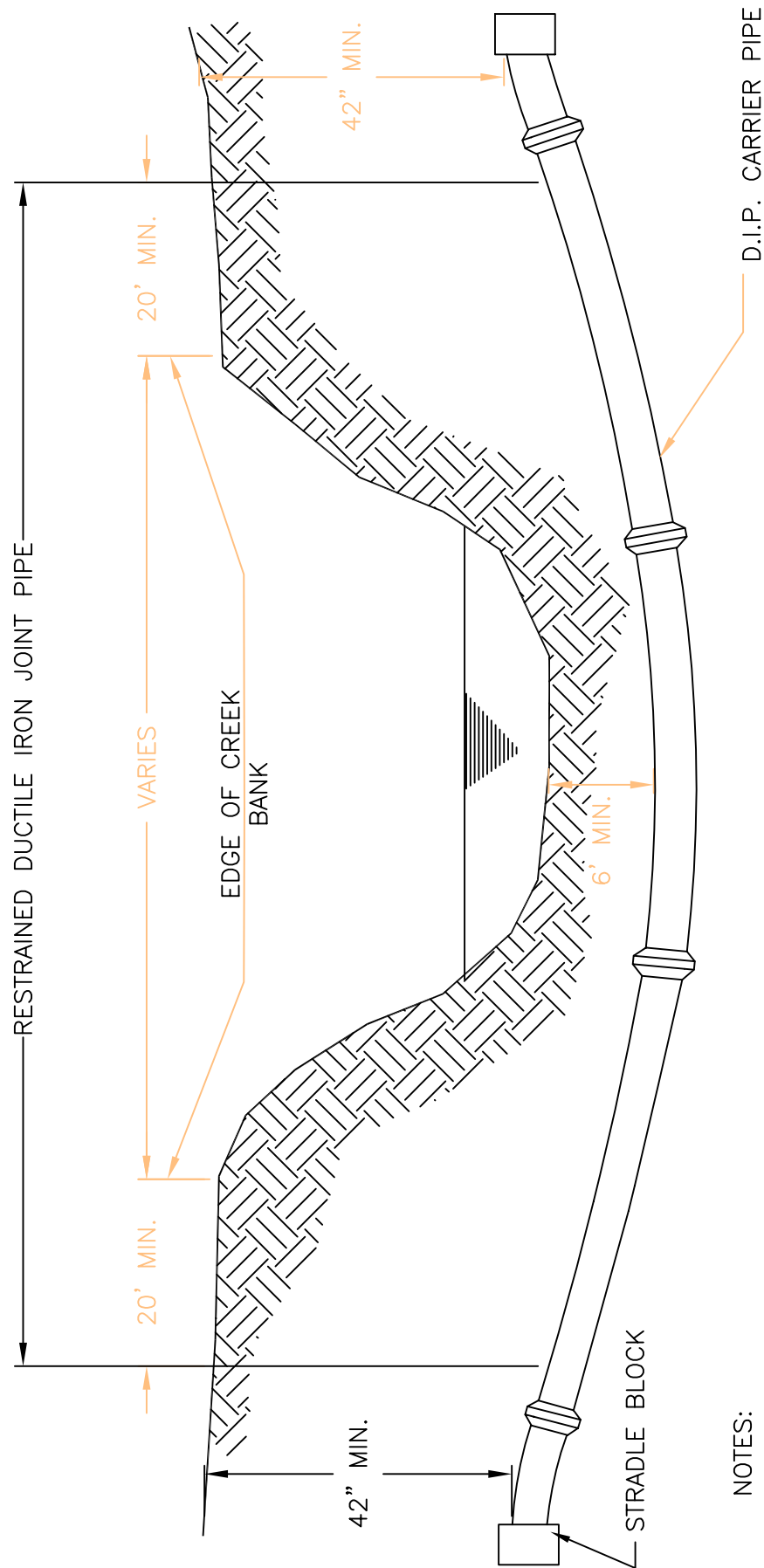
### NOTES:

1. EXCAVATIONS EXCEEDING 5' IN DEPTH MUST BE SHORED, BY CONTRACTOR.
2. ALL MATERIAL FOR SERVICE MUST BE INSTALLED PRIOR TO TAP BEING MADE.

## PLAN VIEWS

## EXCAVATION DETAILS





NOTES:

1. PIPE LAID SO AS NOT TO EXCEED PIPE MANUFACTURERS ALLOWABLE DEFLECTION.
2. CROSSINGS SHALL BE INSTALLED WHERE NOTED ON THE PLANS.

## TYPICAL CREEK CROSSING DETAIL



**Grain Valley**  
Come Home To Opportunity

ALLOWABLE LEAKAGE PER 1,000 FEET OF PIPELINE\* – gph

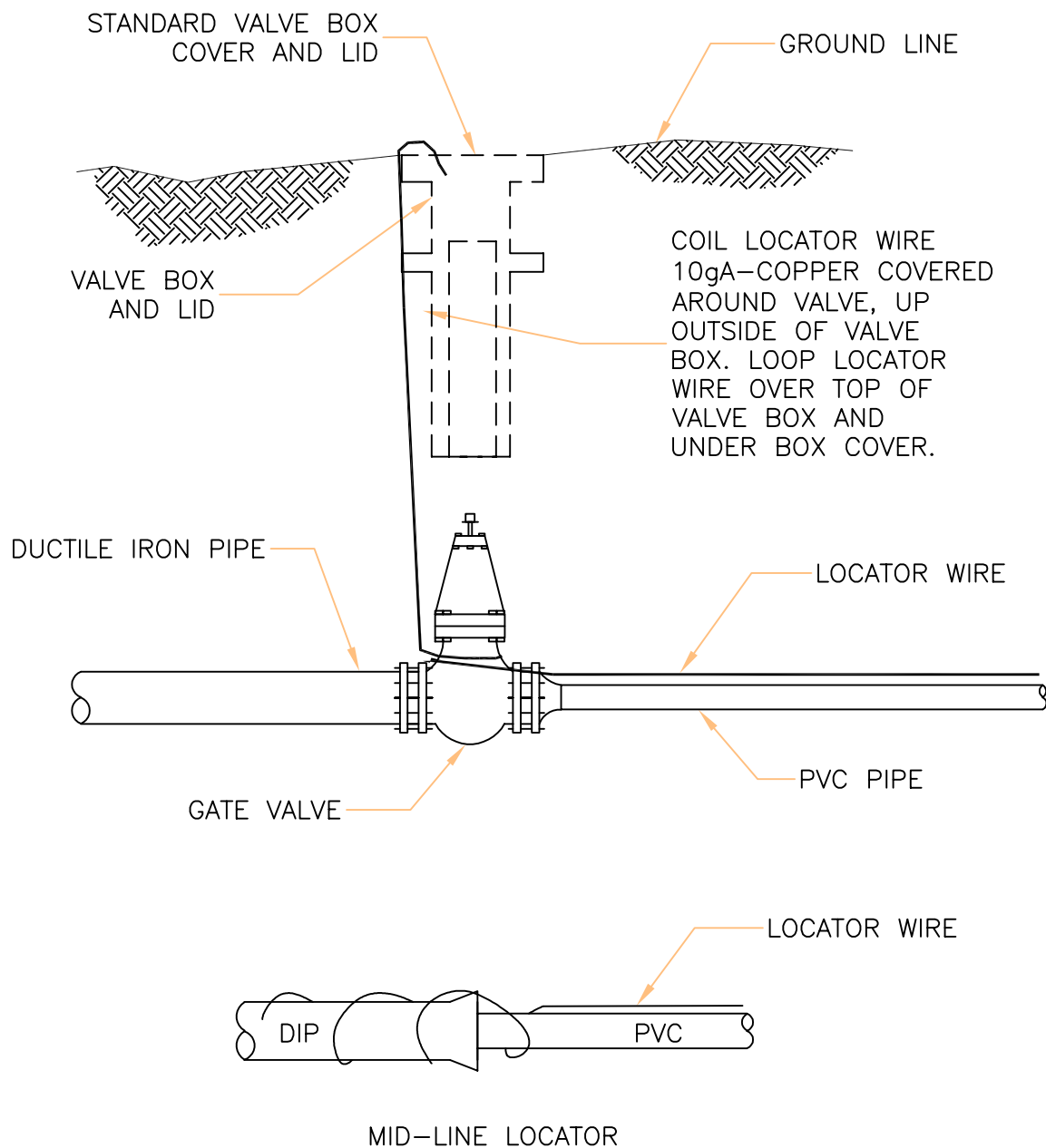
NOMINAL PIPE DIAMETER (INCHES)

AVERAGE TEST PRESSURE (psi)	4	6	8	10	12	14	16	18	20	24
300	0.52	0.78	1.04	1.30	1.56	1.82	2.08	2.34	2.60	3.12
275	0.50	0.75	1.00	1.24	1.49	1.74	1.99	2.24	2.49	2.99
250	0.47	0.71	.095	1.19	1.42	1.66	1.90	2.14	2.37	2.85
225	0.45	0.68	0.90	1.13	1.35	1.58	1.80	2.03	2.25	2.70
200	0.43	0.64	0.85	1.06	1.28	1.48	1.70	1.91	2.12	2.55
175	0.40	0.59	0.80	0.99	1.19	1.39	1.59	1.79	1.98	2.38
150	0.37	0.55	0.74	0.92	1.10	1.29	1.47	1.66	1.84	2.21
125	0.34	0.50	0.67	0.84	1.01	1.18	1.34	1.51	1.68	2.01
100	0.30	0.45	0.60	0.75	0.90	1.05	1.20	1.35	1.50	1.80

\* FOR PIPE WITH 18–FOOT NOMINAL LENGTHS. TO OBTAIN THE RECOMMENDED ALLOWABLE LEAKAGE FOR PIPE WITH 20–FOOT LENGTHS, MULTIPLY THE LEAKAGE CALCULATED FROM THE TABLE BY 0.9. IF THE PIPELINE UNDER TEST CONTAINS SECTIONS OF VARIOUS DIAMETERS, THE ALLOWABLE LEAKAGE WILL BE THE SUM OF THE COMPUTED LEAKAGE FOR EACH SIZE.

ALLOWABLE LEAKAGE FOR WATERLINES





## LOCATOR WIRE DETAIL



*Grain Valley*  
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EROSION CONTROL

DETAIL

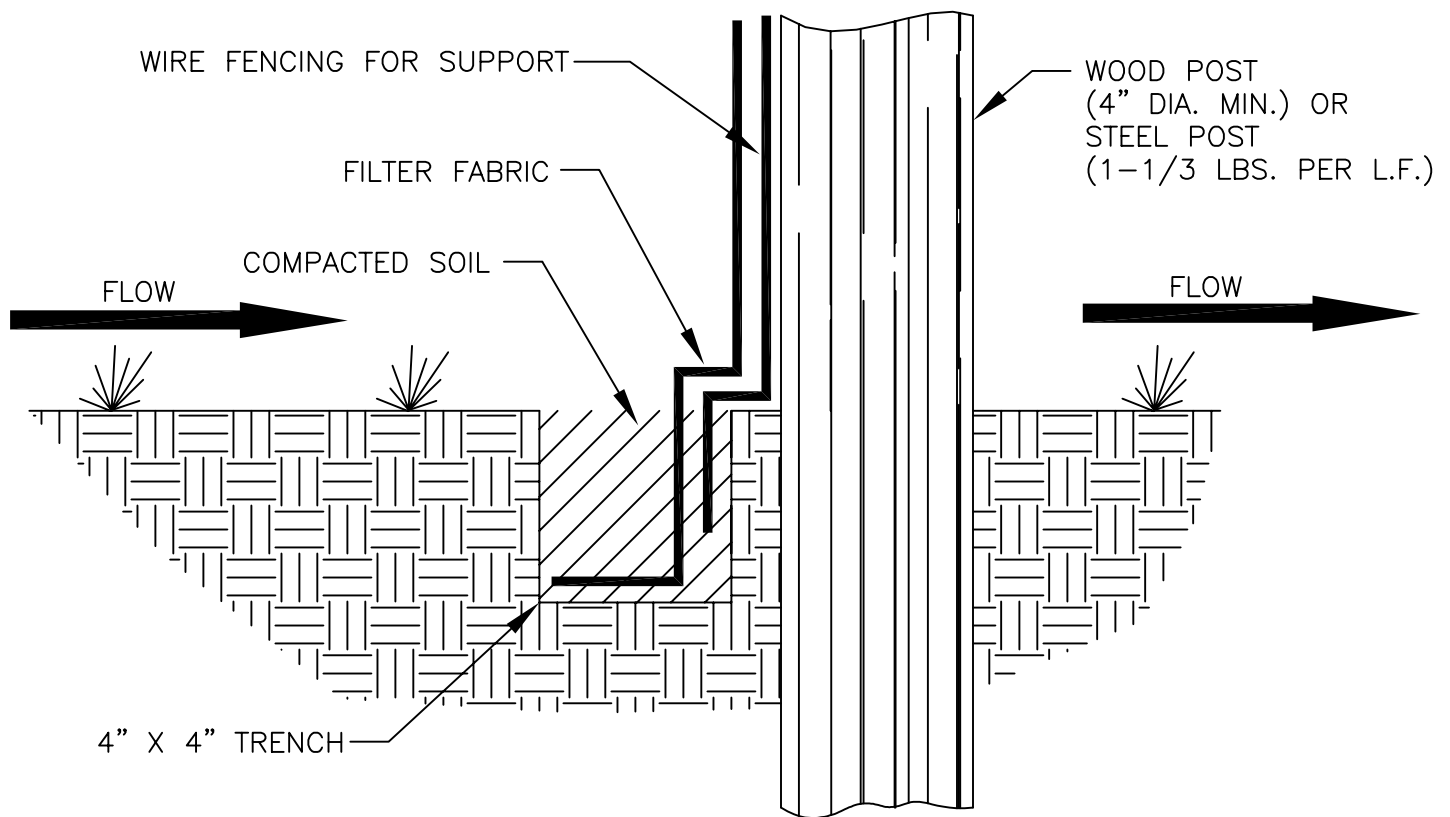
DRAWINGS



## **EROSION CONTROL NOTES**

1. Provide temporary silt fencing at all pipe entrances until all site seeding and sodding has been established. Maintain as necessary.
2. Immediately remove sediments or other materials tracked onto public roadways.
3. Provide and maintain stabilized roadway construction entrance (or entrances as may be required).
4. Coordinate site grading with existing and proposed utilities.
5. Stock pile waste excavation materials away from existing channels and grade to drain.
6. Remove silt build up in basin and verify grade prior to final seeding, lining or rip-rap installation and clean up.
7. All disturbed areas shall be seeded, fertilized and mulched, or sodded, in accordance with the Standards and Specifications adopted by the City of Grain Valley, MoDOT, MoDNR or other governing agency and good engineering practices.
8. Silt fences, whether straw bales or filter fabric, require maintenance to preserve their effectiveness. All silt fences shall be inspected immediately after each heavy rainstorm and at least daily during prolonged rainfall. Any required repairs shall be made immediately. When sediment deposits reach approximately one-half the height of the silt fence, the sediment shall be removed or a second silt fence shall be installed. All costs associated with this work, including related incidentals, shall be the contractor's responsibility and shall be included in the bid for the proposed work.





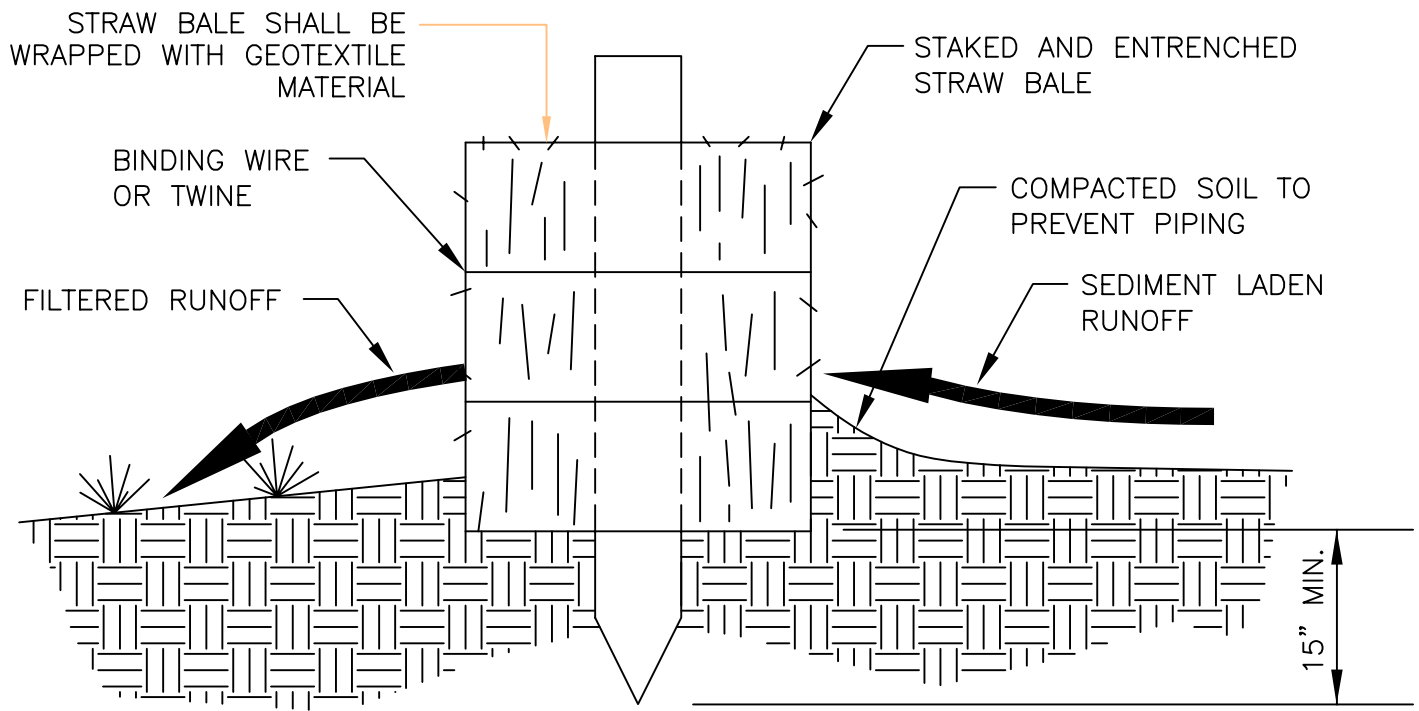
SECTION VIEW

NOTES:

1. THE SIZE OF THE DRAINAGE AREA SHOULD BE NO MORE THAN 1/4 ACRE PER 100 LINEAR FEET OF FENCE LENGTH.
2. THE MAXIMUM SLOPE LENGTH ABOVE THE FENCE SHOULD BE LESS THAN 100 FEET.
3. NO DITCH OR DRAINAGEWAY WITH AN AREA GREATER THAN 2 ACRES SHALL BE ENCLOSED ABOVE A SILT FENCE.
4. NO SILT FENCE SHALL BE CONSTRUCTED IN A LIVE STREAM OR DRAINAGEWAY WITH EXPECTED FLOWS GREATER THAN 1 CFS.
5. THE FILTER FABRIC SHALL HAVE A MINIMUM FILTERING EFFICIENCY OF 75%, A MINIMUM TENSILE STRENGTH OF 30 LBS. PER LINEAR INCH AND A FLOW RATE OF 0.3 GALLONS PER SQUARE FOOT PER MINUTE. THE FILTER FABRIC SHALL ALSO HAVE ULTRAVIOLET RAY INHIBITORS TO ASSURE A LIFE USE EXPECTANCY OF 6 MONTHS AT 0 TO 100 DEGREES FAHRENHEIT.
6. THE FILTER FABRIC SHALL BE 36 INCHES OR LESS IN HEIGHT, WITH JOINTS AT EVERY POST AVOIDING OVERLAP IF POSSIBLE (6" MIN. OVERLAP IF NECESSARY) AND POSTS SPACED EVERY 10 FEET WITH WIRE MESH SUPPORT OR 6 FEET WITHOUT WITHOUT SUPPORT, MAKING SURE THAT A MIN. OF 8" OF FABRIC IS BURIED IN THE 4" X 4" TRENCH.
7. THE SILT FENCE SHALL BE INSPECTED AFTER EVERY RAINFALL TO DETERMINE IF ANY PART OF THE FENCE NEEDS TO BE REPAIRED OR REPLACED. IF IT IS DETERMINED THAT THE FENCE NEEDS ANY REPAIR OR REPLACEMENT THIS SHALL BE DONE IMMEDIATELY.
8. SEDIMENT DEPOSITS SHALL BE REMOVED AFTER EACH RAINFALL OR BEFORE THEY ACCUMULATE TO 1/2 OF THE FENCE HEIGHT.

## SILT FENCE DETAIL





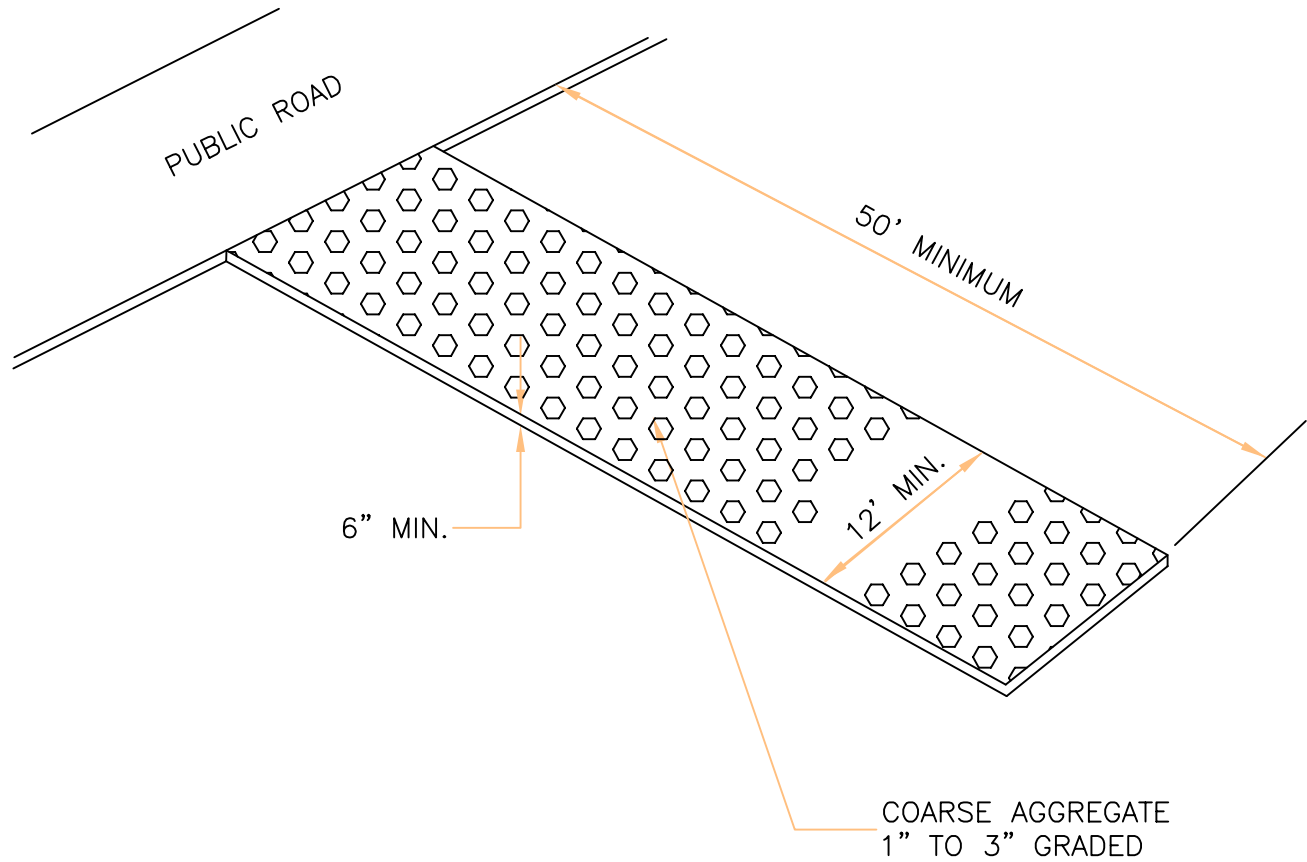
SECTION VIEW

NOTES:

1. STRAW BALES SHOULD ONLY BE USED FOR DRAINAGE AREAS NO LARGER THAN 1/4 ACRE PER 100 FEET OF BALES OR FOR DITCHES DRAINING NO MORE THAN 2 ACRES.
2. STRAW BALES SHOULD ONLY BE USED AS A TEMPORARY MEASURE AND FOR NO LONGER THAN A TIME PERIOD OF THREE MONTHS.
3. EXCAVATE A TRENCH ALONG THE AREAS THAT THE STRAW BALES WILL BE USED AS EROSION CONTROL TO A DEPTH OF 4 INCHES AND TO THE WIDTH OF ONE STRAW BALE. THE STRAW BALES THEN SHALL BE PLACED IN THE TRENCH. SAVE EXCAVATED MATERIAL ON THE UPSTREAM SIDE OF THE TRENCH.
4. STRAW BALES SHOULD BE ANCHORED WITH A MIN. OF 2 STAKES OR REBARS DRIVEN INTO THE UNDERLYING SOIL, MAKING SURE THAT THE BINDING WIRE OR TWINE IS FACING THE SIDES AND NOT TOUCHING THE SOIL. THE FIRST STAKE INTO EACH BALE SHOULD BE DRIVEN TOWARD THE PREVIOUSLY LAID BALE TO FORCE THEM TOGETHER.
5. SPACING BETWEEN THE BALES SHOULD BE TIGHTLY CHINKED WITH LOOSE STRAW.
6. AFTER STRAW BALES ARE IN PLACE THE EXCAVATED SOIL SHOULD BE BACKFILLED AGAINST THE UPSLOPE SIDE OF THE STRAW BALES TO A HEIGHT OF 4 INCHES AFTER COMPACTING.
7. STRAW BALES SHOULD BE INSPECTED AFTER EACH RAINFALL TO DETERMINE IF ANY REPAIRS OR REPLACEMENTS TO THE STRAW BALES ARE NEEDED. IF IT IS DETERMINED THAT THE STRAW BALES NEED TO BE REPAIRED OR REPLACED, THIS SHOULD BE DONE IMMEDIATELY. SEDIMENT ACCUMULATIONS MUST BE REMOVED WHEN THEY REACH 1/2 THE BARRIER HEIGHT.

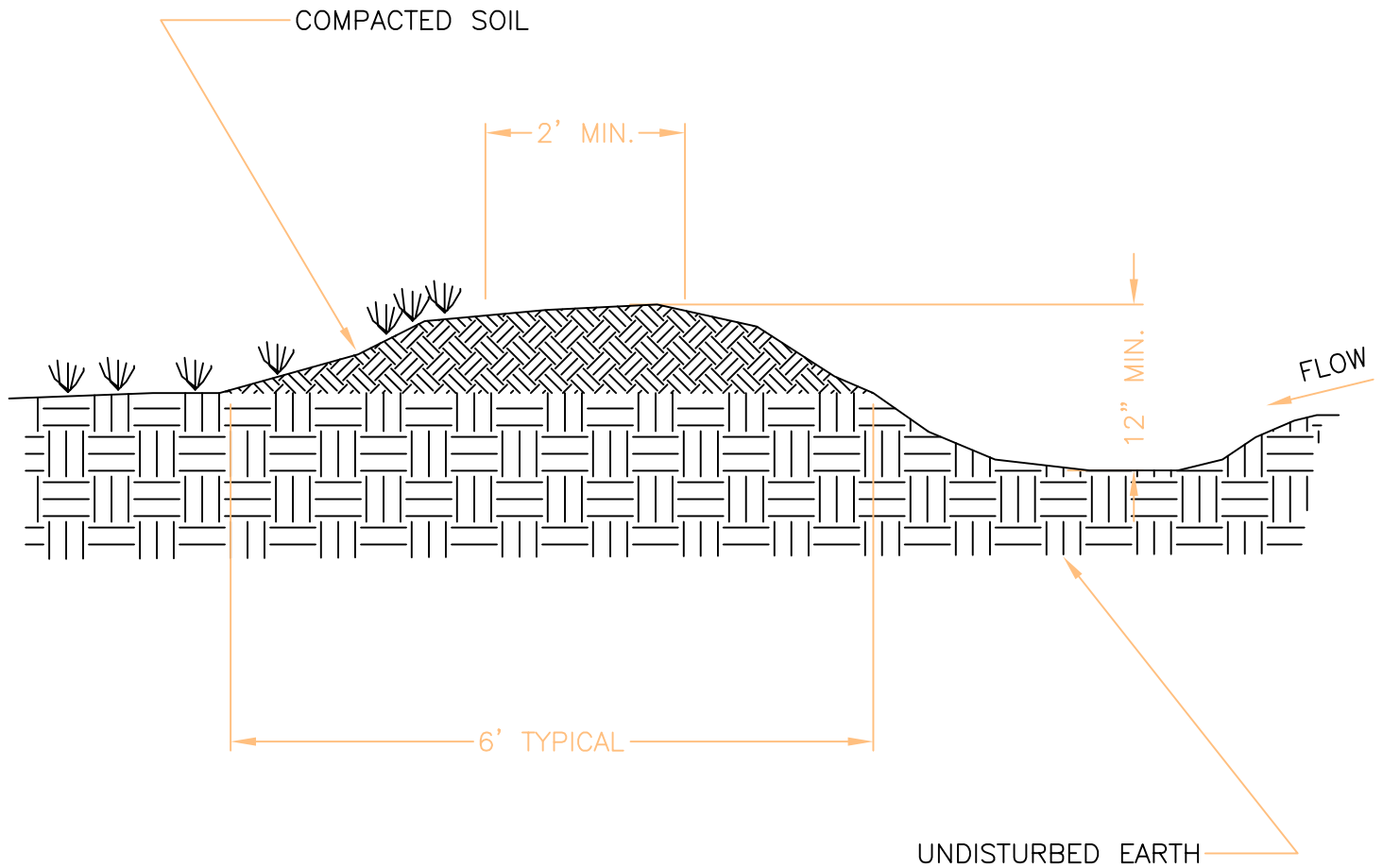
## STRAW BALE DETAIL





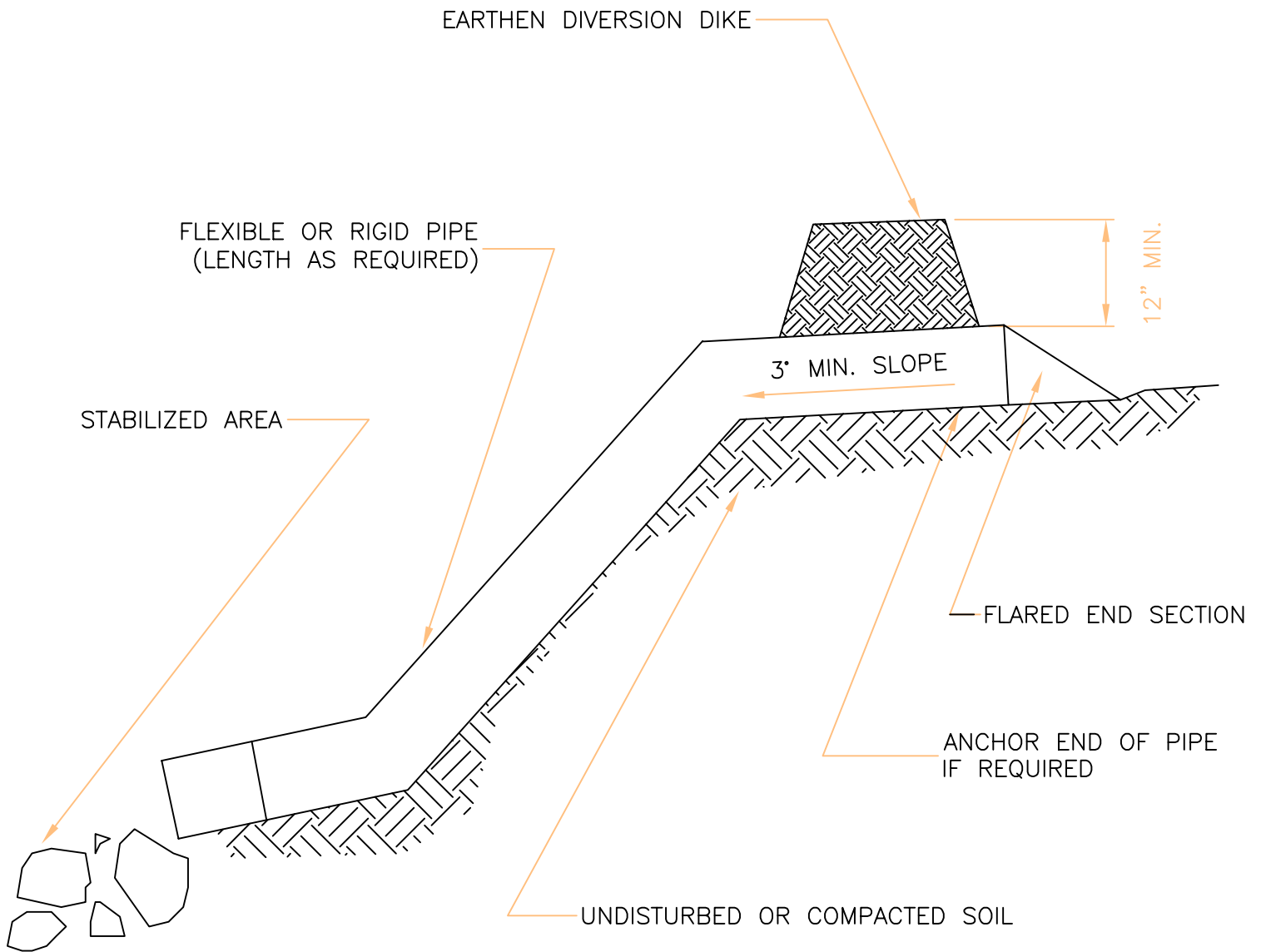
## GRAVEL CONSTRUCTION ENTRANCE DETAIL





## TEMPORARY DIVERSION DIKE DETAIL

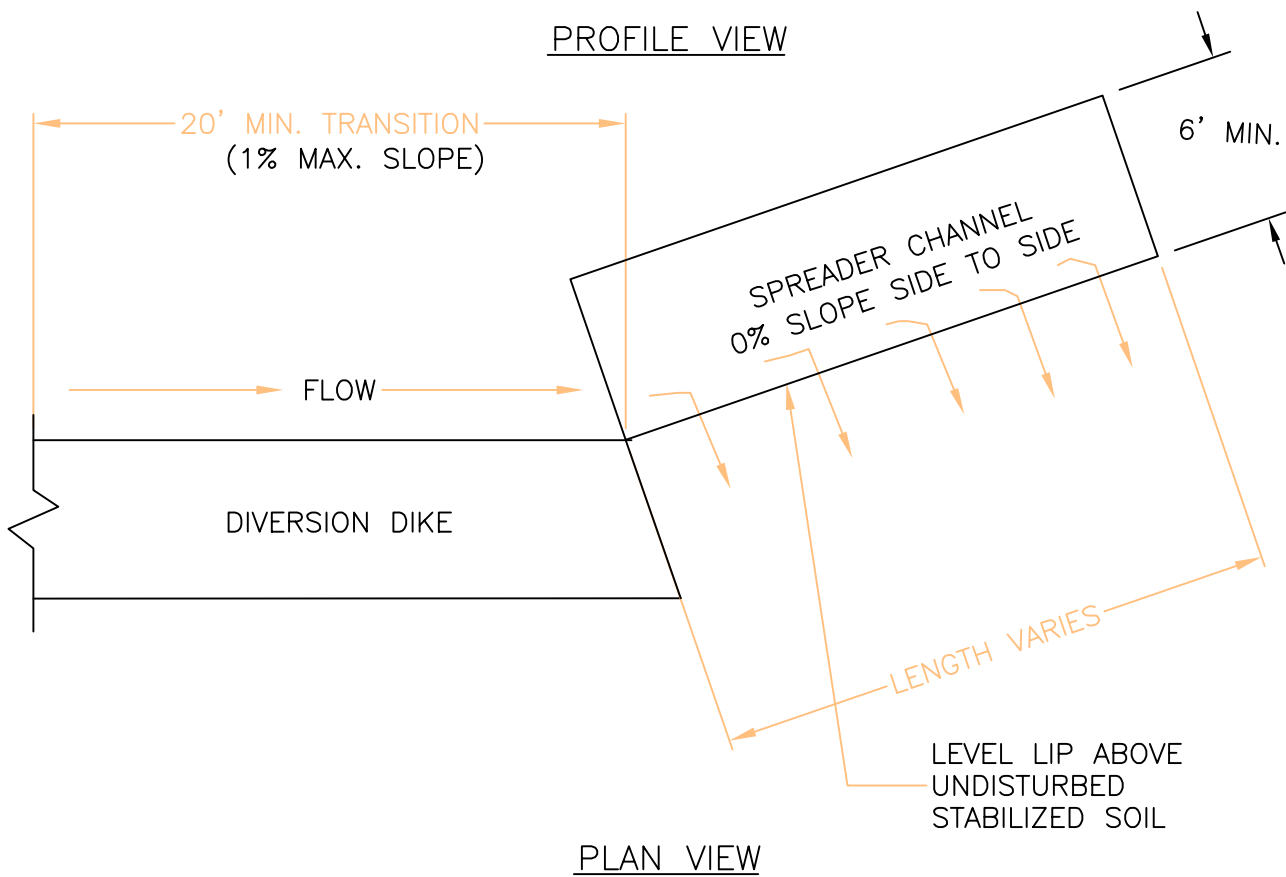
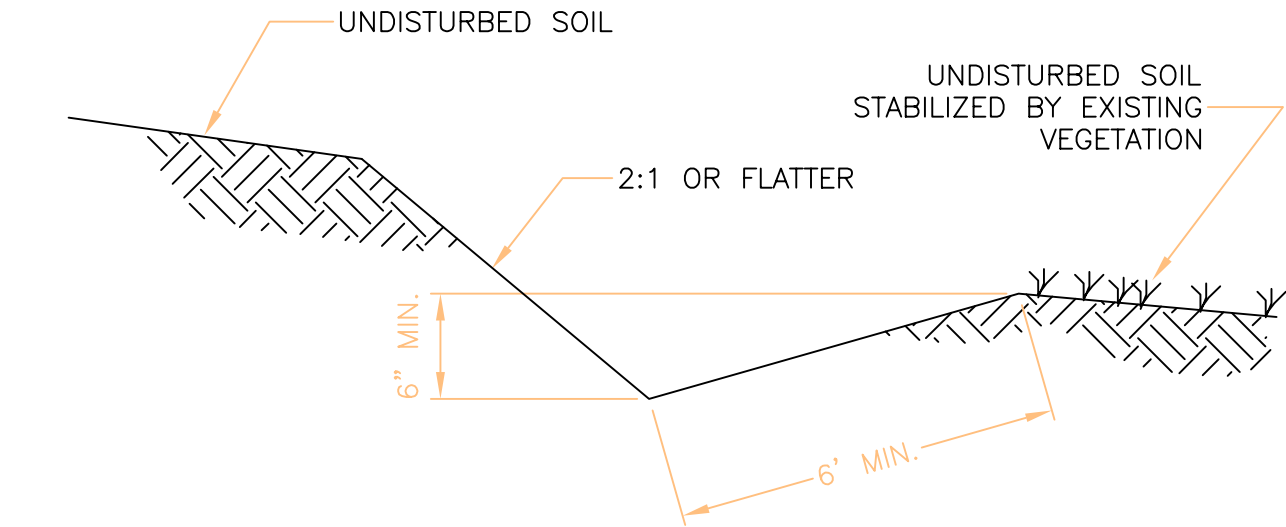




## TEMPORARY SLOPE DRAIN DETAIL



DATE:	6/2/20
SCALE:	NO SCALE



## LEVEL SPREADER DETAIL

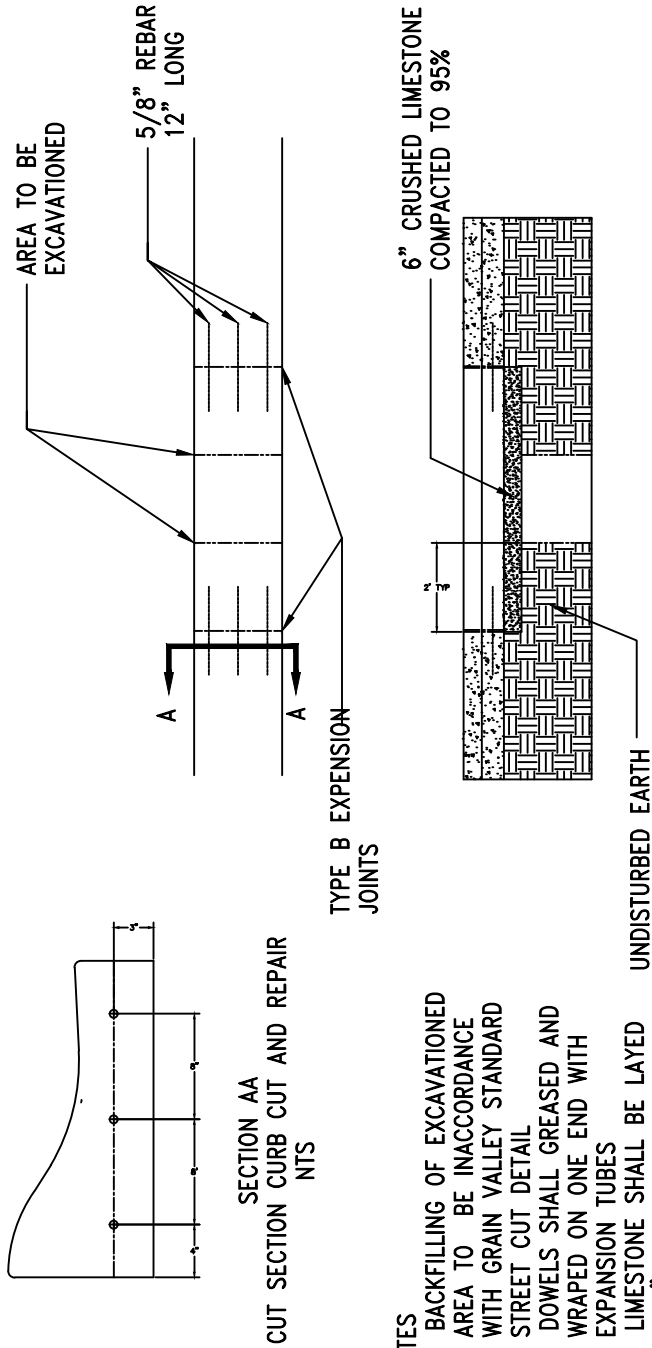




MISCELLANEOUS

DETAIL

DRAWINGS

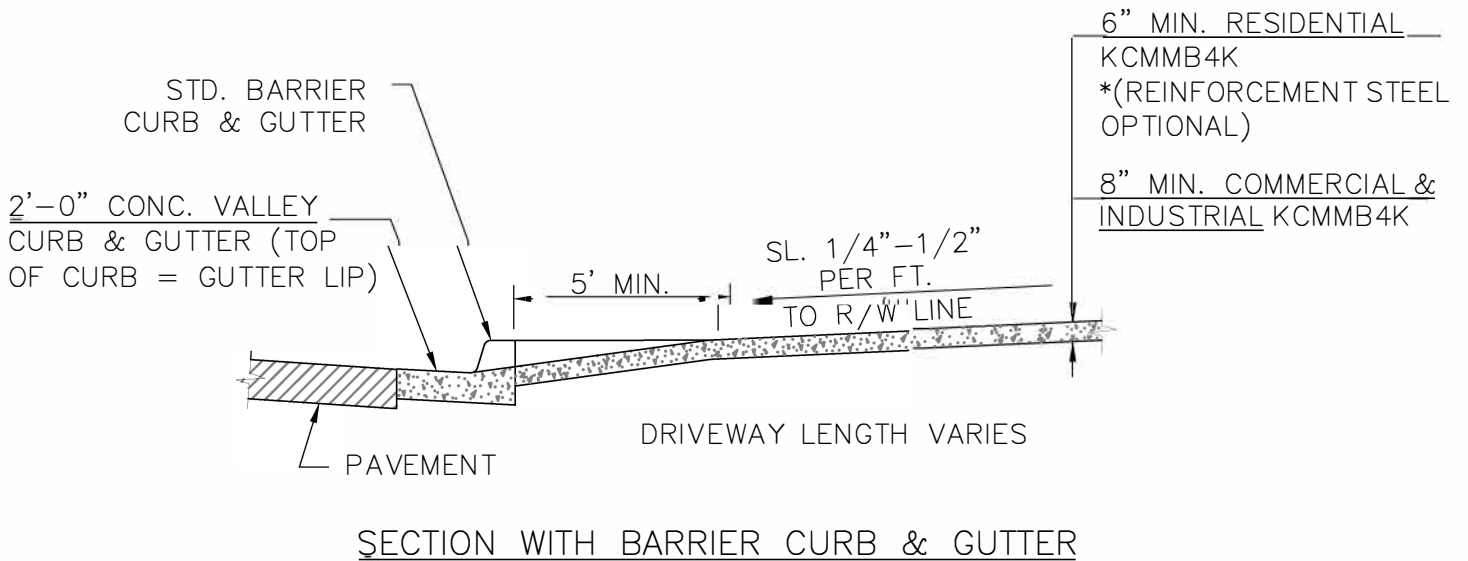
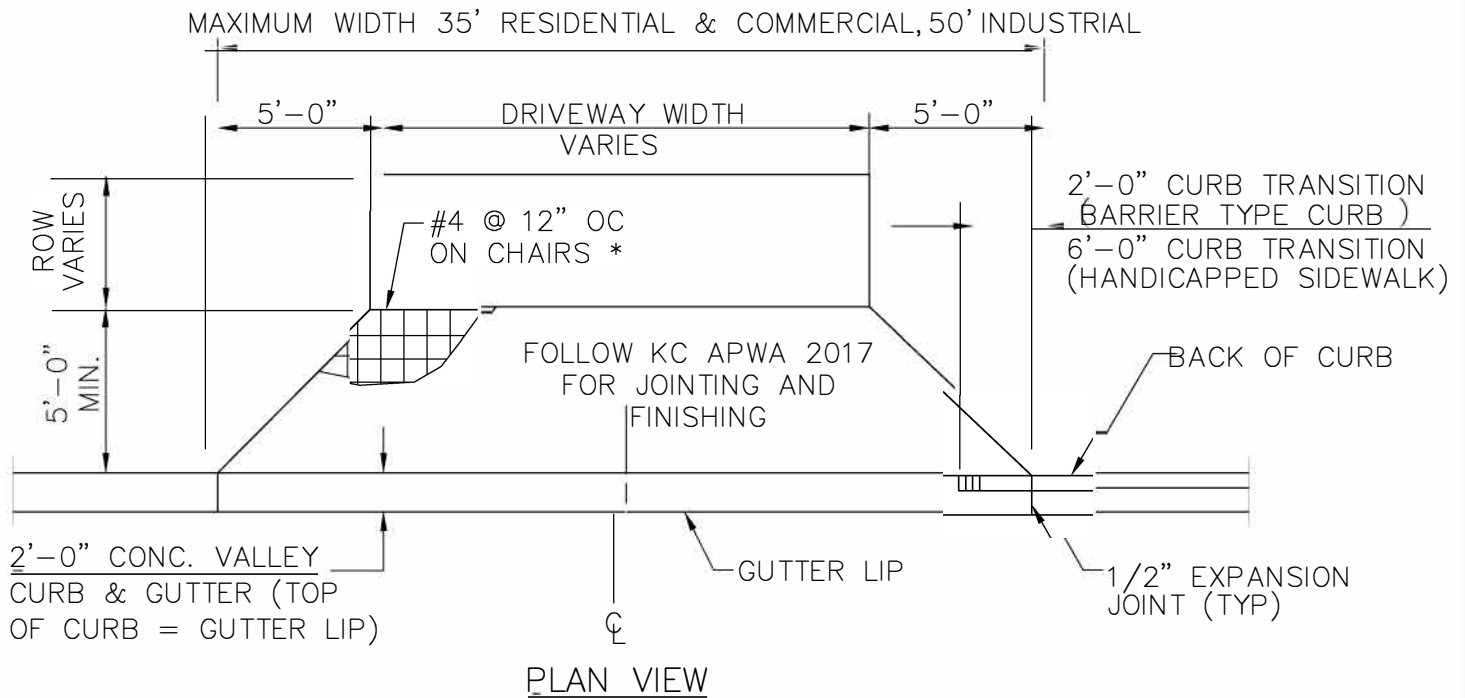


#### NOTES

1. BACKFILLING OF EXCAVATED AREA TO BE IN ACCORDANCE WITH GRAIN VALLEY STANDARD STREET CUT DETAIL
2. DOWELS SHALL BE GREASED AND WRAPPED ON ONE END WITH EXPANSION TUBES
3. LIMESTONE SHALL BE LAYED IN 4" LIFTS AND COMPACTED TO 95% DENSITY
4. CONTRACTION JOINTS SHALL BE INSTALLED EVERY 10' AS PER APWA STANDARD DETAIL NUMBER C-1 (APWA 1997)
5. CONCRETE SHALL MEET STANDARDS SET MCIB FOR TYPE A
6. WHEN WITHIN 4' OF EXPANSION OR CONTROL JOINT EXTEND REPAIR TO JOINT.

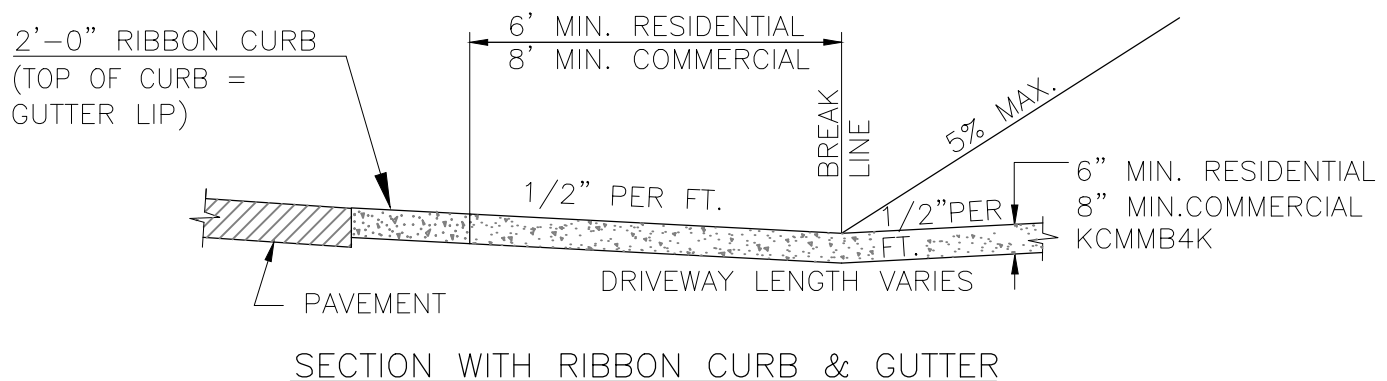
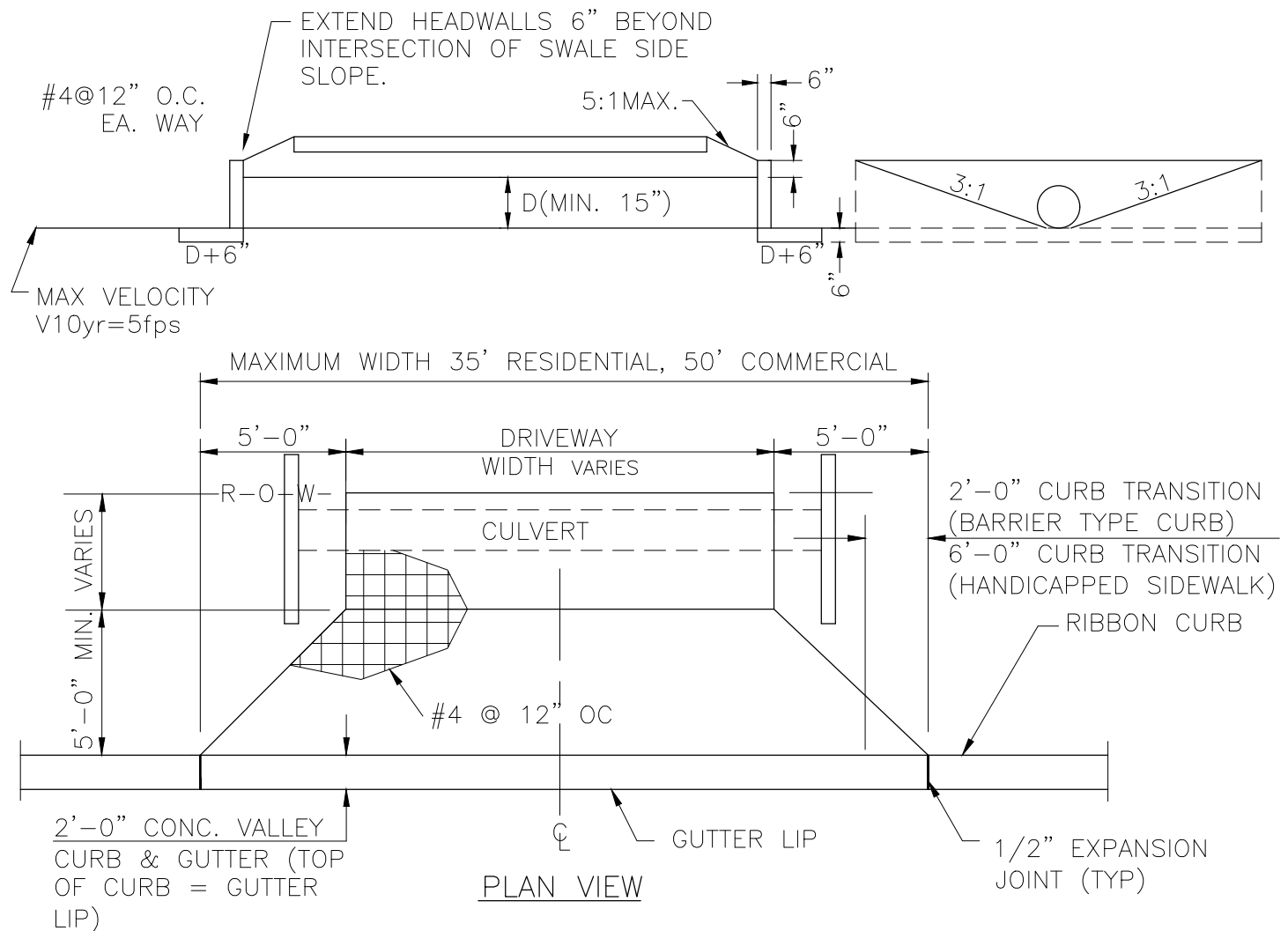
## CURB & GUTTER EXCAVATION REPAIR DETAIL





## DRIVEWAY DETAIL WITH CURB TRANSITION (TYPICAL)





NOTE:

1. 10YR STORM MAY NOT OVER TOP DRIVEWAY
2. SIZE CULVERTS AT 80% CAPACITY FOR SIZES SMALLER THAN 24" DIAMETER.

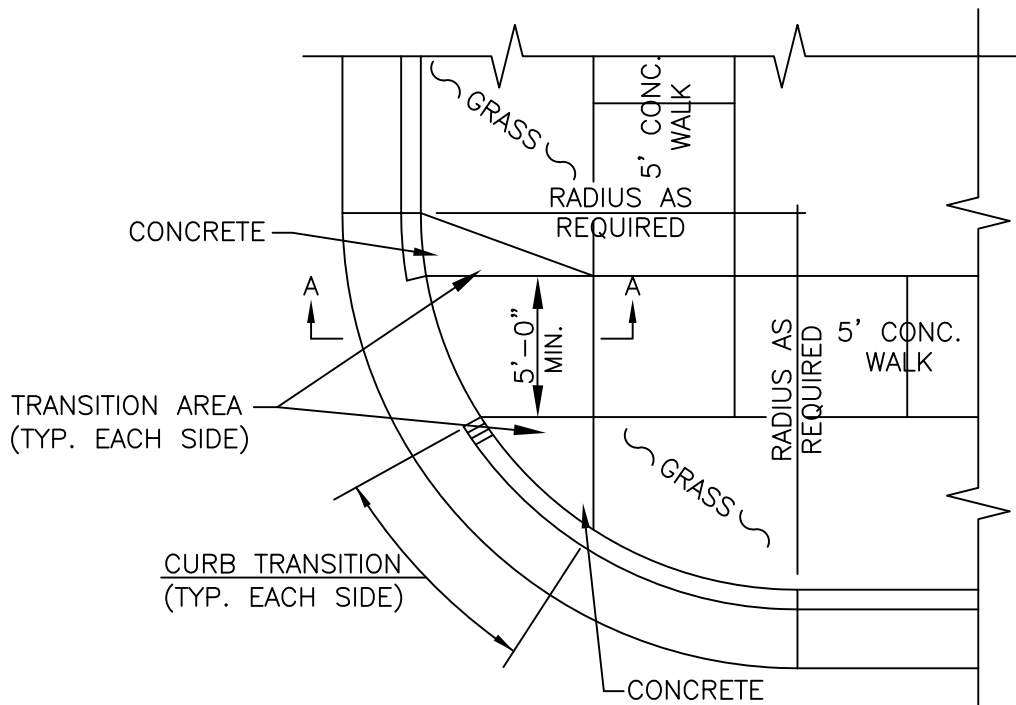
\*MIN. 7 DAY CURE OR 3000 PSI BREAK BEFORE TRAFFIC

## DRIVEWAY DETAIL WITH RIBBON CURB



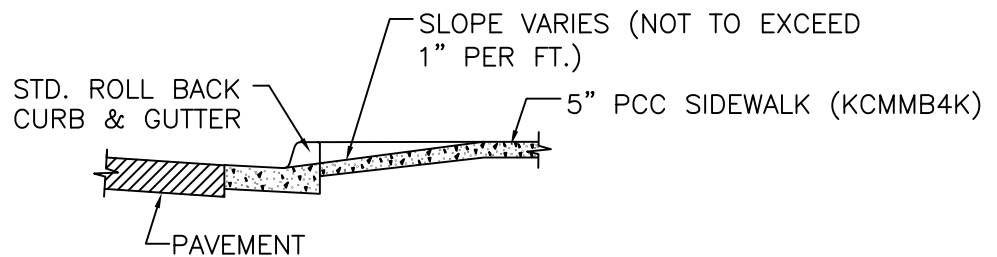
DATE: 04/28/20  
SCALE: NO SCALE

MISC-003

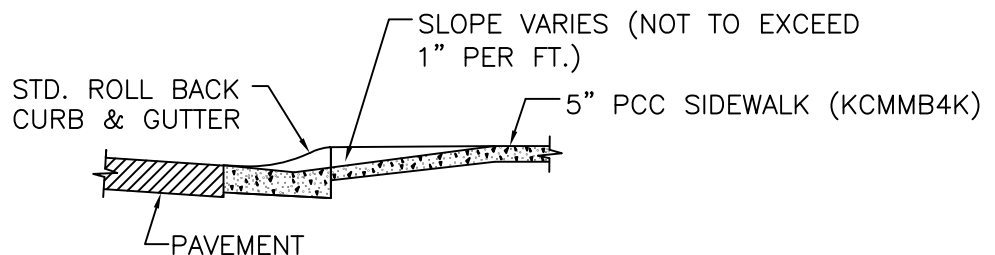


#### PLAN VIEW

NOTE: RAMP & TRANSITION AREA SHALL HAVE A BROOM SURFACE FINISH



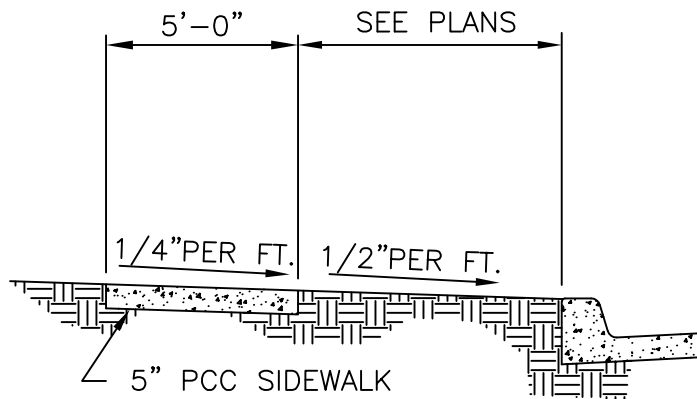
#### SECTION A-A WITH BARRIER CURB & GUTTER



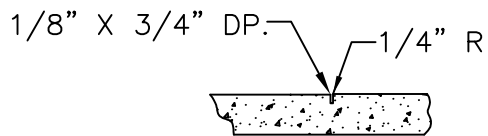
#### SECTION A-A WITH ROLL BACK CURB & GUTTER

### WHEEL CHAIR RAMP "B" DETAIL

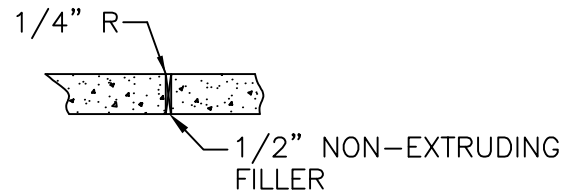




## TYPICAL SIDEWALK SECTION



CONTRACTION JOINT



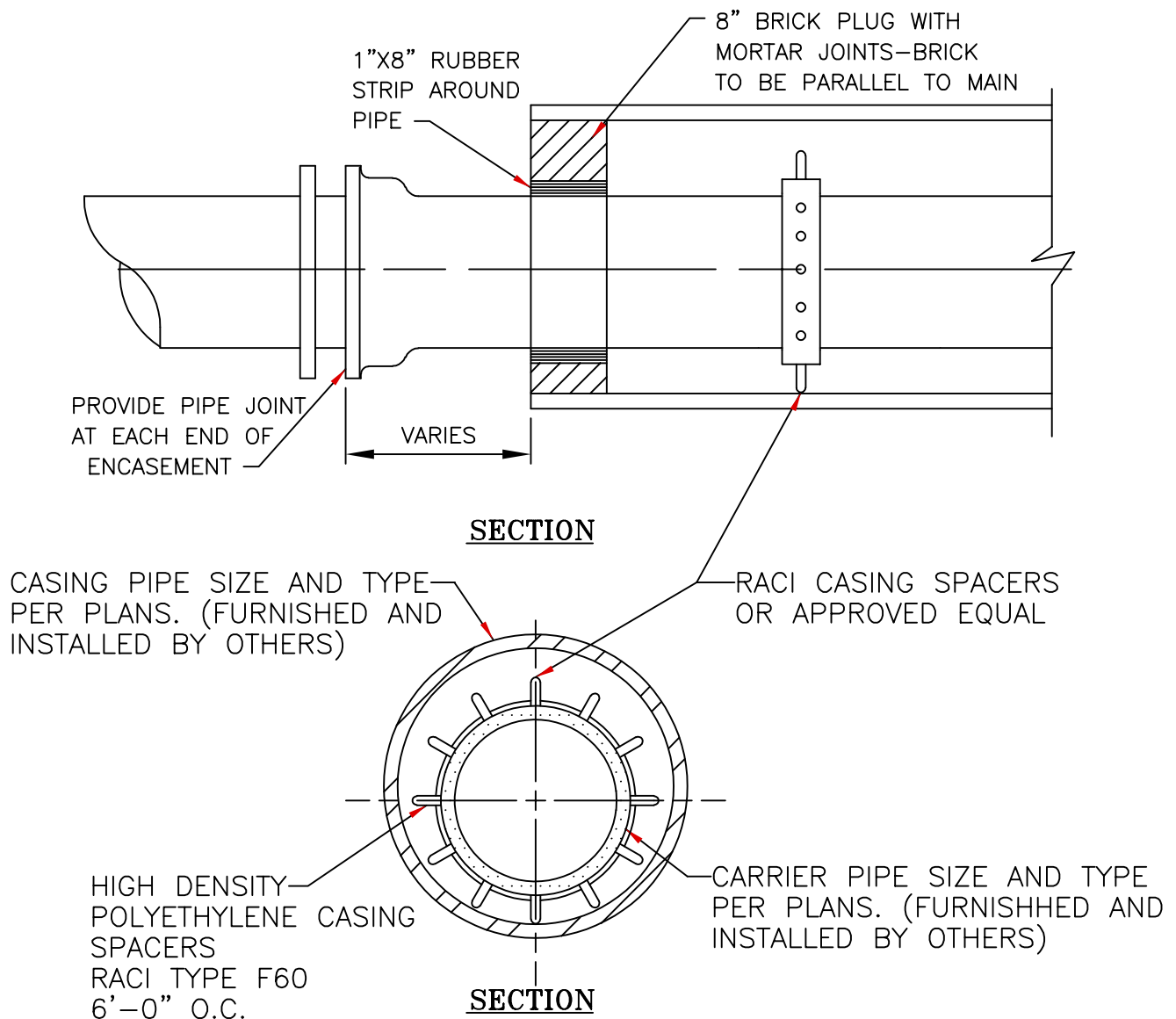
EXPANSION JOINT

### NOTES:

1. CONTRACTION JOINTS 5' O.C. OR WIDTH OF SIDEWALK.
2. EXPANSION JOINTS SHALL ABUT EX. WALKS, CURBS, DRIVEWAYS, SIMILAR STRUCTURES AND 250' CTRS. MAXIMUM.
3. KEY ALL CONSTRUCTION JOINTS.

## SIDEWALK DETAIL





PIPE INSULATOR DETAIL

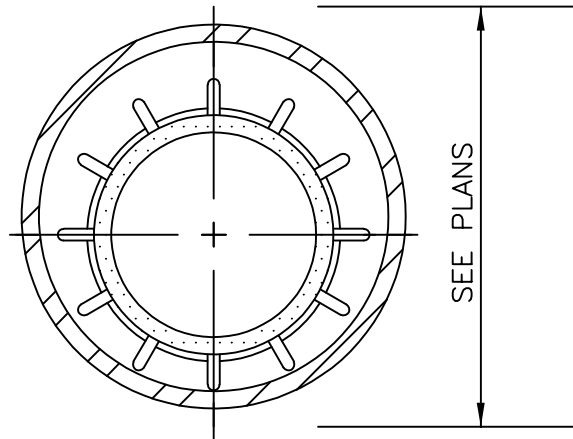
### RACI CASING SPACERS

CASING SPACERS SHALL BE USED TO INSTALL THE CARRIER PIPE INSIDE THE ENCASEMENT PIPE. CASING SPACERS SHALL FASTEN TIGHTLY ONTO THE CARRIER PIPE SO THAT WHEN THE CARRIER PIPE IS BEING INSTALLED THE SPACERS WILL NOT MOVE ALONG THE PIPELINE. CASING SPACERS SHALL BE DOUBLED ON EACH END OF THE ENCASEMENT.

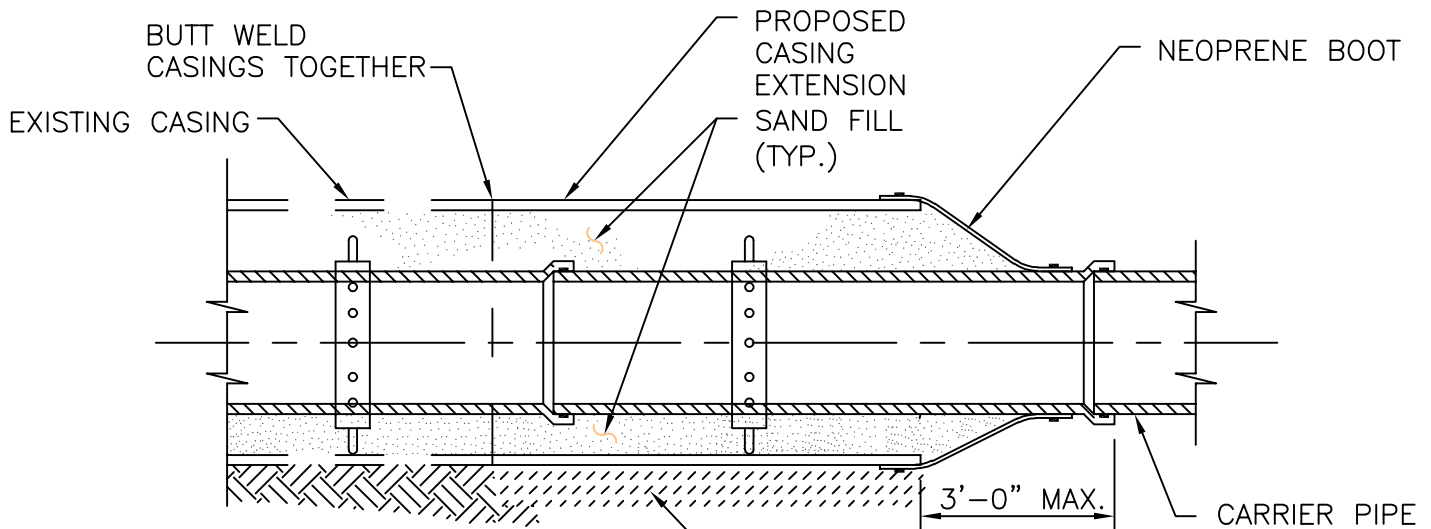
PROJECTION-TYPE CASING SPACERS SHALL BE CONSTRUCTED OF PREFORMED SECTIONS OF HIGH DENSITY POLYETHYLENE. THE FLEXIBLE SECTIONS SHALL BE JOINED TOGETHER AROUND THE PIPE TO PROVIDE A MINIMUM OF 16 PLASTIC PROJECTIONS PER SPACER SECTION. PROJECTION-TYPE CASING SPACERS SHALL BE "RACI" TYPE PROJECTION SPACERS OR ENGINEER PRE-APPROVED EQUAL.

## PIPE ENCASEMENT DETAIL





## SECTION



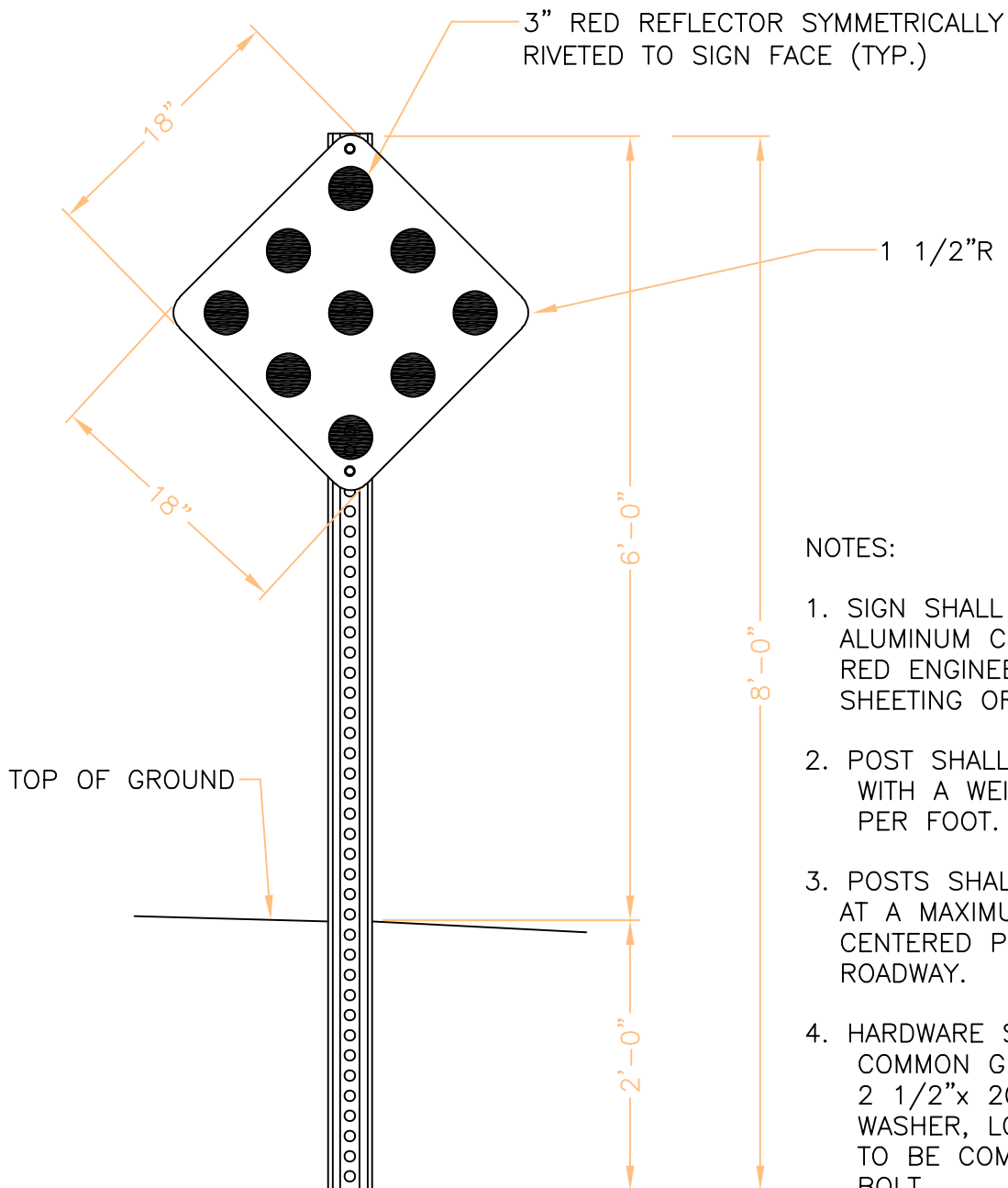
### NOTES:

1. SPLIT CASING MAY BE USED AT OPTION OF CONTRACTOR AND UPON CITY ENGINEERS APPROVAL. SUBMIT DETAIL PRIOR TO CONSTRUCTION.
2. REMOVE EXISTING END SEAL AND RECONSTRUCT AT END OF PROPOSED CASING EXTENSION.
3. PROPOSED CASING EXTENSION TO RETAIN THE SAME ALIGNMENT VERTICALLY AND HORIZONTALLY AS EXISTING CASING.

PIPE EMBEDMENT (SEE EMBEDMENT DETAIL)

## CASING PIPE EXTENSION



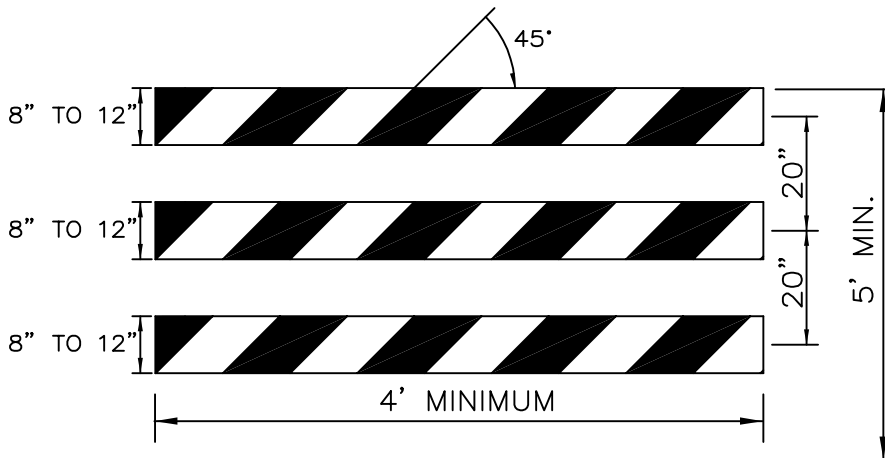
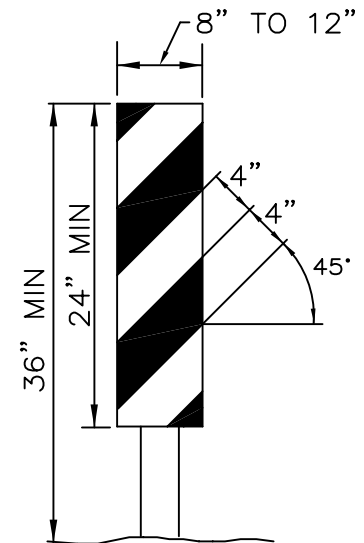
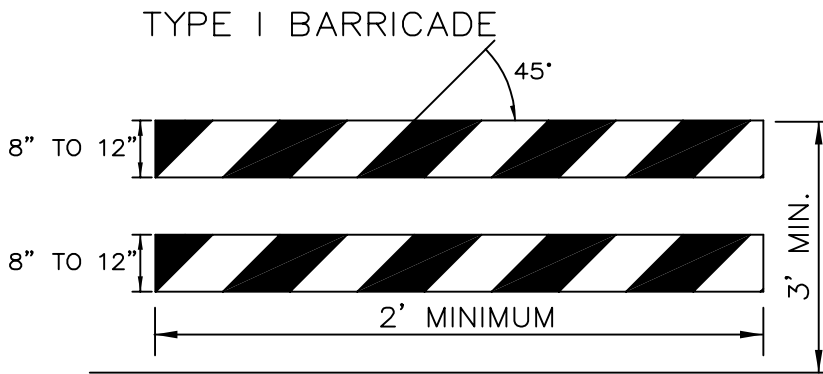
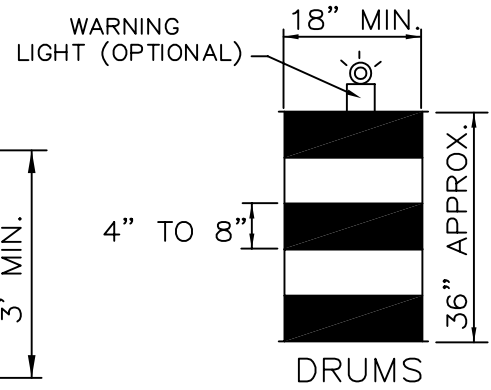
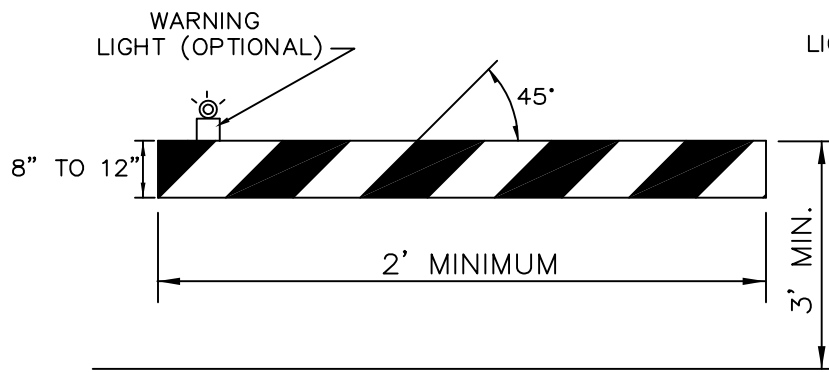


NOTES:

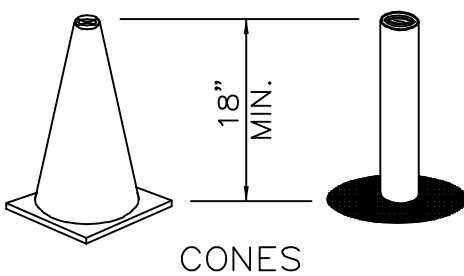
1. SIGN SHALL BE .080 GAUGE ALUMINUM COVERED WITH 3-M RED ENGINEER GRADE REFLECTIVE SHEETING OR EQUIVALENT.
2. POST SHALL BE GREEN U-CHANNEL WITH A WEIGHT OF 2 POUNDS PER FOOT.
3. POSTS SHALL BE SPACED EVENLY AT A MAXIMUM OF 6' APART AND CENTERED PERPENDICULAR TO THE ROADWAY.
4. HARDWARE SHALL BE ZINC PLATED COMMON GRADE. HEX BOLT 5/16"x 2 1/2"x 20, FLAT WASHER, NYLON WASHER, LOCK WASHER, AND NUT TO BE COMPATIBLE WITH THE HEX BOLT.

## END OF ROAD MARKER DETAIL



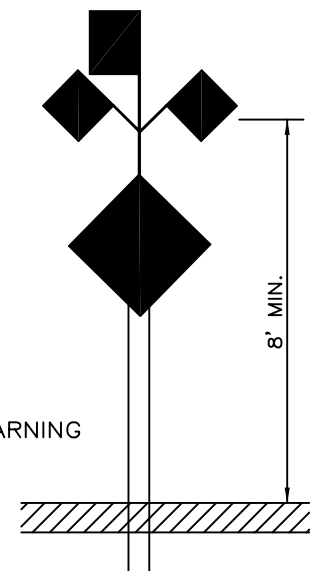


VERTICAL PANEL



CONES

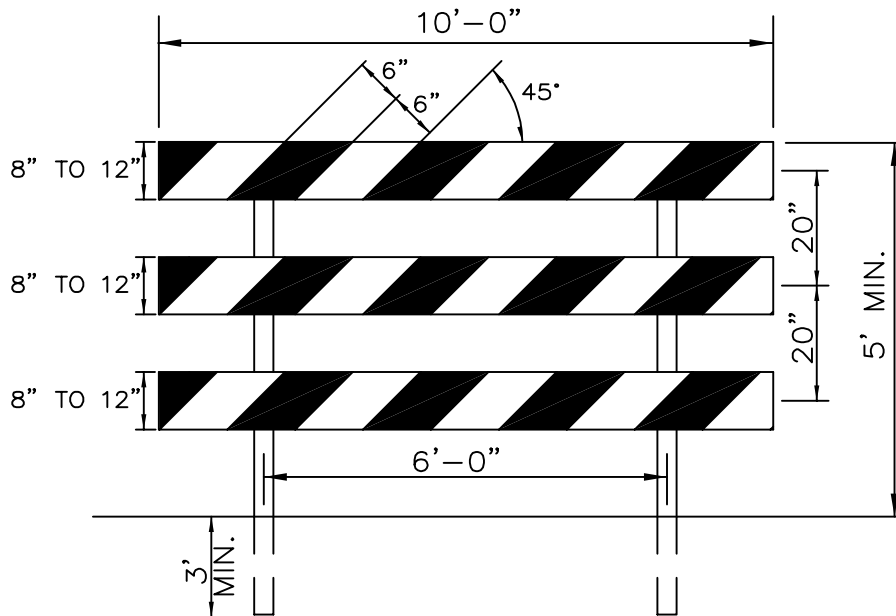
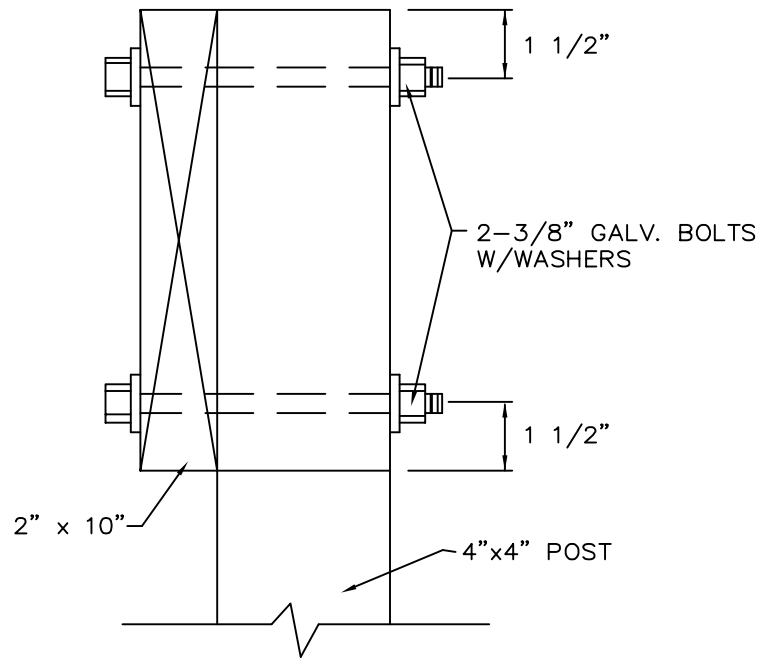
NOTE:  
FLASHING OR STEADY BURN WARNING  
LIGHTS SHOULD BE USED ON  
BARRICADES, PANELS, AND  
DRUMS AS REQUIRED.



HIGH LEVEL  
WARNING DEVICE

## CHANNELIZING AND HIGH LEVEL WARNING DEVICES





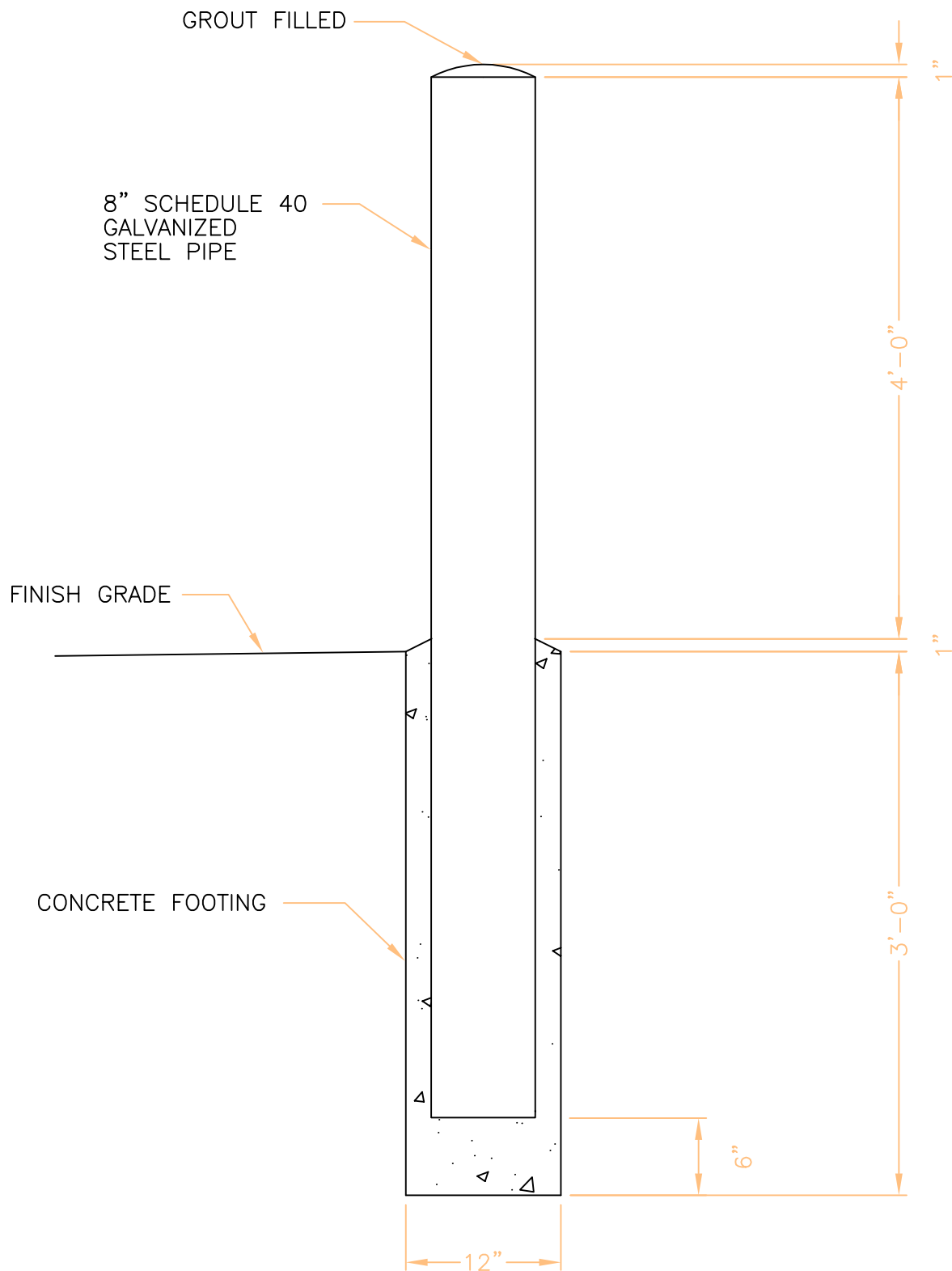
TYPE III BARRICADE

NOTE:

1. STRIPES SHALL BE MADE WITH ALTERNATING WHITE AND RED REFLECTORIZED SHEETING OR PAINT.
2. POSTS SHALL BE 4"x4" WOLMANIZED PRESSURE TREATED CEDAR PAINTED WHITE.

## END OF PAVEMENT TYPE III BARRICADE





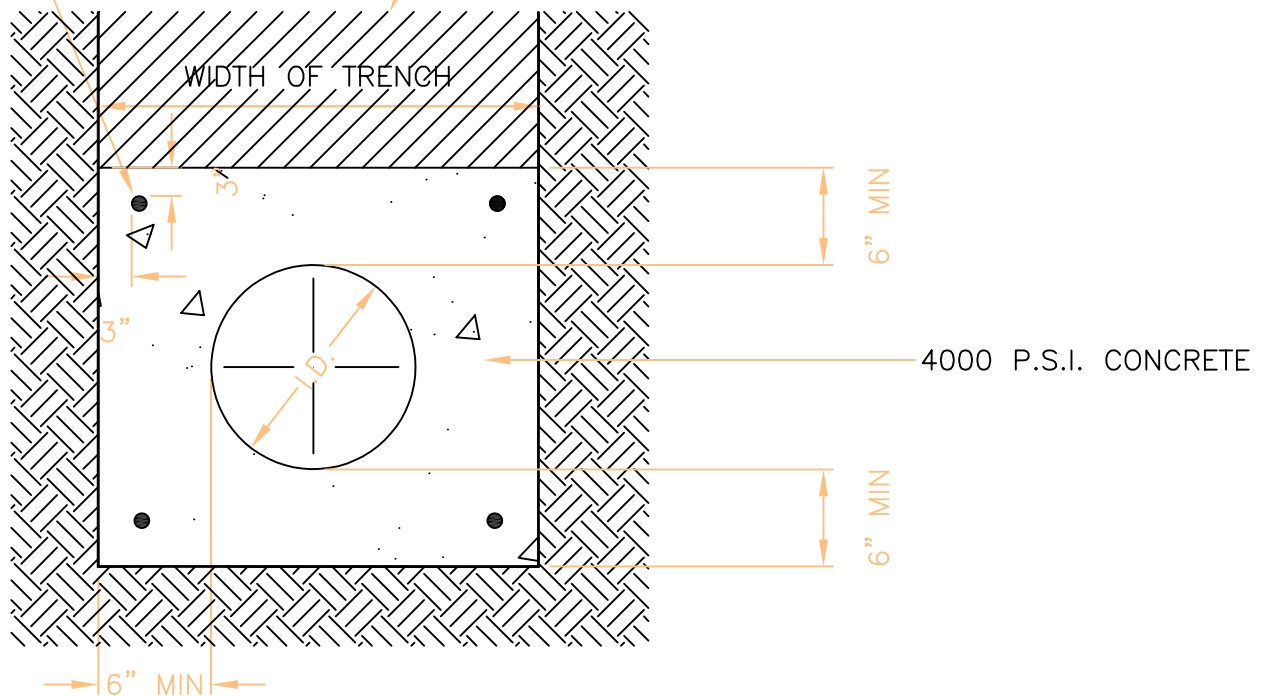
## GUARD POST DETAIL



DATE:	6/2/20
SCALE:	NO SCALE

#4 CONTINUOUS FOR PIPES 36" I.D. AND SMALLER  
#6 CONTINUOUS FOR PIPES LARGER THAN 36" I.D.

COMPACTED TRENCH BACKFILL  
95% MINIMUM DENSITY WITHIN  
STREET RIGHT OF WAY,  
OTHER AREAS IN ACCORDANCE  
WITH SPECIFICATIONS



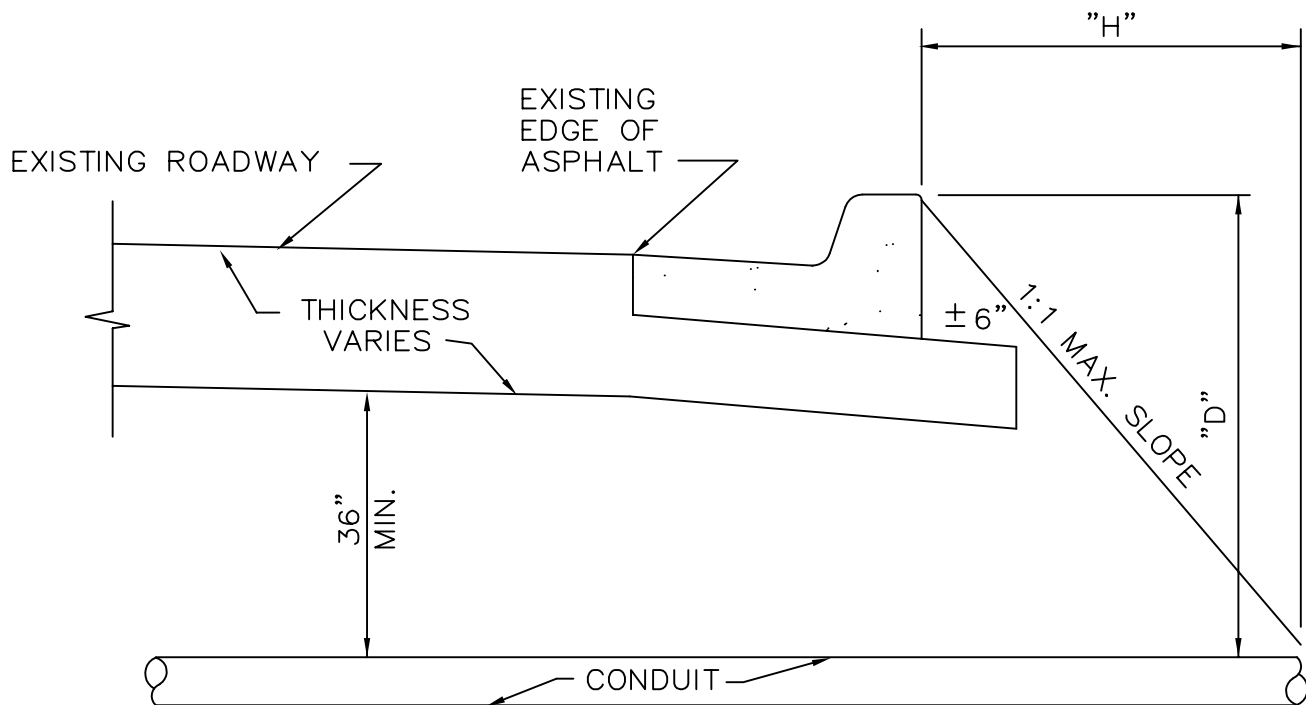
NOTES:

1. CONTRACTOR SHALL BLOCK UP PIPE WITH 8X8X16 SOLID CONCRETE BLOCKS TO GIVE MINIMUM PIPE CLEARANCE INDICATED.
2. CONTRACTOR SHALL PROVIDE PIPE TIE DOWNS AS NECESSARY TO PREVENT FLOATING.
3. ALLOW CONCRETE TO SET 4 HOURS MINIMUM PRIOR TO TRENCH BACKFILL.

## CONCRETE ENCASEMENT DETAIL

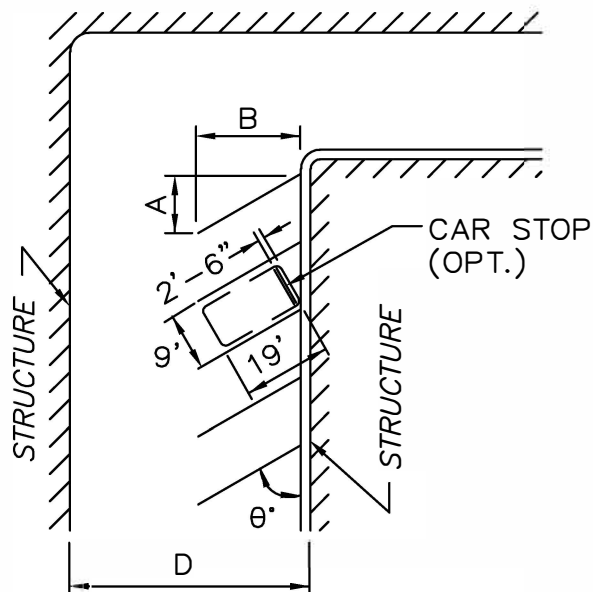


"H" MIN. DISTANCE BEHIND CURB  
TO START PUNCH OR BORE  
"D"=TOTAL DEPTH FROM TOP OF  
CURB TO TOP OF CONDUIT.  
"H"="D"

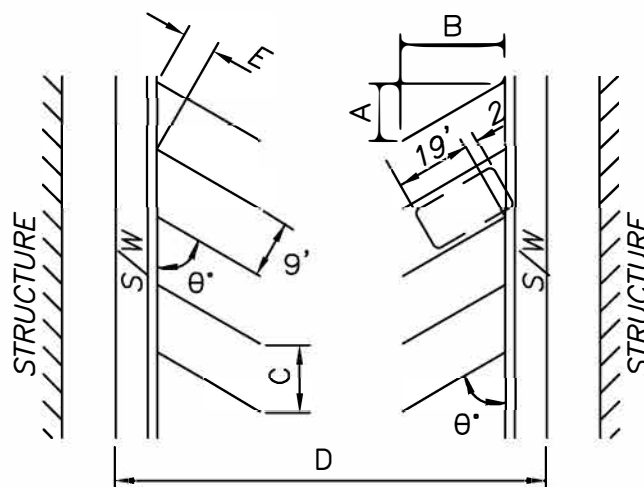


## ROADWAY CONDUIT CROSSING DETAIL (BY PUNCH METHOD)

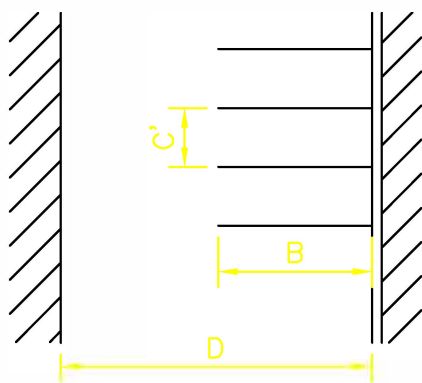




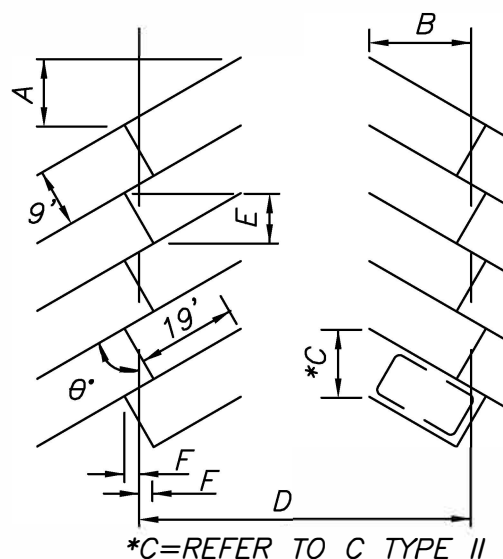
TYPE I



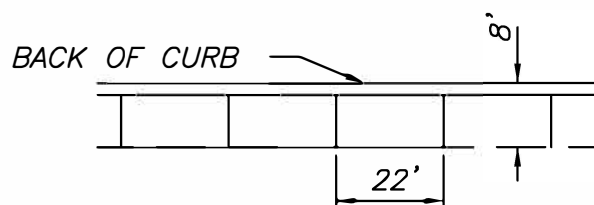
TYPE II



90° PARKING



TYPE III



PARALLEL PARKING STALL

NOTE: DIMENSIONS BELOW ARE GIVEN IN FEET

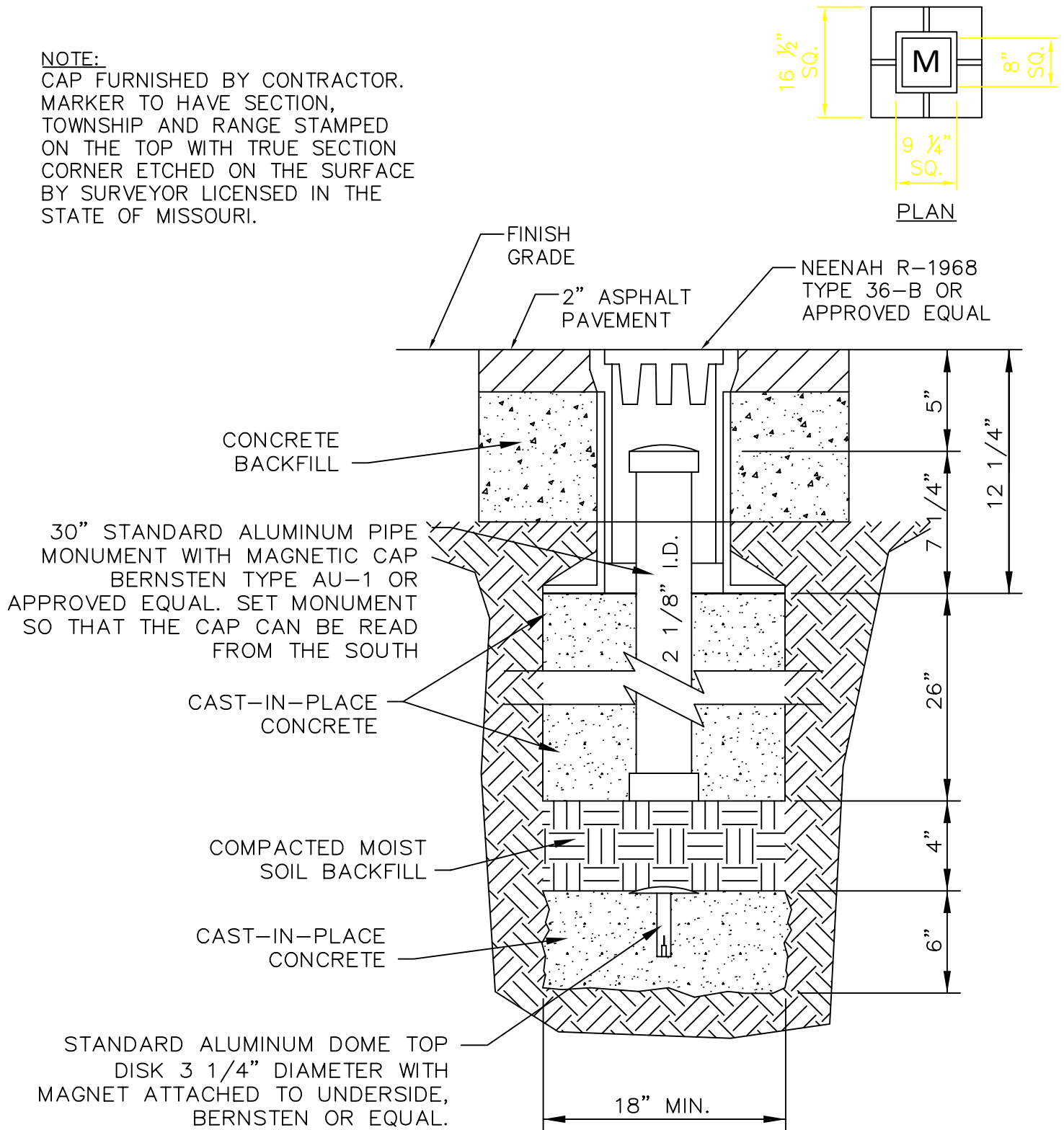
	TYPE I				TYPE II					TYPE III				
$\theta^\circ$	A	B	C	D	A	B	C	D	E	A	B	D	E	F
45	20.5	20.5	12.7	36.5	19.1	19.1	12.7	66.2	9.0	20.5	17.3	50.6	6.4	3.2
60	12.6	21.8	10.4	37.8	11.6	20.1	10.4	68.2	5.2	12.6	19.6	55.2	7.8	2.3
90	0.0	19.0	9.0	43.0	0.0	19.0	9.0	72.0	0.0	0.0	19.0	62.0	9.0	0.0

## PARKING LOT DEATILS



**NOTE:**

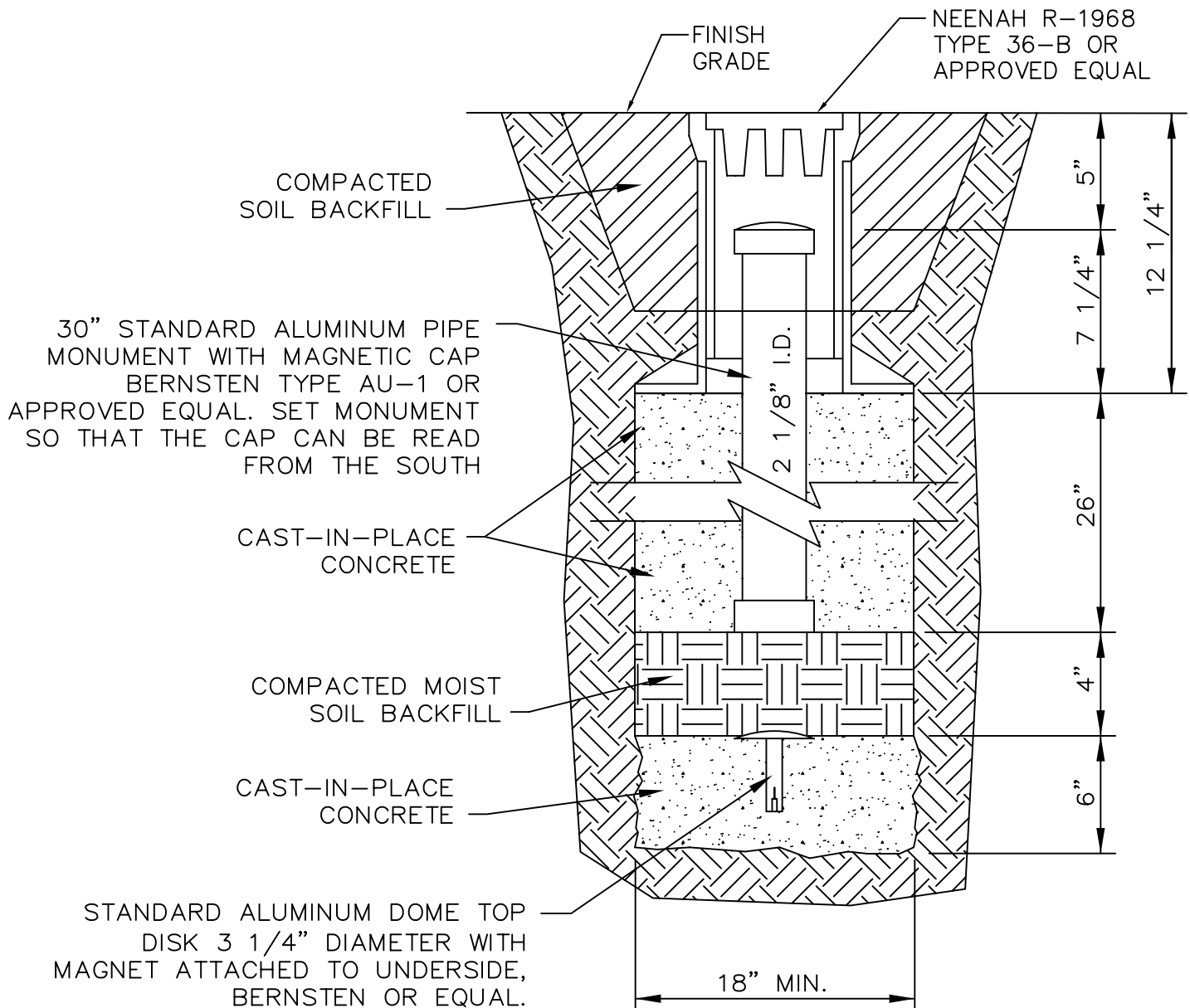
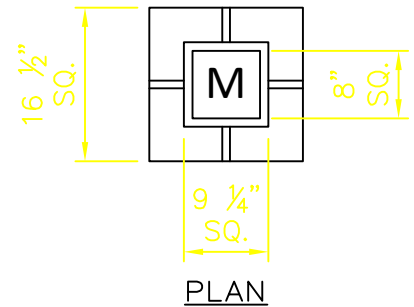
CAP FURNISHED BY CONTRACTOR.  
MARKER TO HAVE SECTION,  
TOWNSHIP AND RANGE STAMPED  
ON THE TOP WITH TRUE SECTION  
CORNER ETCHED ON THE SURFACE  
BY SURVEYOR LICENSED IN THE  
STATE OF MISSOURI.



**MONUMENT AND BOX WITH EXISTING PAVEMENT**  
(NO SCALE)

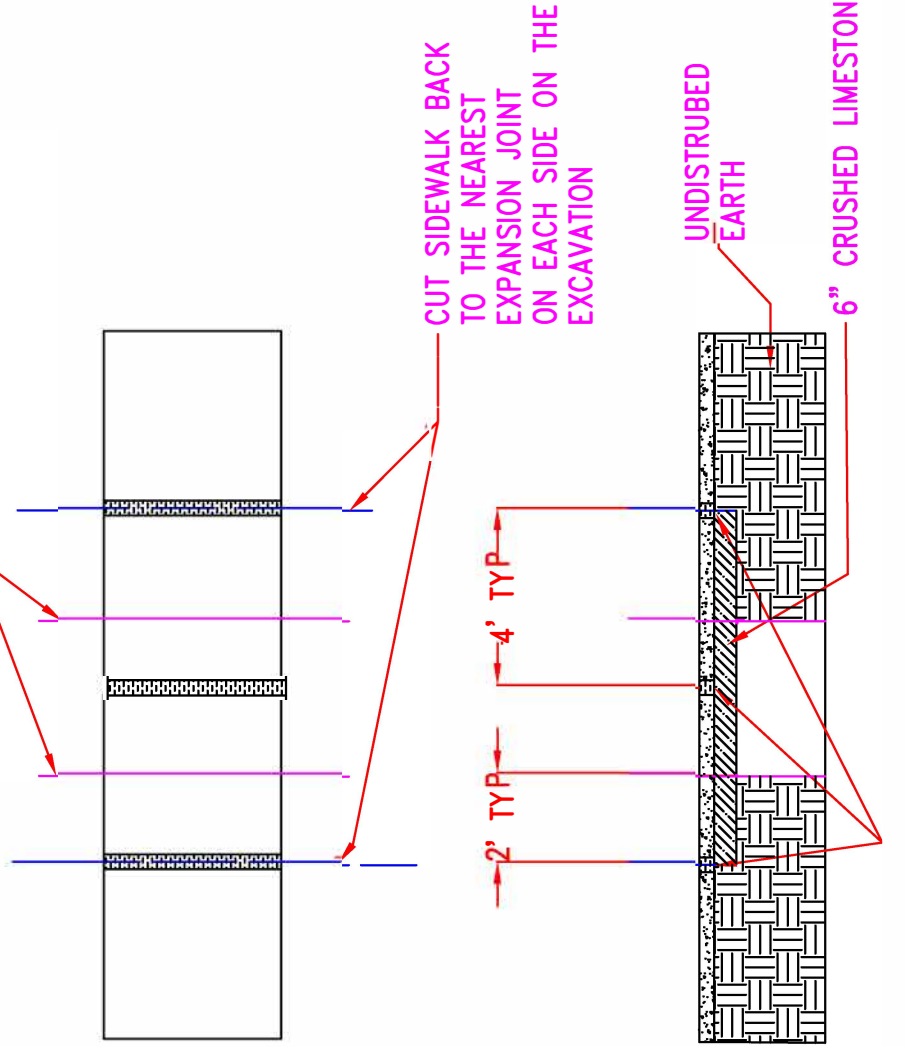


CAP FURNISHED BY CONTRACTOR.  
MARKER TO HAVE SECTION,  
TOWNSHIP AND RANGE STAMPED  
ON THE TOP WITH TRUE SECTION  
CORNER ETCHED ON THE SURFACE  
BY SURVEYOR LICENSED IN THE  
STATE OF MISSOURI.



## MONUMENT AND BOX WITH COMPACTED BACKFILL

(NO SCALE)



## NOTES

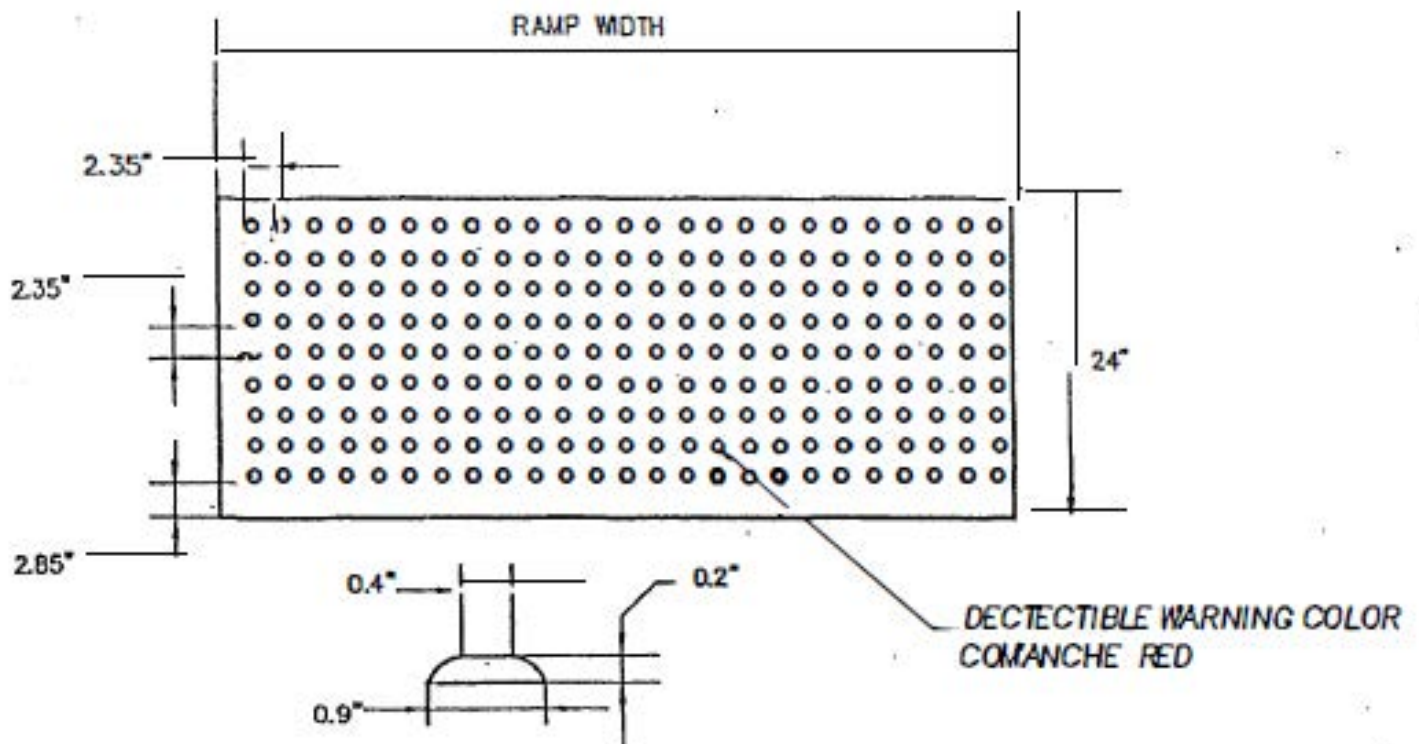
1. CUT THE SIDEWALK AT THE NEAREST EXPANSION JOINT ON EACH SIDE ON THE EXCAVATION
2. IF THE SIDEWALK HAS NO EXPANSION JOINTS MEASURE BACK FROM THE CENTER OF THE EXCAVATION IN 4' OC UNTIL THE CUT IN THE SIDEWALK IS 2' PASS THE EDGES OF THE EXCAVATION AND ON UNDISTURBED EARTH
3. INSTALL EXPANSION JOINTS AT 4' OC AS PER APWA SECTION 2301.4
4. SUBGRADE SHALL BE CRUSHED LIMESTONE AND LAID IN 4" LIFTS WITH A MINIMUM OF 6" SUBGRADE SHALL BE COMPACTED 95% DENSITY
5. CONCRETE SHALL MEET MCIB FOR TYPE A CONCRETE BACKFILL IN THE ARE OF THE EXCAVATION SHALL INACCORDANCE WITH THE GRAIN VALLEY STANDARD DETAIL FOR STREET CUTS
6. EXPANSION JOINTS

## SIDEWALK EXCAVATION REPAIR DETAIL



Grain Valley  
Come Home To Opportunity





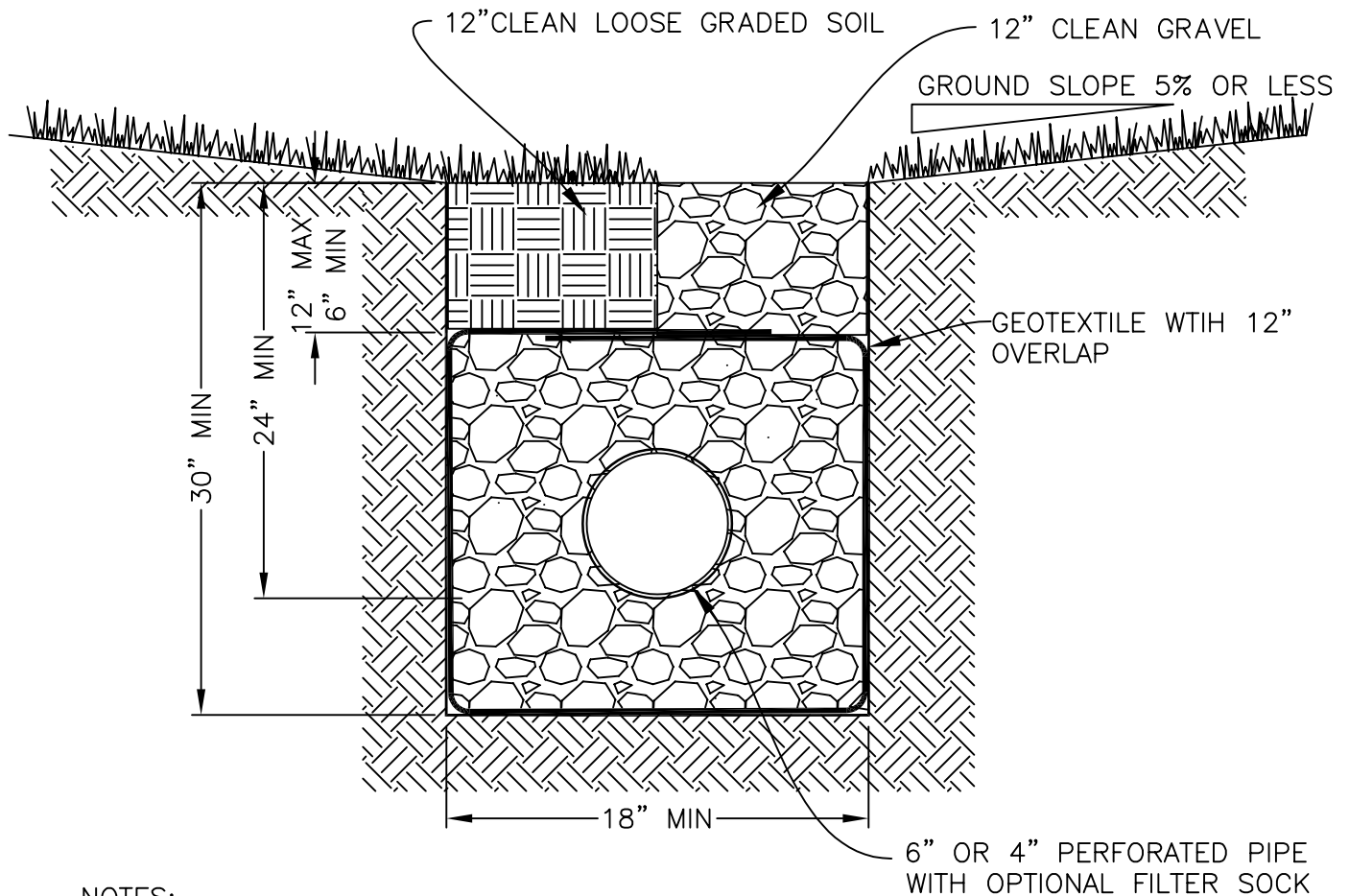
1108.1.1 Dome Size. Truncated domes in a detectable warning surface shall have a base diameter of 0.9 inches (23 mm) minimum to 1.4 inches (36 mm) maximum, a top diameter of 50% of the base diameter minimum to 65% of the base diameter maximum, and a height of 0.2 inches (5 mm).

ALL CURB RAMPS SHALL BE CONSTRUCTED WITH RAISED TRUNCATED DOME DETECTABLE WARNINGS.

## SIDEWALK DETECTIBLE WARNING DETAIL



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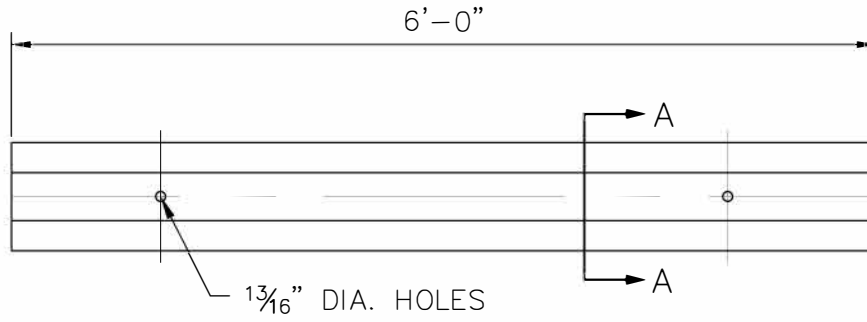


NOTES:

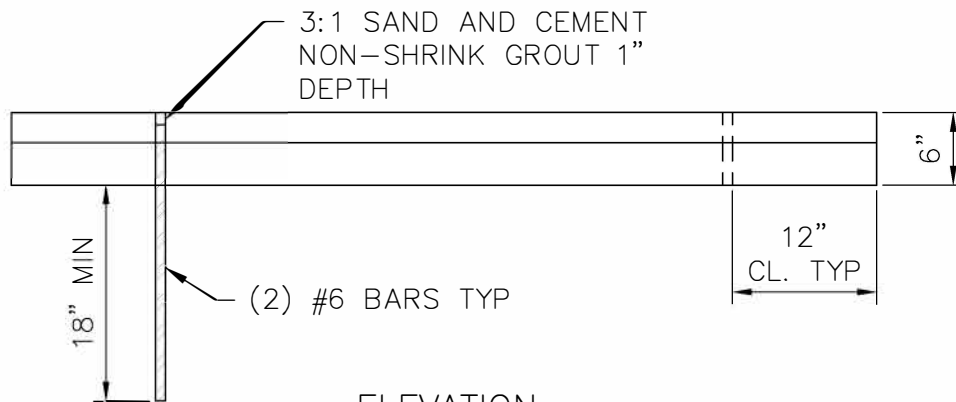
1. DO NOT USE CRUSHED LIMESTONE, SHALE, OR ANY CRUSHED ROCK THAT WILL BECOME CEMENTED OVER TIME.
2. GEOTEXTILE FABRIC SHALL BE PERMEABLE TO DRAIN TRENCH WITHIN 72 HOURS.
3. PIPE SHOULD BE PLACED WITH ZERO GRADE AND MAY BE CONNECTED TO AN INLET STRUCTURE USED TO TRAP SEDIMENT.

## INFILTRATION TRENCH DETAIL

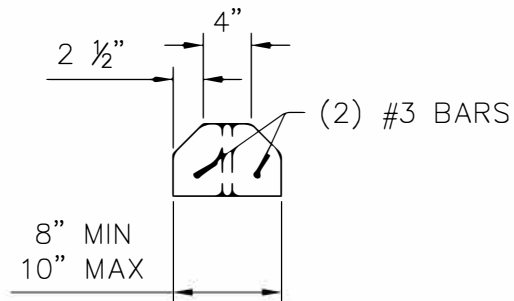




PLAN



ELEVATION

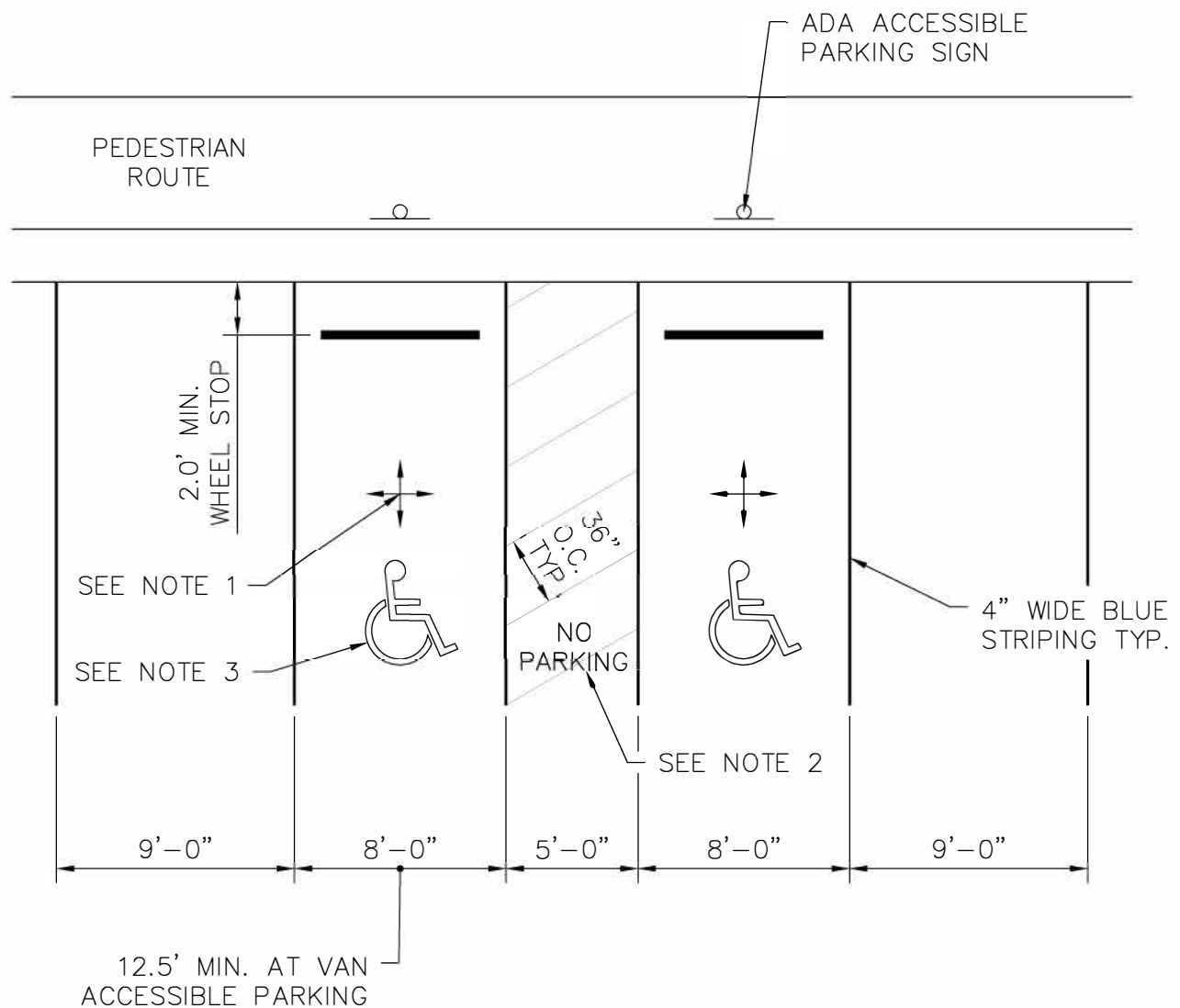


SECTION A-A

PRECAST CONCRETE WHEEL STOP



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NOTES:

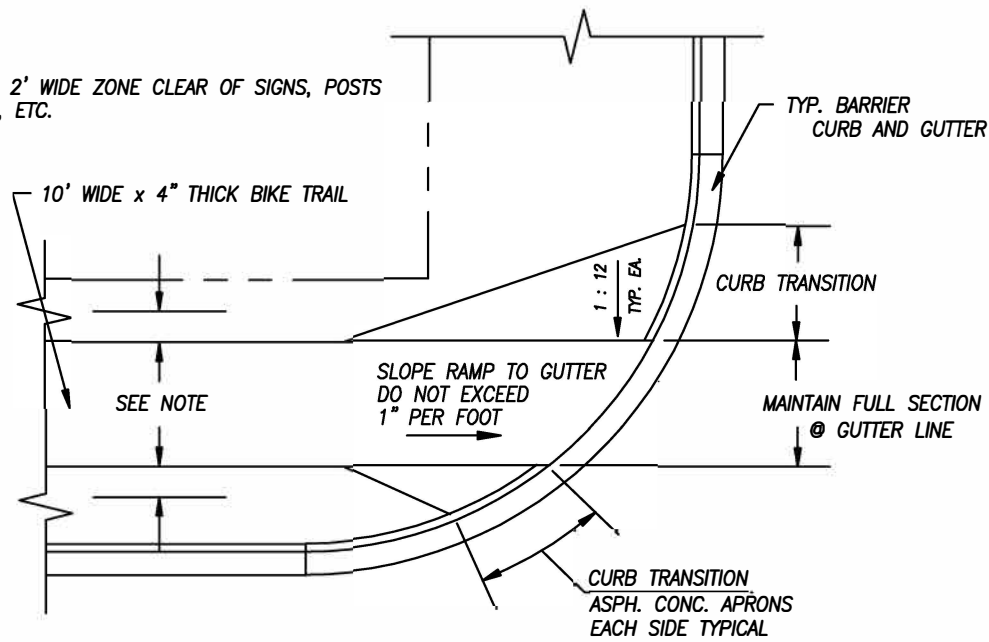
1. 2% MAX SLOPE RECOMMENDED DESIGN SLOPE 1.5% FOR CONSTRUCTION TOLERANCES.
2. WITHIN THE LOADING AND UNLOADING ACCESS ISLE, PAINT THE WORDS "NO PARKING" IN 12" HIGH LETTERS.
3. TYPICAL PAVEMENT SYMBOL, PER MUTCD STANDARD "INTERNATIONAL SYMBOL OF ACCESSIBILITY" BLUE BACKGROUND TRAFFIC WHITE SYMBOL.

ADA ACCESSIBLE PARKING



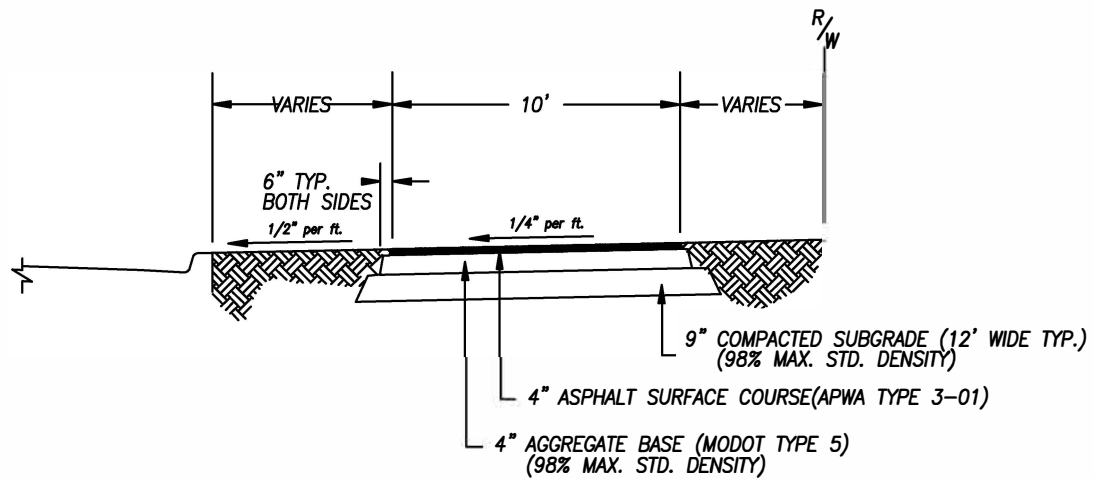


NOTE: MAINTAIN 2' WIDE ZONE CLEAR OF SIGNS, POSTS  
RAILINGS, ETC.



TYPICAL BIKE RAMP

PLAN VIEW



CROSS SECTION

## STANDARD DETAILS

### ASPHALT TRAIL



DATE: 6/2/20  
SCALE: NO SCALE

MISC-023