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Standards Update Transmittal

Reference Number: 2021-17
Standards: Standard Construction Specifications, Section(s) 19, 38, 49, & 50
Standard Drawing, SD-06.0, SD-06.1, SD-6.2, & ST-1A

Update:

1. Modification to Standard Construction Specifications:
 - a. Section 19 – Trench Excavation, Bedding and Backfill
 - b. Section 38 – Storm Drain Construction
 - c. Section 49 – Signals, Lighting, and Electrical Systems
 - d. Section 50 – Construction Materials
2. Modification to Standard Drawings:
 - a. SD - 6.0 Storm Drain Trench Detail
 - b. SD - 6.1 Storm Drain Pipe Bedding and Initial Backfill
 - c. SD - 6.2 Cutoff Collar
 - d. ST - 1A Trench Backfilling and Resurfacing

Amended specifications and drawings are attached. Projects with a preconstruction conference prior to effective date are not subject to modification.

Effect of Update:

1. This modification will ensure that all the applicable standard drawings and standard construction specifications related to pipe bedding and trench backfill are uniform across all specifications.

Request for Update Initiated By: Development Services 10/01/2020
Date

Update Reviewed for Conformity and Consistency to Standards: Shoaib Ahrary 2/16/2022 | 4:35 PM PST
Shoaib Ahrary, PE, ESD Manager Date

Update to Standards Approved: Jeffrey R. Werner 2/16/2022 | 5:10 PM PST
Jeffrey R. Werner, PE, City Engineer Date

PROPOSED REVISIONS TO SECTION 19 SUBSECTIONS ARE AS FOLLOW:

19-1.02A Storm Drain Pipe

Unless otherwise shown on the Plans or specified in the Contract, for storm drain pipe the minimum and maximum trench width shall be as shown on Standard Drawing SD-6.1. If trench widths at the top of the pipe are exceeded by any amount, the Contractor shall provide stronger pipe or improved bedding and backfill conditions, as approved by the City to meet the changed load requirements. Unless approved by the City in writing, the stronger pipe or improved bedding and backfill shall be provided at the Contractor's expense.

19-1.07 Special Foundation Treatment

Whenever the bottom of the trench is soft, saturated, or rocky, or, in the opinion of the City, otherwise unsuitable as a foundation for pipe bedding, the unsuitable material shall be removed to a minimum depth of six inches (6") and replaced with one-inch (1") clean crushed rock in accordance with Type "C" clean crushed rock as described in Section 50-16 "Cleaned Crushed Rock" of these specifications.

When the trench bottom is cobbled or of any other material which might, in the opinion of the City allow loss of sand backfill, the bedding and backfill material shall be one-inch (1") clean crushed rock in accordance with Type "C" clean crushed rock as described in Section 50-16, "Clean Crushed Rock", of these Specifications.

Sand backfill, when permitted by the City for use in rocky trench conditions, shall conform to the requirements in Section 50-13.01, "River Sand", of these Specifications. Such backfill material shall be compacted to a minimum relative compaction of ninety percent (90%).

In addition to the bedding materials specified above, the City may direct the Contractor to furnish and place geotextile fabric below the bedding materials. The geotextile material shall be a high modulus woven fabric, and shall be inert to commonly encountered chemicals, rot-proof and resistant to ultraviolet light exposures, insects, and rodents. The geotextile fabric shall have a minimum grab tensile strength of two hundred pounds (200 lbs.) in any direction as measured in accordance with ASTM D 1682, a Mullen burst strength of at least four hundred pounds (400 lbs.) per square inch per ASTM D 3786, and an Equivalent Opening Size no larger than U.S. Standard Sieve Number 50 as determined by U.S. Corps of Engineers Specification CW-02215. Geotextile fabric shall be Mirafi 600X, or equal. Each roll of fabric used shall be labeled in accordance with ASTM D 4873. Geotextile fabric shall be handled and placed in accordance with the manufacturer's recommendations. Furnishing and placing of geotextile fabric will be paid for as extra work as provided in Section 9, "Changes and Claims", of these Specifications.

If material more than twelve inches (12") below the typical trench bottom is ordered removed by the City, the excavation below that point and the imported material required to backfill the trench to that elevation will be paid for as extra work as provided in Section 9, "Changes and Claims", of these Specifications unless otherwise specified in the Special Provisions. Before excavation of the pipe trench in fill areas or roadway embankments, the fill area or embankment shall be completed to a height above the pipe invert grade line of

not less than twice the internal pipe diameter or to final fill or embankment subgrade, whichever is lower, but in no case less than twelve inches (12") above the top of the pipe. Such embankment shall be compacted to a minimum relative compaction of ninety three percent (93%) for a distance on each side of the pipe equal to at least two (2) pipe diameters. The remainder of the embankment shall be compacted to the minimum relative compaction specified elsewhere in these Specifications for the type of construction being done, or as specified in the Special Provisions or on the Plans. Special foundation treatment for cast-in-place concrete pipe shall be as specified in Section 36-4, "Cast-In-Place Concrete Pipe (CIPCP) - Special Foundation Treatment", of these Specifications.

19-2 PIPE BEDDING AND BACKFILLING OF TRENCHES

19-2.01 Pipe Bedding

Compaction of Bedding and Initial Backfill

Pipe bedding and initial backfill materials shall meet the requirements of the City. Bedding and initial backfill shall be placed in loose lifts not exceeding eight inches (8"), shall be thoroughly compacted under the haunches of the pipe by shovel slicing or tamping and mechanically compacted to a minimum of 90 percent of the ASTM D1557 maximum dry density on all other areas. Backfill and compaction shall be consistent with trench details shown on City Standard Drawings SD - 6.0 and SD - 6.1. Where clean crushed rock is used and conventional compaction testing is not practical, the material shall be mechanically compacted until no further yielding of the material is observed under the compactor. Tests should be completed at a frequency of one (1) per 200 linear feet or one (1) per manhole run whichever occurs first, and a minimum of one test per every lift of initial backfill material.

Initial Backfill Materials

For storm drains the initial backfill material shall consist of Type "B" ¾" clean crushed rock per Section 50-16 of these specifications. For reinforced concrete storm drain pipes greater than forty-eight inches (48") in inside diameter, Type "C" 1-inch clean crushed rock per Section 50-16 may be used for initial backfill.

19-2.01.A Sewer

Unless stated otherwise, all bedding and backfill requirements for sanitary sewer systems shall be constructed in accordance with the standard specifications of the specific utility company. Within the City Limits of Elk Grove, the primary sewer utility companies include, but are not limited to, County Sewer District 1 (CSD-1) and Sacramento Area Sewer District (SASD).

19-2.01.B Storm Drain

Crushed rock used for initial backfill shall be placed and shovel sliced as described herein. The crushed rock shall be placed up to the spring line of the pipe and shovel sliced (a procedure used to force material under the haunches of the pipe by the lateral movement of the shovel) to provide proper support of the haunches of the pipe. Initial backfill material shall then be placed to twelve inches (12") above the top of the pipe.

The Pipe shall be bedded uniformly throughout its length. The bearing shall be achieved

by shaping the bedding or by lightly "bouncing" the pipe to set it into the bedding. Pipe bedding material shall be placed at a minimum thickness meeting the greater of the following criteria:

1. The minimum bedding thickness shall be four inches (4") for pipe with internal diameter forty-eight inches (48") or less, and six inches (6") for pipe with internal diameter greater than forty-eight inches (48"); or
2. The minimum bedding thickness shall be equal to the difference between the outside diameter of the pipe barrel and bell plus one and one-half inches (1-1/2"); or
3. When soil conditions in the trench bottom are unstable, rocky, or otherwise unsuitable as a foundation for pipe bedding, the minimum bedding thickness shall conform to Section 19-1.07, "Trench Excavation - Special Foundation Treatment", in this Section.

19-2.02.A Storm Drain

Unless otherwise specified in the Special Provisions, initial backfill for storm drain construction shall conform to this Section 19 and Standard Drawing SD-6.1.

Granular materials shall conform to Section 50-16, "Clean Crushed Rock", of these Specifications. For field conditions requiring control density backfill the material shall conform to Section 50-15, "Control Density Backfill", of these Specifications. For field conditions requiring portland cement concrete backfill the material shall conform to Section 50-5.01, "Portland Cement Concrete - Composition", Class "C", of these Specifications.

After placement of bedding, the Contractor shall place initial backfill material to the spring line of the pipe, thoroughly compacting it by shovel slicing or light tamping to provide proper support under the pipe haunches. The remaining initial backfill material shall be placed per City Standard Drawings SD - 6.0 and SD - 6.1. Care shall be used not to disturb or displace the pipe. When using control density or concrete backfill, the Contractor shall anchor the pipe to prevent floating or displacement of the pipe. The anchors shall be spaced to insure a continuous even grade in the flow line of the pipe.

19-2.02.B Sewer

Unless stated otherwise, all bedding and backfill requirements for sanitary sewer systems shall be constructed in accordance with the standard specifications of the specific utility company. Within the Elk Grove city limits, the primary sewer utility companies include, but are not limited to, County Sewer District 1 (CSD-1) and Sacramento Area Sewer District (SASD).

19-2.03 Intermediate Backfill

Intermediate backfill shall consist of material placed between the initial backfill and bottom of subgrade in paved areas or to the top of the trench in unpaved areas, unless otherwise shown or specified in the Contract.

The intermediate backfill material may be native material excavated at the work site if the intermediate backfill depth between the top of the initial backfill and subgrade is greater than or equal to eighteen inches (18"). Native material must be free of organic or other unsuitable materials as determined by the City that may cause voids or depressions to develop during or after placement of the intermediate backfill. Rocks, stones and solid

earth chunks exceeding three inches (3") in greatest- dimension shall be removed from the intermediate backfill material. The intermediate backfill material for intermediate backfill depths less than eighteen inches (18") measured from the top of the initial backfill to the bottom of subgrade shall be Type "A" $\frac{3}{4}$ " Class II aggregate base or Type "D" Controlled Density Fill (CDF) material conforming to the requirements in Section 50 of these Specifications and Standard Drawings SD - 6.0 and SD - 6.1. Aggregate base shall be placed in eight inch (8") maximum loose lifts. Compaction requirements for aggregate base shall be the same as required for compaction of job excavated native material. An alternative use of Type "D" CDF material as defined in Section 50-15 of these specifications must be approved in writing by the City. Type "D" material will not be allowed over SCWA water pipes or SASD and CDS-1 sewer pipes.

Unless otherwise shown or specified in the Contract, compaction of all intermediate backfill material shall be by mechanical pneumatic or vibratory compaction equipment. Hydraulic ponding and hydraulic jetting methods are not permitted.

1. Compaction

The first lift of the intermediate backfill material shall be no more than eight inches (8") in loose thickness and shall be compacted to achieve a minimum of ninety percent (90%) of the ASTM D1557 maximum dry density at a moisture content between zero (0) and three percent (3%) above the optimum moisture content. This lift shall be tested for relative compaction prior to continuation of backfill procedures. All subsequent backfill shall be placed in lifts no greater than eight inches (8") in loose thickness (or less depending on ability of compaction equipment) and compacted to achieve a minimum of ninety-three percent (93%) of the ASTM D1557 maximum dry density at a moisture content between zero (0) and three percent (3%) above the optimum moisture content. The intermediate backfill material within a two foot (2') wide zone surrounding vertical structures shall be mechanically compacted by smaller hand operated or walk behind compactors in addition to the larger trench compaction equipment. Hydraulic jetting will not be permitted by the City of Elk Grove.

For new and existing street areas where over-compaction of expansive soils is a concern, if native material, used in the upper three feet (3') of trenches, has an Expansion Index (EI) greater than seventy (70) (based on 1997 UBC Test Method 29-2), then the contractor/developer shall submit for approval, alternative methods to either reduce the expansion potential of the native material or replace with suitable non-expansive material. An alternative to conventional intermediate backfill materials would be CDF.

2. Moisture Content

The moisture content of the intermediate backfill during compaction shall be between zero (0) and three percent (3%) above the optimum moisture content as established by ASTM D1557 unless otherwise specified by the geotechnical report for the specific project. The intermediate backfill material shall be uniformly moisture conditioned as needed prior to placement and compaction.

19-2.03A Cut Off Collars

If crushed rock, Type "E" Material, is selected for initial backfill on drain pipe, a path is created that can allow water flow within the initial backfill material. Trench plugs or cut off collars of CDF material shall be installed within the initial backfill zone. Cut off collars, where required, shall be at least eight inches (8") thick (as measured in the direction of the

pipeline) and extend at least one foot (1') laterally beyond the initial backfill into the surrounding soils in all directions. The required pipe sleeves shall be placed a minimum of two feet (2') away from all service connections on the main line. The plugs or collars shall be generally placed near the mid-point of the pipeline between manholes. However, final placement shall be determined at the mandatory pre-construction meeting with City representatives.

Cut off collars shall also be installed around all services that extend beyond the curb or back of sidewalk at the outside edge of a roadway, including joint utility crossings. The collars may either be installed on the horizontal portion of the main service lateral prior to the elbow or on the vertical portion of the service prior to any plumbing fittings installed by the Contractor. The collar shall be placed behind the back of curb and sidewalk where present. The horizontal collar has the added benefit of being easier to construct and reduces the potential of the pipe shearing by extending horizontally through a rigid structure.

PROPOSED REVISIONS TO SECTION 38 SUBSECTIONS ARE AS FOLLOW:

38-5 STORM DRAIN INLET LATERALS

Unless otherwise indicated on the Plans or in the Special Provisions, storm drain inlet laterals shall be a minimum of eighteen inches (18") in diameter and materials for inlet laterals shall conform to the requirements of Section 50, "Construction Materials", of these Specifications for each respective type and class of pipe. Connections of laterals to manholes and inlets shall be water and soil tight, and shall conform to Section 39, "Manholes", and Section 27-13, "Drop Inlets and Catch Basins", of these Specifications.

All inlet laterals shall be inspected by lamping conforming to Section 38-9.05, "Lamping of Storm Drain Inlet Laterals", in this Section of these Specifications or television inspection. When the radius or length of the lateral exceeds thirty feet (30'), a television inspection is required conforming to Section 38-9.04, "Television Video Inspection (TVI) – Storm Drains", in this Section of these Specifications. Other proposed methods of inspection may be approved by the City.

38-7 PROTECTIVE COVERING

38-7.01 Storm Drain Pipe

Unless otherwise shown in the Plans, storm drain pipe laid in trenches at such an elevation that the top of the pipe bell has less than twelve (12") inches to the bottom of subgrade shall be protected with a concrete cap of fully encased in slurry, as shown on Standard Drawing SD-6.1, "Storm Drain Pipe Bedding and Initial Backfill". Unless otherwise shown on the Plans the concrete used in making the cap shall be Class "C" concrete conforming to Section 50-5, "Portland Cement Concrete", of these Specifications. Unless otherwise shown on the Plans, slurry encasement shall consist of controlled density fill (CDF) conforming to Section 50-15.01, "Controlled Density Fill (CDF)", of these specifications. Unless otherwise shown on the Plans, slurry encasement shall consist of controlled density fill (CDF) conforming to Section 50-15.01, "Controlled Density Fill (CDF)", of these specifications.

38-8 BACKFILLING PIPE TRENCHES

Backfill of all storm drain pipes shall conform to the requirements in Section 19, "Trench Excavation, Bedding and Backfill", of these Specifications. Bedding and backfill for drain pipes shall be in accordance with Standard Drawing SD-6.0 and SD-6.1.

PROPOSED REVISIONS TO SECTION 49 SUBSECTION IS AS FOLLOW:

49-2.01 Trench Excavation and Backfill

Unless otherwise permitted in writing by the City, all surplus excavated material shall be removed and disposed of the same day the surplus material is excavated outside the city right-of-way in accordance with the provisions in Section 18-7 "SURPLUS MATERIAL DISPOSAL" of these Specifications.

Unless otherwise shown or specified in the Contract, trench excavation and backfill shall conform to Section 19, "Trench Excavation, Bedding, and Backfill", of these Specifications, and restoration of surfaces shall conform to Section 14, "Restoration of Surfaces", of these Specifications.

The Contractor must contact Underground Service Alert in accordance with the provisions in Section 6-16.04 "Underground Service Alert (USA)" of these Specifications.

SECTION 50 – CONSTRUCTION MATERIALS

PROPOSED REVISIONS TO SECTION 50 SUBSECTIONS ARE AS FOLLOW:

50-7 AGGREGATE BASES

Aggregate bases shall conform to the requirements of Section 26, “Aggregate Bases”, of the State Specifications, and these Specifications.

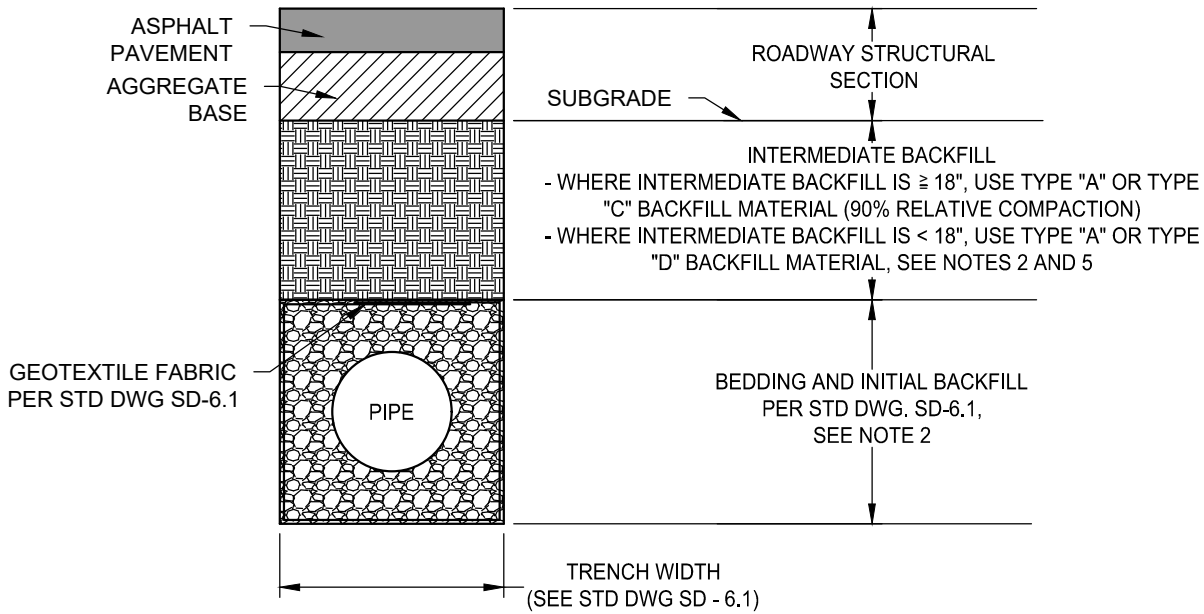
The combined aggregate shall conform to the gradation requirements specified for the 3/4-inch maximum aggregate for Class 2 aggregate base, unless otherwise specified in the Special Provisions.

SEE COMMENT FOR SECTION 50-14

50-14

Deleted – NOT USED

STORM DRAIN TRENCH DETAIL



BACKFILL MATERIALS

TYPE "A" BACKFILL MATERIAL: 3/4" CLASS II AB AS PER SECTION 50 OF THE CITY STANDARD CONSTRUCTION SPECIFICATIONS.

TYPE "B" BACKFILL MATERIAL: 3/4" CLEAN CRUSHED ROCK AS PER SECTION 50 OF THE CITY STANDARD CONSTRUCTION SPECIFICATIONS.

TYPE "C" BACKFILL MATERIAL: JOB EXCAVATED NATIVE MATERIAL FREE OF ORGANIC OR UNSUITABLE MATERIALS THAT CAN CAUSE VOIDS OR DEPRESSIONS TO DEVELOP DURING OR AFTER PLACEMENT OF THE BACKFILL. ROCKS, STONES, AND SOLID EARTH CHUNKS EXCEEDING 3-INCHES IN GREATEST DIMENSION ARE NOT ALLOWED.

TYPE "D" BACKFILL MATERIAL: CONTROLLED DENSITY FILL AS PER SECTION 50 OF THE CITY STANDARD CONSTRUCTION SPECIFICATIONS.

TYPE "E" BACKFILL MATERIAL: CLASS "C" CONCRETE AS PER SECTION 50 OF THE CITY STANDARD CONSTRUCTION SPECIFICATIONS.

NOTES

1. GEOTEXTILE SHALL BE INSTALLED AS PER STD DWG SD-6.1 AND AS PER SECTION 50 OF THE CITY STANDARD CONSTRUCTION SPECIFICATIONS.
2. INTERMEDIATE BACKFILL TO BE PLACED IN 8" MAXIMUM LOOSE LIFTS.
3. CUTOFF COLLARS TO BE INSTALLED EVERY MANHOLE RUN AS PER STD DWG SD-6.2 AND AS PER SECTION 19 OF THE CITY STANDARD CONSTRUCTION SPECIFICATIONS.
4. CONTROL DENSITY FILL (CDF) BACKFILL AROUND MANHOLES TO BE AS PER SECTION 39 OF THE CITY STANDARD CONSTRUCTION SPECIFICATIONS.
5. IF ROADWAY SUBGRADE IS WITHIN 12" OF TOP OF PIPE, BEDDING AND INITIAL BACKFILL SHALL CONFORM TO SHALLOW PIPE DETAILS AS PER STD DWG SD-6.1.

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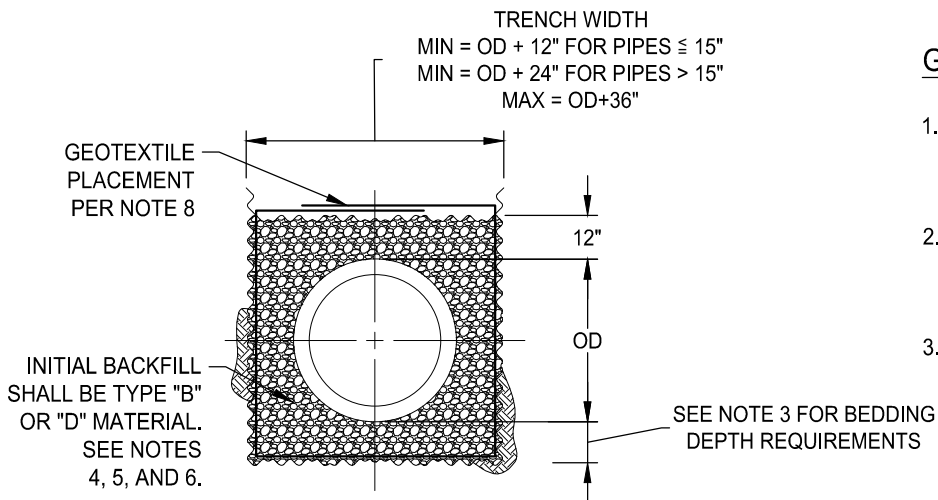
STORM DRAIN TRENCH DETAIL

APPROVED BY:
Jeffrey B. Wan 02-16-2022
CITY ENGINEER DATE



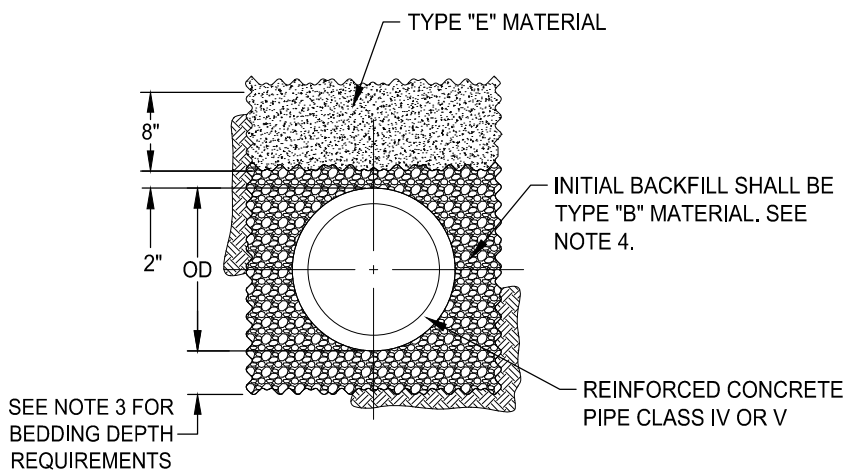
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SD - 6.0

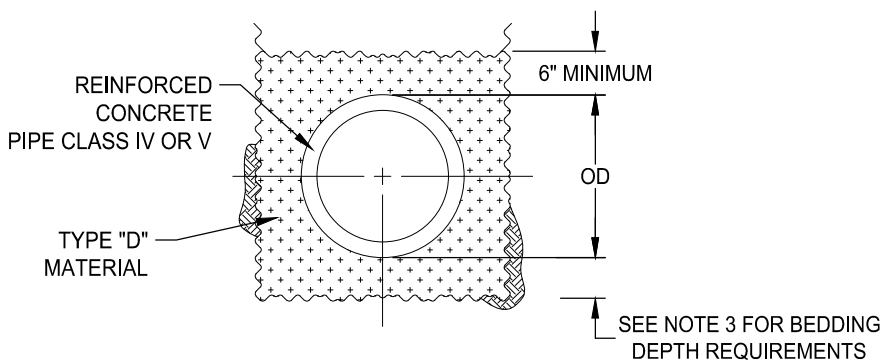


INITIAL BACKFILL REQUIREMENTS

HDPE, C900 PVC, C915 PVC, RCP



INITIAL BACKFILL REQUIREMENTS FOR SHALLOW PIPE - OPTION 1



INITIAL BACKFILL REQUIREMENTS FOR SHALLOW PIPE - OPTION 2

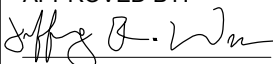
GENERAL NOTES:

1. INITIAL BACKFILL MATERIAL SHALL BE THOROUGHLY COMPACTED AROUND PIPE BY SHOVEL SLICING OR TAMPING.
2. "TRENCH EXCAVATION, BEDDING AND BACKFILL" AS PER SECTION 19 OF THE CITY STANDARD CONSTRUCTION SPECIFICATIONS.
3. MINIMUM DEPTH OF BEDDING SHALL BE THE GREATER OF:
 4" MIN FOR PIPES WITH ID ≤ 48"
 6" MIN FOR PIPES WITH ID > 48"
 OR
 THE DIFFERENCE BETWEEN THE OD OF THE PIPE BARREL AND THE BELL PLUS 1.5".
- FOR ROCKY OR UNSUITABLE BEDDING CONDITIONS, SEE SECTION 19 OF THE CITY STANDARD CONSTRUCTION SPECIFICATIONS FOR TYP. BEDDING REQUIREMENTS.
4. IF MINIMUM TRENCH WIDTH CANNOT BE ACHIEVED, TYPE "D" MATERIAL SHALL BE USED IN LIEU OF TYPE "B" MATERIAL AT NO EXTRA COST.
5. IF BOTTOM OF ROADWAY STRUCTURAL SECTION (SUBGRADE) IS WITHIN 12" OF TOP OF PIPE, BEDDING AND INITIAL BACKFILL SHALL BE PER ONE OF THE TWO SHALLOW PIPE DETAILS ON THIS SHEET.
6. FOR ADDITIONAL INITIAL BACKFILL MATERIAL OPTIONS FOR 48" AND LARGER RCP, SEE SECTION 19 OF THE CITY STANDARD CONSTRUCTION SPECIFICATIONS.
7. SEE STD DWG SD-6.0 AND SECTION 19 OF THE CITY STANDARD CONSTRUCTION SPECIFICATIONS FOR BACKFILL MATERIAL DEFINITIONS AND ADDITIONAL REQUIREMENTS.
8. GEOTEXTILE FABRIC SHALL BE INSTALLED AS FOLLOWS:
 - FOR DRY TRENCH CONDITIONS - PLACE ON TOP OF INITIAL BACKFILL MATERIAL EXTENDING A 2" EDGE FACING DOWN ON THE TRENCH SIDES.
 - FOR SATURATED TRENCH CONDITIONS - WRAP BEDDING AND INITIAL BACKFILL MATERIALS WITH GEOTEXTILE FABRIC. OVERLAP THE FABRIC EDGES AT LEAST TWO FEET (2') ON TOP OF INITIAL BACKFILL MATERIAL.


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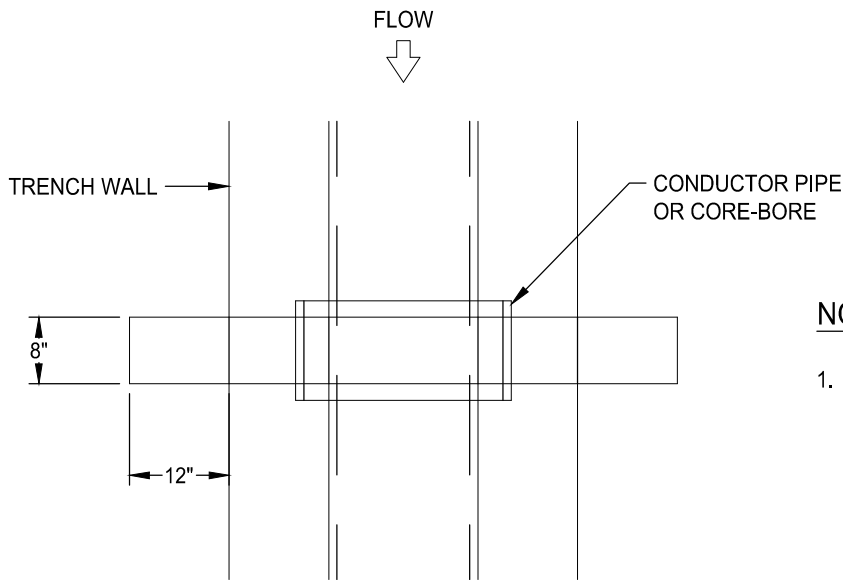
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STORM DRAIN PIPE BEDDING AND INITIAL BACKFILL

APPROVED BY:

 CITY ENGINEER DATE 02-16-2022

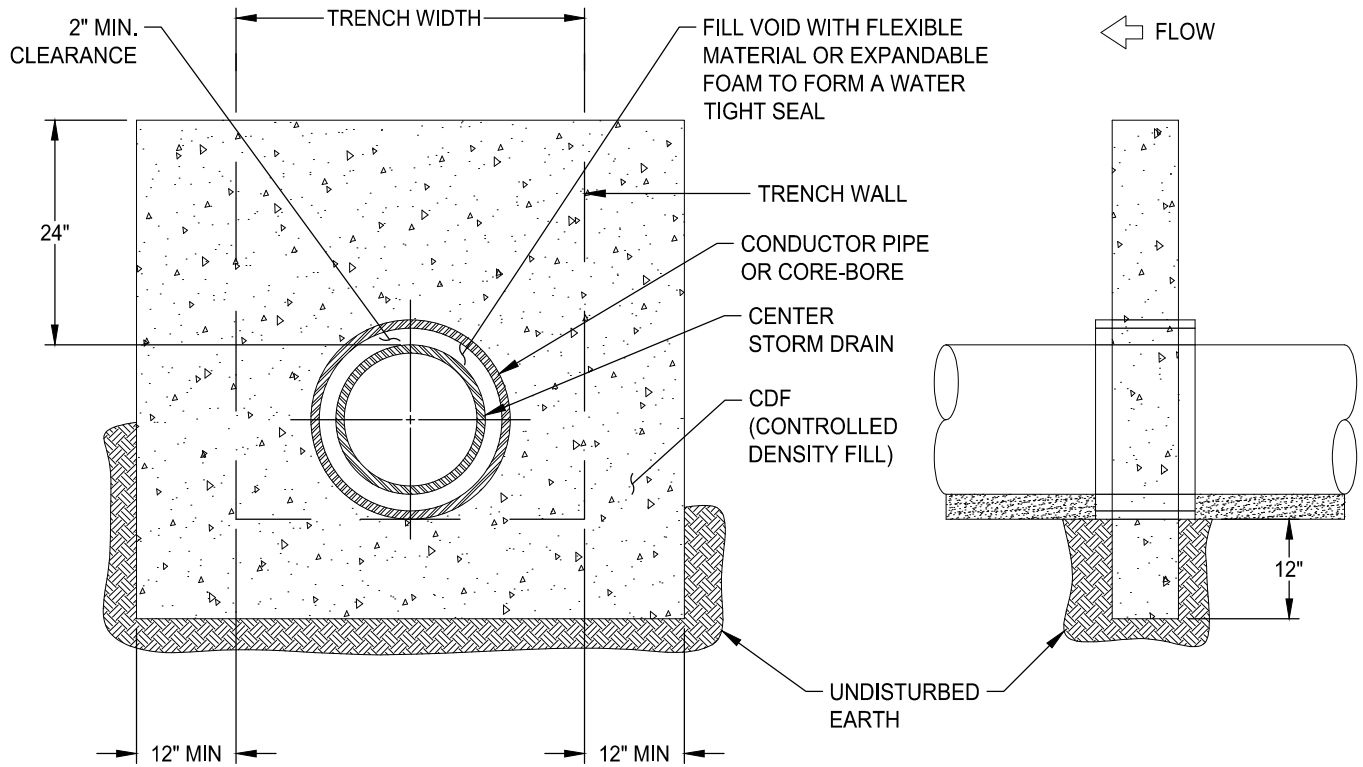
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SD - 6.1





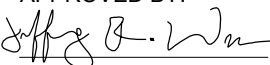
NOTES:

1. TOP OF COLLAR TO EXTEND INTO INTERMEDIATE BACKFILL 12" MINIMUM OR TOP OF GROUND WATER HGL.



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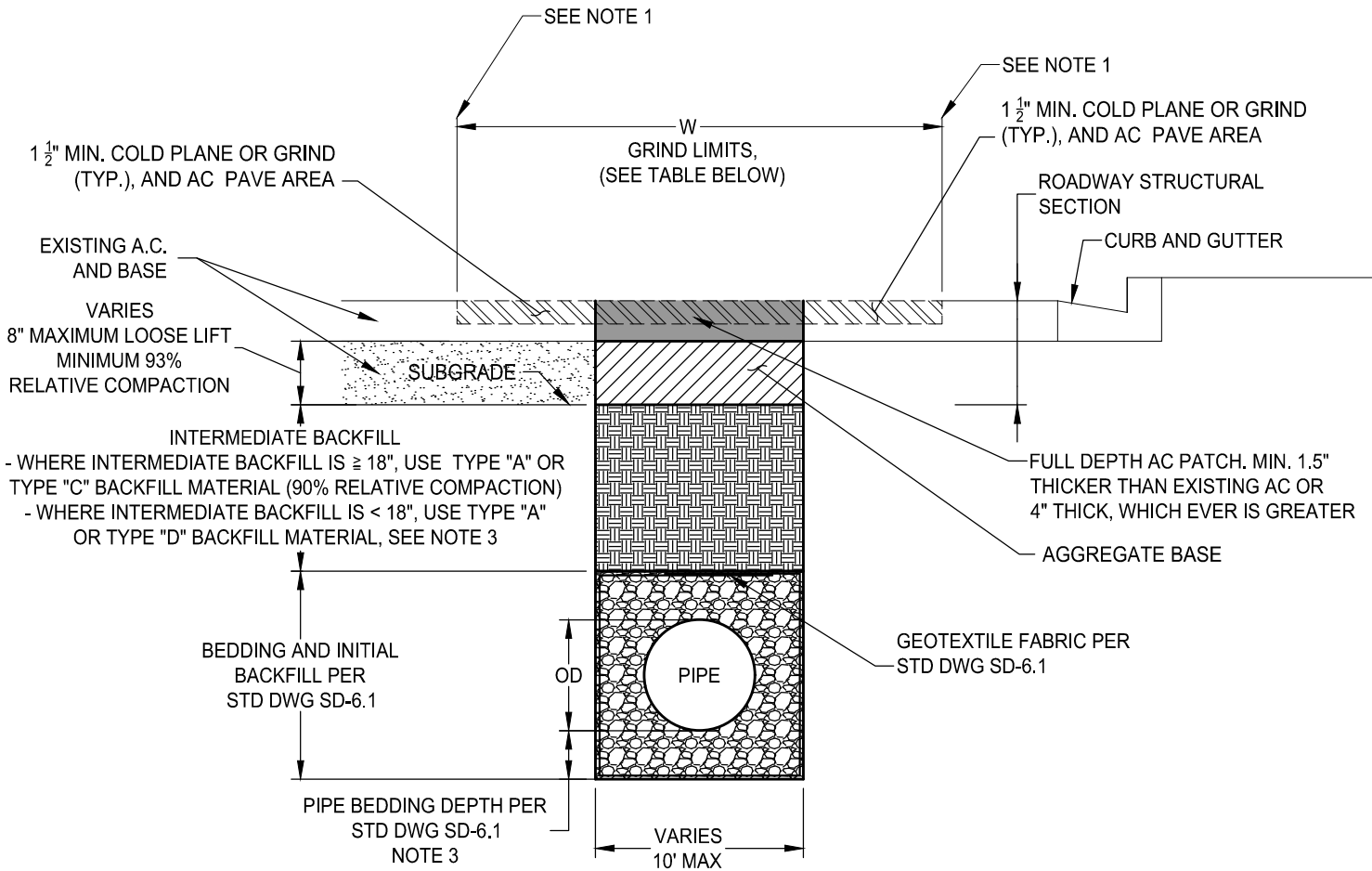
APPROVED BY:

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 CITY ENGINEER DATE

CUTOFF COLLAR



DRAWING NUMBER

SD - 6.2



GRIND LIMITS DETAILS

PAVEMENT CONDITION PCI	W	
	ACROSS TRAFFIC (PERPENDICULAR)	ALONG TRAFFIC (LONGITUDINAL)
85-100	TRENCH + 2' EACH SIDE (10' MIN)	TRENCH + 2' EACH SIDE
70<85	TRENCH + 2' EACH SIDE (5' MIN)	TRENCH + 2' EACH SIDE (8' MIN)
50<70	TRENCH + 2' EACH SIDE (5' MIN)	TRENCH + 2' EACH SIDE (5' MIN)
<50	TRENCH + 1' EACH SIDE (5' MIN)	TRENCH + 1' EACH SIDE (4' MIN)

NOTES:

1. GRINDING/PAVEMENT JOINT SHALL BE LOCATED ALONG GUTTER LINES, LANE LINES, OR CENTER OF LANES AND SHALL NOT BE PLACED IN WHEEL LINES.
2. ENTIRE BIKE LANE SHALL BE REPAVED WHEN TRENCHING OCCURS IN BIKE LANE AREA.
3. INTERMEDIATE BACKFILL MATERIALS SHALL BE PER STD DWG SD-6.0.

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TRENCH BACKFILLING AND RESURFACING

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ST - 1A