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DEVIATION REQUEST AND DECISION FORM

Updated: 6/26/2019

PROJECT INFORMATION

Project Name : Mountain's Edge
 Schedule No.(s) : 3200000740
 Legal Description : N2N2SW4 EX THAT PT CONVEYED BY REC # 219060197 SEC 13-12-63

APPLICANT INFORMATION

Company : M.V.E., Inc.
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 Owner Consultant Contractor
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 Colorado Springs, CO 80909
 Phone Number : 719-635-5736
 FAX Number :
 Email Address : Daveg@mvecivil.com

ENGINEER INFORMATION

Company : M.V.E., Inc.
 Name : David Gorman Colorado P.E. Number : 31672
 Mailing Address : 1903 Lelaray Street, Suite 200
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 Phone Number : 719-635-5736
 FAX Number :
 Email Address : Daveg@mvecivil.com

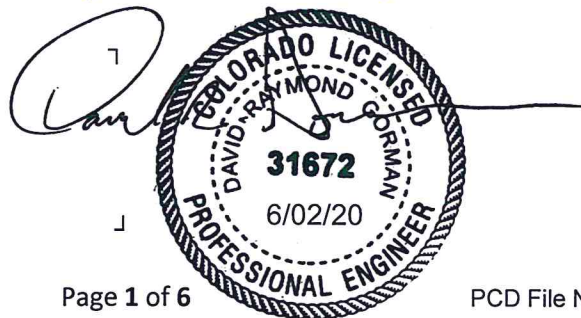
OWNER, APPLICANT, AND ENGINEER DECLARATION

To the best of my knowledge, the information on this application and all additional or supplemental documentation is true, factual and complete. I am fully aware that any misrepresentation of any information on this application may be grounds for denial. I have familiarized myself with the rules, regulations and procedures with respect to preparing and filing this application. I also understand that an incorrect submittal will be cause to have the project removed from the agenda of the Planning Commission, Board of County Commissioners and/or Board of Adjustment or delay review until corrections are made, and that any approval of this application is based on the representations made in the application and may be revoked on any breach of representation or condition(s) of approval.

Bill the Manager _____ Date June 3, 20

Signature of owner (or authorized representative)

Engineer's Seal, Signature
And Date of Signature



DEVIATION REQUEST (Attach diagrams, figures, and other documentation to clarify request)

A deviation from the standards of or in Section **4.3.6.A.3** of the Engineering Criteria Manual (ECM) is requested.

Identify the specific ECM standard which a deviation is requested:

- Storm Sewer Lines: **At no time shall storm sewer lines be placed less than 2 feet in** depth measured perpendicularly to the finished road surface. When placed outside the road, at no time shall the storm sewer lines be placed less than 1 foot in depth from the ground surface.
- Storm Sewer Lines: Include pipe culverts, box culverts, and manholes, excluding the risers

State the reason for the requested deviation:

The culvert's proximity to McClelland Road and existing topographical conditions of the McClelland Road east roadside ditch do not allow for installation of the culvert with 2 ft. of cover.

Explain the proposed alternative and compare to the ECM standards (May provide applicable regional or national standards used as basis):

ECM Section 3.3.2.1.7 states "Minimum and maximum cover for culverts shall be determined based on loading, type and class of pipe, manufacturer's recommendation, and soil bedding conditions....."

Standard Practice Reinforced Concrete Pipe allows for installation of pipe cover as low as 1 foot.

The proposed 14"x23" elliptical pipe is equivalent to an 18" circular pipe. The Concrete Pipe Association has issued a design aid titled Concrete Pipe Association Fill Height Table indicates 21" or 24" Class III pipe with Type 4 bedding is adequate for 1 ft of cover for AASHTO HL-93 loading (approximately equivalent to the old HS-20 designation). The referenced CPA document is attached.

We have specified Class IV pipe for this culvert for added reliability with 1 ft. of cover.

LIMITS OF CONSIDERATION

(At least one of the conditions listed below must be met for this deviation request to be considered.)

- The ECM standard is inapplicable to the particular situation.
- Topography, right-of-way, or other geographical conditions or impediments impose an undue hardship and an equivalent alternative that can accomplish the same design objective is available and does not compromise public safety or accessibility.
- A change to a standard is required to address a specific design or construction problem, and if not modified, the standard will impose an undue hardship on the applicant with little or no material benefit to the public.

Provide justification:

The location of the proposed reinforced concrete pipe (RCP) is at the intersection of existing McClelland Road and proposed Farmhouse Court. The topography of the existing shallow roadside ditch of McClelland Road extending far to the north and south of the site, coupled with the topography of the site east of McClelland Road which slopes down to the east, creates a condition that prevents use of RCP culvert with more than 1 foot of cover from the road surface. As a partial solution, an elliptical pipe is specified at this location to decrease the cross-sectional height but maintain pipe capacity equivalent to an 18" round RCP.

The proposed 14"x23" elliptical pipe is shown by the Concrete Pipe Association's Fill Height Table to be adequate with Class III pipe, Type 4 bedding and 1 ft of cover for AASHTO HL-93 loading (approximately equivalent to the old HS-20 designation). The referenced CPA document is attached. Additionally, we have specified Class IV pipe for this culvert for added reliability.

CRITERIA FOR APPROVAL

Per ECM section 5.8.7 the request for a deviation may be considered if the request is **not based exclusively on financial considerations**. The deviation must not be detrimental to public safety or surrounding property. The applicant must include supporting information demonstrating compliance with **all of the following criteria**:

The deviation will achieve the intended result with a comparable or superior design and quality of improvement.

The proposed 14"x23" elliptical pipe is shown by the Concrete Pipe Association's Fill Height Table to be adequate with Class III pipe, Type 4 bedding and 1 ft of cover for AASHTO HL-93 loading (approximately equivalent to the old HS-20 designation). Additionally, we have specified Class IV pipe for this culvert for added reliability. Based on these findings, The deviation will achieve the intended result with a comparable or superior design and quality of improvement.

The deviation will not adversely affect safety or operations.

The proposed culvert meets applicable loading standards and will not affect safety. The proposed culvert will be installed in the roadside ditch in the same manner as the typical culvert installations in the County and will not affect normal operations of the road or road maintenance.

The deviation will not adversely affect maintenance and its associated cost.

The proposed Reinforced Concrete Pipe culvert will be structurally sound at the depth of cover specified and service life for the culvert will meet or exceed County requirements based on manufacturer design recommendations and literature. The deviation will not adversely affect maintenance and its associated cost.

The deviation will not adversely affect aesthetic appearance.

The deviation concerning depth of cover for a proposed Reinforced Concrete Pipe culvert will not be noticeably different than other culvert installations in the area and will not adversely affect aesthetic appearance of the road or roadside ditches.

The deviation meets the design intent and purpose of the ECM standards.

The deviation concerning depth of cover for a proposed Reinforced Concrete Pipe culvert meets the design intent and purpose of the ECM standards because the design fulfills the purpose of the adequately draining flows under the proposed roadway, does not adversely affect health, safety and welfare of the public, nor does it adversely impact the ability of the county to maintain the road and culvert or increase the costs of maintenance.

The deviation meets the control measure requirements of Part I.E.3 and Part I.E.4 of the County's MS4 permit, as applicable.

The deviation concerning depth of cover for a proposed Reinforced Concrete Pipe culvert does not interfere with or affect control measures or control measure requirements and therefore meets all control measure requirements of El Paso County's MS4 permit.

REVIEW AND RECOMMENDATION:

Approved by the ECM Administrator

This request has been determined to have met the criteria for approval. A deviation from Section _____ of the ECM is hereby granted based on the justification provided.

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Denied by the ECM Administrator

This request has been determined not to have met criteria for approval. A deviation from Section _____ of the ECM is hereby denied.

Γ Γ

L J

ECM ADMINISTRATOR COMMENTS/CONDITIONS:

1.1. PURPOSE

The purpose of this resource is to provide a form for documenting the findings and decision by the ECM Administrator concerning a deviation request. The form is used to document the review and decision concerning a requested deviation. The request and decision concerning each deviation from a specific section of the ECM shall be recorded on a separate form.

1.2. BACKGROUND

A deviation is a critical aspect of the review process and needs to be documented to ensure that the deviations granted are applied to a specific development application in conformance with the criteria for approval and that the action is documented as such requests can point to potential needed revisions to the ECM.

1.3. APPLICABLE STATUTES AND REGULATIONS

Section 5.8 of the ECM establishes a mechanism whereby an engineering design standard can be modified when if strictly adhered to, would cause unnecessary hardship or unsafe design because of topographical or other conditions particular to the site, and that a departure may be made without destroying the intent of such provision.

1.4. APPLICABILITY

All provisions of the ECM are subject to deviation by the ECM Administrator provided that one of the following conditions is met:

- The ECM standard is inapplicable to a particular situation.
- Topography, right-of-way, or other geographical conditions or impediments impose an undue hardship on the applicant, and an equivalent alternative that can accomplish the same design objective is available and does not compromise public safety or accessibility.
- A change to a standard is required to address a specific design or construction problem, and if not modified, the standard will impose an undue hardship on the applicant with little or no material benefit to the public.

1.5. TECHNICAL GUIDANCE

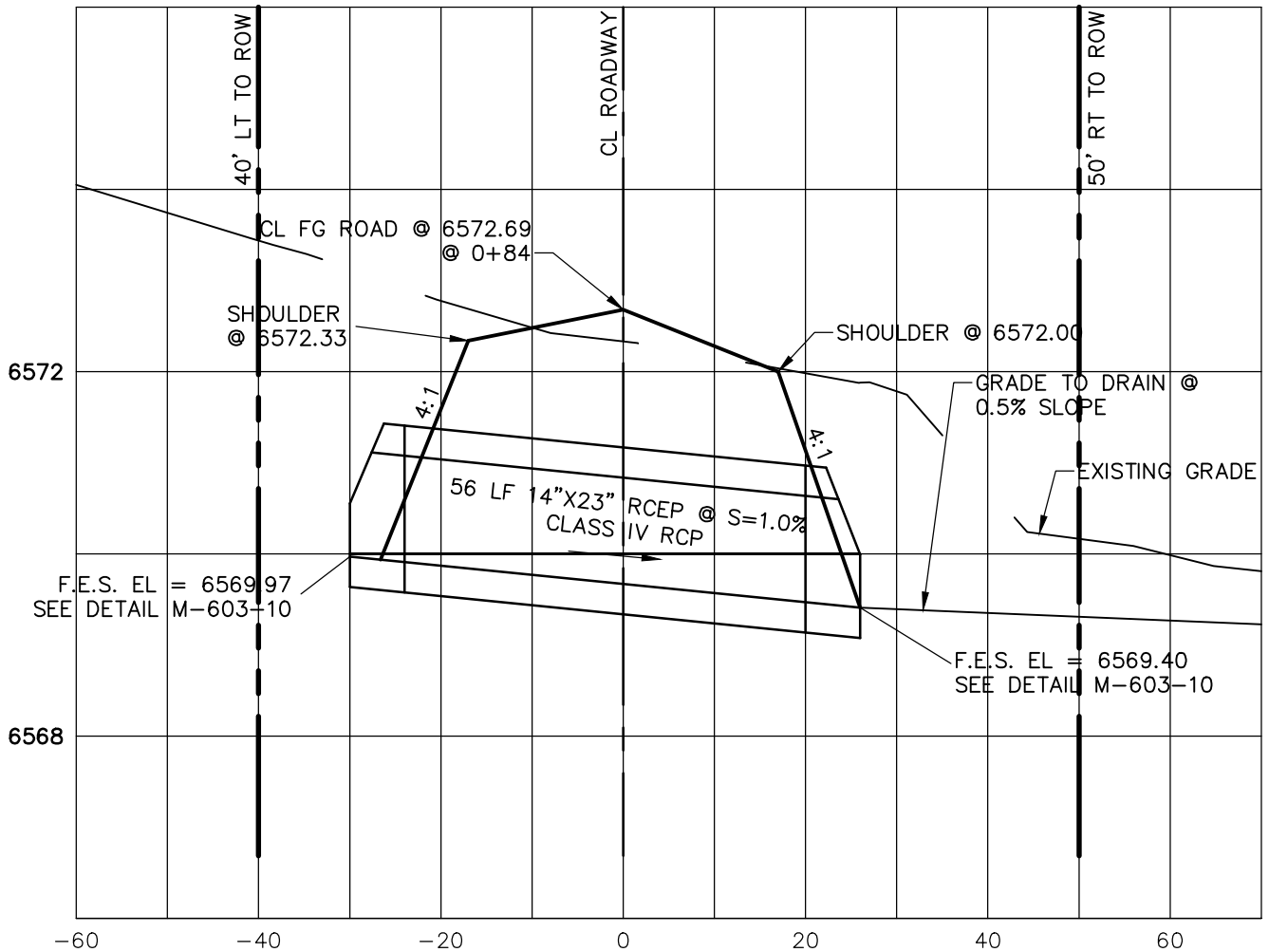
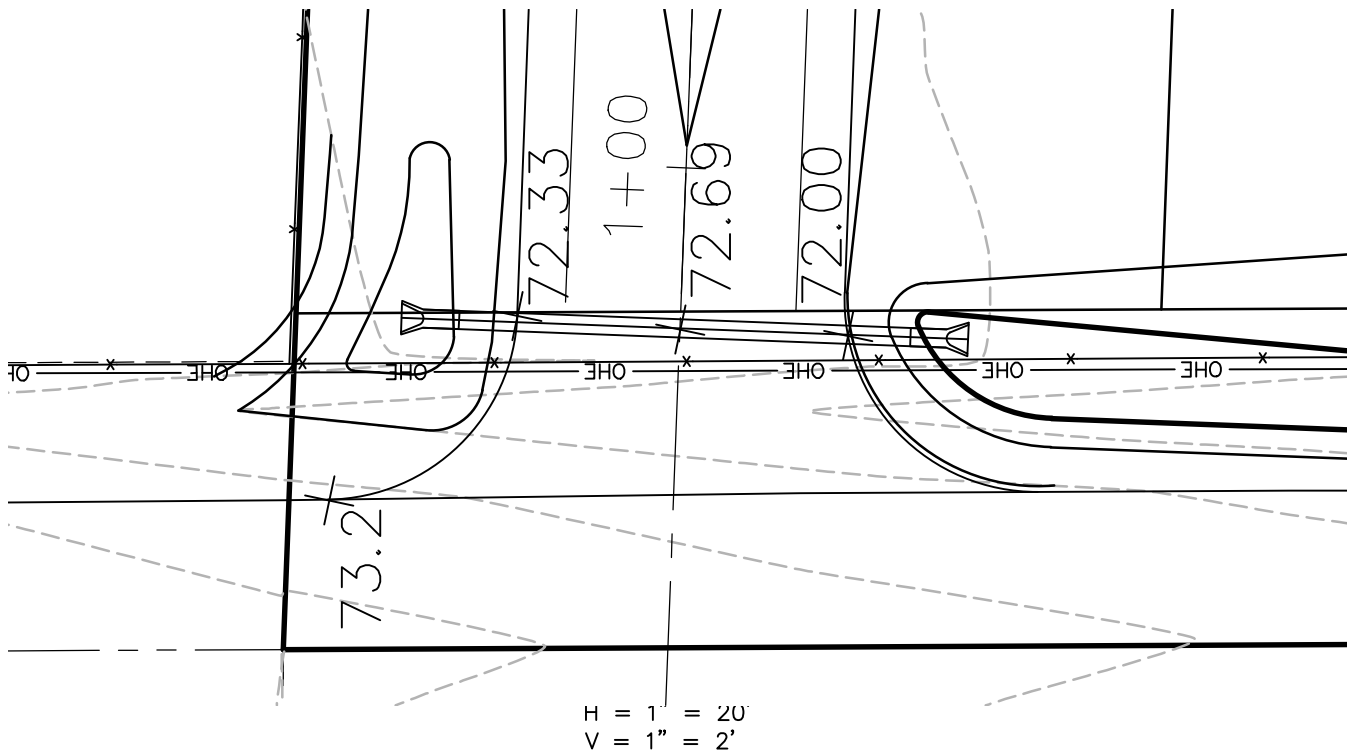
The review shall ensure all criteria for approval are adequately considered and that justification for the deviation is properly documented.

1.6. LIMITS OF APPROVAL

Whether a request for deviation is approved as proposed or with conditions, the approval is for project-specific use and shall not constitute a precedent or general deviation from these Standards.

1.7. REVIEW FEES

A Deviation Review Fee shall be paid in full at the time of submission of a request for deviation. The fee for Deviation Review shall be as determined by resolution of the BoCC.



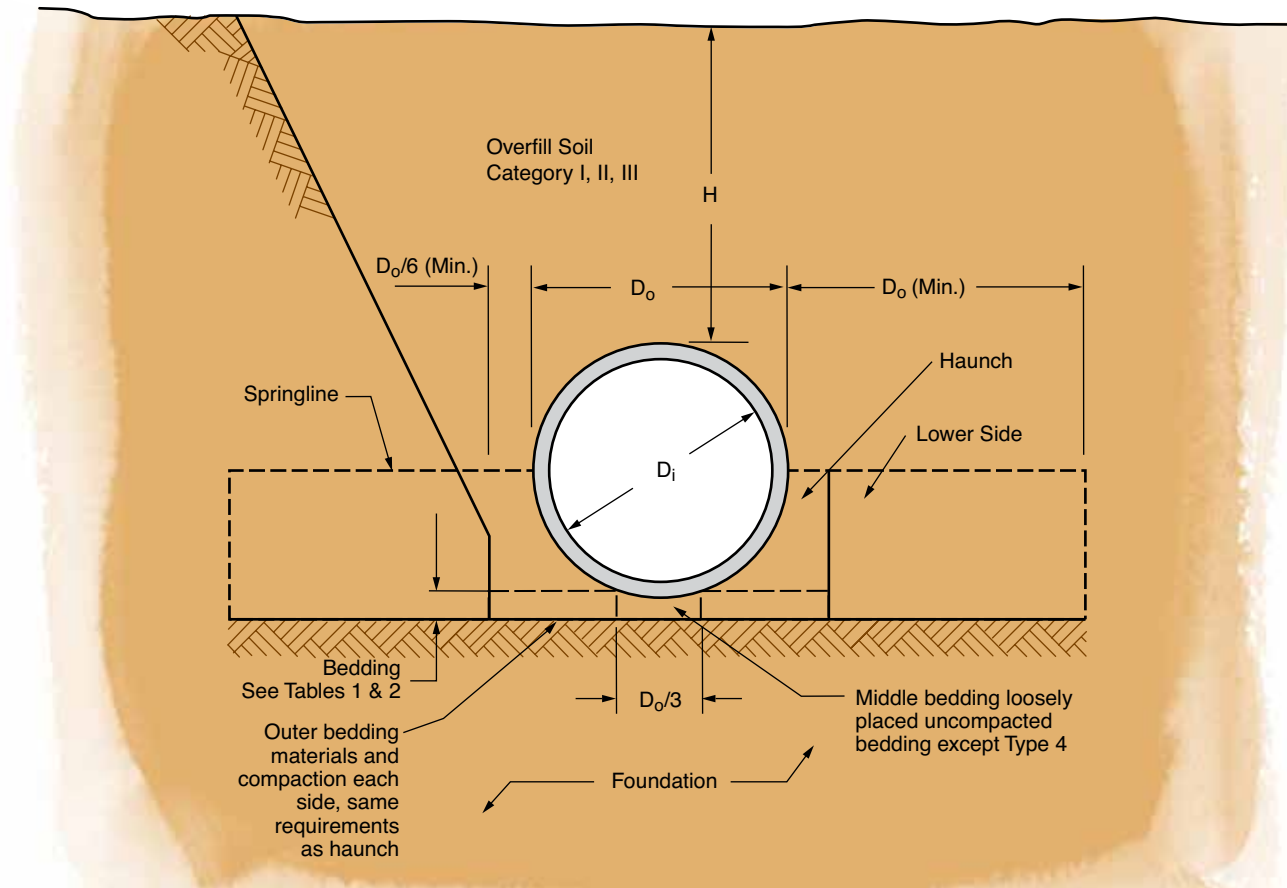
FOR CONCRETE PIPE

LRFD FILL HEIGHT TABLES



Standard Trench/Embankment Installation

Concrete pipe should be installed in accordance with the AASHTO LRFD Bridge Construction Specifications, Section 27 or ASTM C1479. Figure 1 shows the basic pipe and soil terminology.



There are four types of Standard Installations, each with its own soil and compaction requirements. Type 1 bedding provides the most support using highly compacted granular material, while Type 4 provides for less support allowing the use of silts and clay soils with little or no compaction. These four choices provide flexibility and versatility for the designer and contractor, as well as performance and economy for the owner that are not available with other types of pipe.

The soil and compaction requirements are provided in Table 1. Table 2 shows the equivalent soil designations per the Unified Soil Classification System (USCS) and AASHTO.

To facilitate your selection of the proper reinforced concrete pipe using the most beneficial Standard Installation for the conditions at the site, fill height tables are provided on the following pages. The required 0.01 inch crack D-Loads in units of lbs per linear foot per foot of diameter are provided numerically and the class of pipe per ASTM C76 (AASHTO M 170) meeting this requirement is designated by color of the cell.

Table 1: Standard Installation Soils and Minimum Compaction Requirements

| Installation Type | Bedding Thickness | Haunch and Outer Bedding | Lower Side |
|-------------------|---|---|--|
| Type 1 | D _o /24 minimum, not less than 3" (75 mm) If rock foundation, use D _o /12 minimum, not less than 6" (150 mm) | 95% Category I | 90% Category I, 95% Category II, or 100% Category III |
| Type 2 | D _o /24 minimum, not less than 3" (75 mm) If rock foundation, use D _o /12 minimum, not less than 6" (150 mm) | 90% Category I or 95% Category II | 85% Category I, 90% Category II, or 95% Category III |
| Type 3 | D _o /24 minimum, not less than 3" (75 mm) If rock foundation, use D _o /12 minimum, not less than 6" (150 mm) | 85% Category I, 90% Category II, or 95% Category III | 85% Category I, 90% Category II, or 95% Category III |
| Type 4 | No bedding required except if rock foundation, use D _o /12 minimum, not less than 6" (150 mm) | No compaction required, except if Category III, use 85% | No compaction required, except if Category III, use 85% |

Reference: ASCE 15-98, "Standard Practice for Direct Design of Buried Precast Concrete Pipe Using Standard Installations (SIDD)", 1998.

Table 3: Reinforced Pipe Classes for 0.01 inch Crack Per ASTM C 76 (lbs/ft/ft)

| | |
|----------------|--------|
| Class I | ≤ 800 |
| Class II | ≤ 1000 |
| Class III | ≤ 1350 |
| Class IV | ≤ 2000 |
| Class V | ≤ 3000 |
| Special Design | > 3000 |

Table 2: Equivalent USCS and AASHTO Soil Classifications for Standard Installation Soil Designations

| Representative Soil Types | | | Percent Compaction | |
|-----------------------------------|---|--------|--------------------|------------------|
| SIDD | USCS | AASHTO | Standard Proctor | Modified Proctor |
| Gravelly Sand (Category I) | SW, SP, GW, GP | A1, A3 | 100 | 95 |
| | | | 95 | 90 |
| | | | 90 | 85 |
| | | | 85 | 80 |
| | | | 80 | 75 |
| Sandy Silt (Category II) | GM, SM, ML, Also GC, SC with less than 20% passing #200 sieve | A2, A4 | 100 | 95 |
| | | | 95 | 90 |
| | | | 90 | 85 |
| | | | 85 | 80 |
| | | | 80 | 75 |
| Silty Clay (Category III) | CL, MH, GC, SC | A5, A6 | 100 | 90 |
| | | | 95 | 85 |
| | | | 90 | 80 |
| | | | 85 | 75 |
| | | | 80 | 70 |
| Not Allowed for Haunch or Bedding | CH | A7 | 100 | 90 |
| | | | 95 | 85 |
| | | | 90 | 80 |
| | | | 85 | 75 |
| | | | 80 | 70 |

Reference: ASCE 15-98, "Standard Practice for Direct Design of Buried Precast Concrete Pipe Using Standard Installations (SIDD)", 1998.

NOTES:

1. Compaction and soil symbols – i.e. "95% Category I" refers to Category I soil material with a minimum Standard Proctor compaction of 95%. See Table 2 for equivalent Modified Proctor values.
2. Soil in the outer bedding, haunch, and lower side zones shall be compacted to at least the same compaction as the majority of soil in the overfill zone.

Fill Height Tables are based on:

1. $s = 120$ pcf

2. AASHTO HL-93 live load

3. Positive Projecting Embankment Condition -

this gives conservative results in comparison to trench conditions

D-Load (lb/ft/ft) for Type 4 Bedding

| | |
|-----------|----------------|
| Class I | Class IV |
| Class II | Class V |
| Class III | Special Design |

| Pipe Size (in) | Fill Height in Feet | | | | | | | | | | | | | |
|----------------|---------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
| 12 | 1579 | 1481 | 1111 | 1032 | 1071 | 1154 | 1264 | 1383 | 1372 | 1521 | 1671 | 1820 | 1969 | 2119 |
| 15 | 1519 | 1426 | 1073 | 998 | 1036 | 1116 | 1221 | 1336 | 1326 | 1616 | 1612 | 1756 | 1899 | 2042 |
| 18 | 1443 | 1391 | 1050 | 978 | 1015 | 1093 | 1195 | 1307 | 1297 | 1580 | 1576 | 1715 | 1854 | 1994 |
| 21 | 1306 | 1366 | 1035 | 966 | 1002 | 1079 | 1179 | 1288 | 1279 | 1557 | 1552 | 1688 | 1825 | 1961 |
| 24 | 1288 | 1349 | 1025 | 959 | 994 | 1070 | 1168 | 1276 | 1267 | 1541 | 1535 | 1670 | 1804 | 1938 |
| 27 | 1431 | 1352 | 1025 | 960 | 993 | 1068 | 1165 | 1271 | 1259 | 1531 | 1524 | 1657 | 1790 | 1922 |
| 30 | 1560 | 1360 | 1029 | 965 | 995 | 1070 | 1166 | 1270 | 1254 | 1524 | 1517 | 1648 | 1780 | 1911 |
| 33 | 1437 | 1316 | 1010 | 955 | 988 | 1064 | 1160 | 1264 | 1252 | 1520 | 1512 | 1642 | 1773 | 1903 |
| 36 | 1336 | 1285 | 993 | 947 | 982 | 1060 | 1157 | 1260 | 1251 | 1518 | 1509 | 1639 | 1768 | 1898 |
| 42 | 1181 | 1211 | 966 | 935 | 976 | 1057 | 1153 | 1256 | 1252 | 1518 | 1508 | 1636 | 1764 | 1892 |
| 48 | 1068 | 1090 | 941 | 927 | 973 | 1056 | 1152 | 1255 | 1257 | 1522 | 1511 | 1638 | 1765 | 1892 |
| 54 | 1029 | 1058 | 925 | 921 | 973 | 1058 | 1154 | 1257 | 1264 | 1529 | 1516 | 1642 | 1768 | 1894 |
| 60 | 1059 | 1038 | 912 | 918 | 975 | 1062 | 1158 | 1261 | 1273 | 1538 | 1523 | 1649 | 1774 | 1899 |
| 66 | 1021 | 1022 | 906 | 917 | 978 | 1066 | 1163 | 1266 | 1282 | 1548 | 1532 | 1657 | 1781 | 1906 |
| 72 | 969 | 1008 | 902 | 917 | 984 | 1072 | 1169 | 1272 | 1292 | 1559 | 1541 | 1666 | 1790 | 1914 |
| 78 | 927 | 996 | 899 | 920 | 990 | 1079 | 1176 | 1280 | 1303 | 1570 | 1551 | 1675 | 1799 | 1923 |
| 84 | 893 | 986 | 898 | 925 | 997 | 1086 | 1184 | 1288 | 1315 | 1582 | 1562 | 1686 | 1810 | 1933 |
| 90 | 866 | 978 | 898 | 931 | 1004 | 1094 | 1192 | 1296 | 1408 | 1595 | 1574 | 1697 | 1820 | 1944 |
| 96 | 844 | 948 | 899 | 936 | 1012 | 1102 | 1201 | 1305 | 1417 | 1608 | 1585 | 1708 | 1831 | 1955 |
| 102 | 826 | 932 | 911 | 949 | 1024 | 1115 | 1214 | 1318 | 1429 | 1685 | 1597 | 1720 | 1843 | 1966 |
| 108 | 812 | 927 | 923 | 962 | 1037 | 1128 | 1226 | 1330 | 1441 | 1698 | 1609 | 1732 | 1855 | 1978 |
| 114 | 801 | 938 | 935 | 975 | 1050 | 1141 | 1239 | 1343 | 1454 | 1712 | 1682 | 1745 | 1867 | 1990 |
| 120 | 793 | 949 | 947 | 986 | 1063 | 1154 | 1252 | 1356 | 1467 | 1726 | 1694 | 1757 | 1879 | 2002 |
| 126 | 786 | 960 | 959 | 999 | 1076 | 1167 | 1265 | 1369 | 1480 | 1740 | 1707 | 1823 | 1892 | 2014 |
| 132 | 782 | 971 | 967 | 1013 | 1090 | 1180 | 1278 | 1382 | 1493 | 1754 | 1720 | 1836 | 1952 | 2027 |
| 138 | 779 | 982 | 968 | 1026 | 1103 | 1194 | 1292 | 1395 | 1506 | 1769 | 1733 | 1848 | 1965 | 2040 |
| 144 | 778 | 994 | 980 | 1039 | 1116 | 1207 | 1305 | 1409 | 1519 | 1783 | 1746 | 1861 | 1978 | 2095 |

Note: Class IV pipe is specified due to 1' cover and EPC ECM criteria for 2'

The preceding fill height tables are based on a concrete pipe installed in a positive projecting embankment installation with a soil unit weight of 120 lbs/ft³ and HL-93 live load per the AASHTO LRFD Bridge Design specifications at the surface. Pipe outside diameters were based on a wall C thickness since the larger outside diameters would represent the highest soil overburden load on the pipe. The required classes of pipe do not account for construction loads or any other load induced on the pipe prior to its completed installation, or live load in excess of HL-93.

| Dimensions of Circular Concrete Pipe - Metric Units | | | | | |
|---|-----------------------------|---------------------------|---------------------|---------------------------|---------------------|
| Designated Internal Diameter mm | Actual Internal Diameter mm | Wall B | | Wall C | |
| | | Minimum Wall Thickness mm | Average Weight kg/m | Minimum Wall Thickness mm | Average Weight kg/m |
| 300 | 305 | 50 | 162 | 69 | 197 |
| 375 | 381 | 57 | 216 | 75 | 262 |
| 450 | 457 | 63 | 253 | 82 | 335 |
| 525 | 533 | 69 | 327 | 88 | 417 |
| 600 | 610 | 75 | 430 | 94 | 505 |
| 675 | 686 | 82 | 500 | 100 | 602 |
| 750 | 762 | 88 | 598 | 107 | 708 |
| 825 | 838 | 94 | 695 | 113 | 821 |
| 900 | 914 | 100 | 832 | 119 | 940 |
| 975 | 991 | 113 | 923 | 125 | 1090 |
| 1050 | 1067 | 117 | 1057 | 132 | 1207 |
| 1200 | 1219 | 125 | 1324 | 144 | 1504 |
| 1350 | 1372 | 138 | 1589 | 157 | 1829 |
| 1500 | 1524 | 150 | 1927 | 169 | 2192 |
| 1650 | 1676 | 163 | 2295 | 182 | 2582 |
| 1800 | 1829 | 175 | 2695 | 194 | 2998 |
| 1950 | 1981 | 188 | 3125 | 207 | 3457 |
| 2100 | 2134 | 200 | 3585 | 219 | 3943 |
| 2250 | 2286 | 213 | 4078 | 232 | 4460 |
| 2400 | 2438 | 225 | 4598 | 244 | 5009 |
| 2550 | 2591 | 238 | 5179 | 257 | 5595 |
| 2700 | 2743 | 250 | 5752 | 269 | 6202 |
| 3000 | 3048 | 279 | 6344 | 298 | 7521 |
| 3600 | 3658 | 330 | 8104 | 349 | 10,540 |

| Dimensions of Circular Concrete Pipe - Imperial Units | | | | | | |
|---|-------------------------------|--------------------------------|-------------------------------|--------------------------------|-------------------------------|--------------------------------|
| Internal Diameter inches | Wall A | | Wall B | | Wall C | |
| | Minimum Wall Thickness inches | Average Weight pounds per foot | Minimum Wall Thickness inches | Average Weight pounds per foot | Minimum Wall Thickness inches | Average Weight pounds per foot |
| 12 | 1-3/4 | 79 | 2 | 93 | 2-3/4 | 133 |
| 15 | 1-7/8 | 103 | 2-1/4 | 127 | 3 | 177 |
| 18 | 2 | 131 | 2-1/2 | 168 | 3-1/4 | 226 |
| 21 | 2-1/4 | 171 | 2-3/4 | 214 | 3-1/2 | 281 |
| 24 | 2-1/2 | 217 | 3 | 264 | 3-3/4 | 341 |
| 27 | 2-5/8 | 255 | 3-1/4 | 322 | 4 | 406 |
| 30 | 2-3/4 | 295 | 3-1/2 | 384 | 4-1/4 | 476 |
| 33 | 2-7/8 | 336 | 3-3/4 | 451 | 4-1/2 | 552 |
| 36 | 3 | 383 | 4 | 524 | 4-3/4 | 633 |
| 42 | 3-1/2 | 520 | 4-1/2 | 686 | 5-1/4 | 811 |
| 48 | 4 | 683 | 5 | 867 | 5-3/4 | 1011 |
| 54 | 4-1/2 | 864 | 5-1/2 | 1068 | 6-1/4 | 1232 |
| 60 | 5 | 1064 | 6 | 1295 | 6-3/4 | 1473 |
| 66 | 5-1/2 | 1287 | 6-1/2 | 1542 | 7-1/4 | 1735 |
| 72 | 6 | 1532 | 7 | 1811 | 7-3/4 | 2023 |
| 78 | 6-1/2 | 1797 | 7-1/2 | 2100 | 8-1/4 | 2329 |
| 84 | 7 | 2085 | 8 | 2409 | 8-3/4 | 2656 |
| 90 | 7-1/2 | 2395 | 8-1/2 | 2740 | 9-1/4 | 3004 |
| 96 | 8 | 2710 | 9 | 3090 | 9-3/4 | 3374 |
| 102 | 8-1/2 | 3078 | 9-1/2 | 3480 | 10-1/4 | 3765 |
| 108 | 9 | 3446 | 10 | 3865 | 10-3/4 | 4178 |
| 114 | 9-1/2 | 3840 | 10-1/2 | 4278 | 11-1/4 | 4611 |
| 120 | 10 | 4263 | 11 | 4716 | 11-3/4 | 5066 |
| 126 | 10-1/2 | 4690 | 11-1/2 | 5175 | 12-1/4 | 5542 |
| 132 | 11 | 5148 | 12 | 5655 | 12-3/4 | 6040 |
| 138 | 11-1/2 | 5627 | 12-1/2 | 6156 | 13-1/4 | 6558 |
| 144 | 12 | 6126 | 13 | 6679 | 13-3/4 | 7098 |
| 150 | 12-1/2 | 6647 | 13-1/2 | 7223 | 14-1/4 | 7659 |
| 156 | 13 | 7190 | 14 | 7789 | 14-3/4 | 8242 |
| 162 | 13-1/2 | 7754 | 14-1/2 | 8375 | 15-1/4 | 8846 |
| 168 | 14 | 8339 | 15 | 8983 | 15-3/4 | 9471 |
| 174 | 14-1/2 | 8945 | 15-1/2 | 9612 | 16-1/4 | 10,117 |
| 180 | 15 | 9572 | 16 | 10,263 | 16-3/4 | 10,785 |



American **Concrete Pipe** Association

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