1			SECTION 33 05 10
2			UTILITY TRENCH EXCAVATION, EMBEDMENT AND BACKFILL
3	PAF	RT 1	- GENERAL
4	11	STI	MAADV
4	1.1	50	
5		A.	Section Includes:
6 7			1. Excavation, Embedment and Backfill for:
8			<ol> <li>1) Water Distribution or Transmission Main</li> </ol>
9			2) Wastewater Force Main
10			3) Reclaimed Water Main
11			b. Gravity Applications
12			1) Wastewater Gravity Mains
13			2) Storm Sewer Pipe and Culverts
14			3) Storm Sewer Precast Box and Culverts
15 16			2. Including:
10			b Disposal of excess unsuitable material
18			c. Site specific trench safety
19			d. Pumping and dewatering
20			e. Embedment
21			f. Concrete encasement for utility lines
22			g. Backfill
23			h. Compaction
24		B.	Deviations from this City of Fort Worth Standard Specification
25			1. None.
26		C.	Related Specification Sections include, but are not necessarily limited to:
27			1. Division 0 – Bidding Requirements, Contract Forms, and Conditions of the
28			Contract
29			2. Division 1 – General Requirements
30			3. Section 02 41 13 – Selective Site Demolition
31			4. Section 02 41 15 – Paving Removal
32			5. Section 02 41 14 – Utility Removal/Abandonment
33			6. Section 03 30 00 – Cast-in-place Concrete
34			7. Section 03 34 13 – Controlled Low Strength Material (CLSM)
35			8. Section 31 10 00 – Site Clearing
36			9. Section 31 25 00 – Erosion and Sediment Control
37			10. Section 33 05 26 – Utility Markers/Locators
38			11. Section 34 71 13 – Traffic Control
39	1.2	PR	ICE AND PAYMENT PROCEDURES

40 A. Measurement and Payment

2       underground utility or excavation         3       a. Measurement         4       1) This ftem is considered subsidiary to the installation of the utility pipe line as designated in the Drawings.         6       b. Payment         7       1) The work performed and the materials furnished in accordance with this Item are considered subsidiary to the installation of the utility pipe for the type of embedment and backfill as indicated on the plans. No other compensation will be allowed.         11       2. Imported Embedment or Backfill         12       a. Measurement         13       1) Measured by the cubic yard as delivered to the site and recorded by truck ticket provided to the City         14       b. Payment         15       b. Payment         16       1) Imported fill shall only be paid when using materials for embedment and backfill other than those identified in the Drawings. The work performed and materials furnished in accordance with price bid per cubic yard of "Imported Embedment/Backfill delivered to the Site for:         10       1) Imported fill shall only be paid for at the unit price bid per cubic yard of "Imported Embedment/Backfill or embedment         20       c. The price bid shall include:         21       a) Various embedment/backfill materials         22       1) Furnishing backfill or embedment as specified by this Specification         23       1) Furnishing hachall include:         23 <td< th=""><th>1</th><th>1.</th><th>Trench Excavation, Embedment and Backfill associated with the installation of an</th></td<>	1	1.	Trench Excavation, Embedment and Backfill associated with the installation of an
<ul> <li>a. Measurement</li> <li>i) This Item is considered subsidiary to the installation of the utility pipe line as designated in the Drawings.</li> <li>b. Payment</li> <li>i) The work performed and the materials furnished in accordance with this Item are considered subsidiary to the installation of the utility pipe for the type of embedment and backfill as indicated on the plans. No other compensation will be allowed.</li> <li>ii) The work performed and backfill as indicated on the plans. No other compensation will be allowed.</li> <li>iii) Measured by the cubic yard as delivered to the site and recorded by truck ticket provided to the City</li> <li>b. Payment</li> <li>i) Imported fill shall only be paid when using materials for embedment and backfill other than those identified in the Drawings. The work performed as provided under "Measurement" will be paid for at the unit price bid per cubic yard of "Imported Embedment/Backfill delivered to the Site for:</li> <li>a) Various embedment/backfill materials</li> <li>c. The price bid shall include:</li> <li>a) Measurement for Utility Lines</li> <li>a. Measurement and compaction of backfill or embedment</li> <li>b) Payment</li> <li>j) Hauling to the site</li> <li>j) Placement and compaction of backfill or encodence with this Item and measured by the cubic yard of "Concrete Encasement for Utility Lines</li> <li>a. Measurement</li> <li>j) The work performed and materials furnished in accordance with this Item and measured as provided under "Measurement" will be paid for at the unit price bid shall include:</li> <li>j) The work performed and materials furnished in accordance with this Item and measured as provided under "Measurement" will be paid for at the unit price bid shall include:</li> <li>j) The work performed and materials furnished in accordance with this Item and measured as provided under "Measurement" will be paid for at the unit price bid shall include:</li> <li>j) The work</li></ul>	2		underground utility or excavation
<ul> <li>1) This item is considered subsidiary to the installation of the utility pipe line as designated in the Drawings.</li> <li>b. Payment <ol> <li>The work performed and the materials furnished in accordance with this Item are considered subsidiary to the installation of the utility pipe for the type of embedment and backfill as indicated on the plans. No other compensation will be allowed.</li> <li>Imported Embedment or Backfill <ol> <li>Measurement</li> <li>Measured by the cubic yard as delivered to the site and recorded by truck ticket provided to the City</li> <li>b. Payment</li> </ol> </li> <li>Imported Fill shall only be paid when using materials for embedment and backfill other than those identified in the Drawings. The work performed and materials furnished in accordance with pre-bid item and measured as provided under "Measurement" will be paid for at the unit price bid per cubic yard of "Imported Embedment/Backfill" delivered to the Site for: <ol> <li>Warious embedment/backfill or embedment</li> </ol> </li> <li>C. The price bid shall include: <ol> <li>Furnishing backfill or embedment as specified by this Specification</li> <li>Hauling to the site</li> <li>Concrete Encasement for Utility Lines</li> <li>Measurement</li> <li>The work performed and materials furnished in accordance with this Item and measured as provided under "Measurement" will be paid for at the unit price bid per cubic yard of "Concrete Encasement for Utility Lines" per plan quantity.</li> <li>Fayment</li> <li>The work performed and materials furnished in accordance with this Item and measured as provided under "Measurement" will be paid for at the unit price bid per cubic yard of "Concrete Encasement for Utility Lines" per plan quantity.</li> <li>Fayment</li> <li>The work performed and materials furnished in accordance with the strem and measured as provided under "Measurement for Utility Lines" per plan quantity.</li> <li>C. The price bid shall include:</li> <li>Furnishing, hauling, placing and finishing concrete in accordance w</li></ol></li></ol></li></ul>	3		a. Measurement
5       as designated in the Drawings.         6       b. Payment         7       1) The work performed and the materials furnished in accordance with this         8       trend of the trend subsidiary to the installation of the utility pipe for the         9       type of embedment and backfill as indicated on the plans. No other         10       compensation will be allowed.         11       2. Imported Embedment or Backfill         12       a. Measurement         13       1) Measured by the cubic yard as delivered to the site and recorded by truck ticket provided to the Cay         15       b. Payment         16       1) Imported Eil shall only be paid when using materials for embedment and backfill other than those identified in the Drawings. The work performed and materials furnished in accordance with pre-bid item and measured as provided under "Measurement" will be paid for at the unit price bid per cubic yard of "Imported Embedment/Backfill" delivered to the Site for:         21       a) Various embediment/backfill materials         22       c. The price bid shall include:         23       1) Purnishing backfill or embedment as specified by this Specification         24       2) Hauling to the site         25       3) Placement and compaction of backfill or embedment         26       3. Oracrete Encasement for Utility Lines         27       a. Measurement	4		1) This Item is considered subsidiary to the installation of the utility pipe line
6       b. Payment         1)       The work performed and the materials furnished in accordance with this Item are considered subsidiary to the installation of the utility pipe for the type of embedment and backfill as indicated on the plans. No other compensation will be allowed.         11       2.       Imported Embedment or Backfill         12       a.       Measurement         13       1)       Measured by the cubic yard as delivered to the site and recorded by truck ticket provided to the City         16       1)       Imported fill shall only be paid when using materials for embedment and backfill other than those identified in the Drawings. The work performed and materials furnished in accordance with pre-bid item and measured as provided under "Measurement" will be paid for at the unit price bid per cubic yard of "Imported Embedment/Backfill" delivered to the Site for: a)         21       a)       Various embedment/backfill materials         22       c.       The price bid shall include:         23       1)       Furnishing backfill or embedment as specified by this Specification 2)         24       2)       Hauling to the site         25       3)       Placement and compaction of backfill or embedment         26       Concrete Encasement for Utility Lines         3       Measurement         10       Measurement         21       and measured as provided under "Measurement" will be paid for at the unit	5		as designated in the Drawings.
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8         Item are considered subsidiary to the installation of the utility pipe for the type of embediment and backfill as indicated on the plans. No other compensation will be allowed.           11         2. Imported Embedment or Backfill           12         a. Measurement           13         1) Measured by the cubic yard as delivered to the site and recorded by truck ticket provided to the City           14         1) Imported Fill shall only be paid when using materials for embedment and backfill other than those identified in the Drawings. The work performed           18         and materials furnished in accordance with pre-bid item and measured as provided under "Measurement" will be paid for at the unit price bid per cubic yard of "Imported Embedment/Backfill of elivered to the Site for:           21         a) Various embedment backfill materials           22         c. The price bid shall include:           23         1) Furnishing backfill or embedment specified by this Specification           24         29           25         3) Placement and compaction of backfill or embedment           26         3. Concrete Encasement for Utility Lines           31         11 Measured by the cubic yard per plan quantity.           29         b. Payment           30         1) Measured as provided under "Measurement" will be paid for at the unit price bid per cubic yard of "Concrete Encasement for Utility Lines" per plan quantity.           36         Concrete Enc	7		1) The work performed and the materials furnished in accordance with this
9         type of embedment and backfill as indicated on the plans. No other           10         compensation will be allowed.           11         2. Imported Embedment or Backfill           12         a. Measurement           13         1) Measured by the cubic yard as delivered to the site and recorded by truck           14         ticket provided to the City           15         b. Payment           16         1) Imported fill shall only be paid when using materials for embedment and           17         backfill other than those identified in the Drawings. The work performed           18         and materials furnished in accordance with pre-bid item and measured as           19         provided or "Imported Embedment/Backfill" delivered to the Site for:           20         cubic yard of "Imported Embedment/Backfill relivered to the Site for:           21         a) Various embedment/backfill materials           22         c. The price bid shall include:           23         1) Furnishing backfill or embedment as specified by this Specification           24         2) Hauling to the site           25         3) Placement and compaction of backfill are medment           26         3. Concrete Encasement for Utility Lines           27         a. Measurement           28         1) Measured by the cubic yard of "Concrete En	8		Item are considered subsidiary to the installation of the utility pipe for the
10       compensation will be allowed.         11       2. Imported Embedment or Backfill         12       a. Measurement         13       1) Measured by the cubic yard as delivered to the site and recorded by truck ticket provided to the City         15       b. Payment         16       1) Imported fill shall only be paid when using materials for embedment and backfill other than those identified in the Drawings. The work performed         18       and materials furnished in accordance with pre-bid item and measured as         19       provided under "Measurement" will be paid for at the unit price bid per         20       c. The price bid shall include:         21       a) Various embedment/backfill materials         22       c. The price bid shall include:         23       1) Furnishing backfill or embedment as specified by this Specification         24       2) Hauling to the site         25       3) Placement and compaction of backfill or embedment         26       Concrete Encasement for Utility Lines         27       a. Measurement         30       1) The work performed and materials furnished in accordance with this Item         31       and measured as provided under "Measurement" will be paid for at the unit         38       payment         39       payment         310	9		type of embedment and backfill as indicated on the plans. No other
11       2. Imported Embedment or Backfill         12       a. Measurement         13       1) Measured by the cubic yard as delivered to the site and recorded by truck ticket provided to the City         14       1) Imported fill shall only be paid when using materials for embedment and backfill other than those identified in the Drawings. The work performed and materials furnished in accordance with pre-bid item and measured as provided under "Measurement" will be paid for at the unit price bid per cubic yard of "Imported Embedment/Backfill" delivered to the Site for:         10       Various embedment/backfill materials         21       a) Various embedment/backfill materials         22       c. The price bid shall include:         23       1) Furnishing backfill or embedment as specified by this Specification         24       2) Hauling to the site         25       3) Placement and compaction of backfill or embedment         26       Concrete Encasement for Utility Lines         27       a. Measuremont         28       1) Measured by the cubic yard of "Concrete Encasement for Utility Lines" per plan quantity.         29       b. Payment         30       1) The work performed and materials furnished in accordance with this Item and measured as provided under "Measurement" will be paid for at the unit price bid shall include:         31       a) Measured by the cubic yard of "Concrete Encasement for Utility Lines" per plan quantity. <tr< td=""><td>10</td><td></td><td>compensation will be allowed.</td></tr<>	10		compensation will be allowed.
12       a. Measurement         13       1) Measured by the cubic yard as delivered to the site and recorded by truck ticket provided to the City         14       ticket provided to the City         15       b. Payment         16       1) Imported fill shall only be paid when using materials for embedment and backfill other than those identified in the Drawings. The work performed and materials furnished in accordance with pre-bid item and measured as provided under "Measurement" will be paid for at the unit price bid per cubic yard of "Imported Embedment/Backfill" delivered to the Site for:         10       a) Various embedment/backfill materials         21       a) Various embedment/backfill materials         22       c. The price bid shall include:         23       1) Furnishing backfill or embedment as specified by this Specification         24       2) Hauling to the site         25       3) Placement and compaction of backfill or embedment         26       3. Concrete Encasement for Utility Lines         27       a. Measured by the cubic yard per plan quantity.         29       b. Payment         30       1) The work performed and materials furnished in accordance with this Item and measured as provided under "Measurement" will be paid for at the unit price bid shall include:         31       and measured as provided under "Measurement" will be paid for at the unit frice bid per cubic yard of "Concrete Encasement for Utility Lines" per plan quantity.<	11	2.	Imported Embedment or Backfill
1) Measured by the cubic yard as delivered to the site and recorded by truck ticket provided to the City         14       ticket provided to the City         15       b. Payment         16       1) Imported fill shall only be paid when using materials for embedment and backfill other than those identified in the Drawings. The work performed and materials furnished in accordance with pre-bid item and measured as provided under "Measurement" will be paid for at the unit price bid per cubic yard of "Imported Embedment/Backfill" delivered to the Site for: <ul> <li>a) Various embedment/backfill materials</li> <li>c. The price bid shall include:</li> <li>1) Furnishing backfill or embedment as specified by this Specification</li> <li>2) Hauling to the site</li> <li>3) Placement and compaction of backfill or embedment</li> </ul> <li>26 Concrete Encasement for Utility Lines         <ul> <li>a. Measurement</li> <li>1) The work performed and materials furnished in accordance with this Item and measured as provided under "Measurement" will be paid for at the unit price bid per cubic yard of "Concrete Encasement for Utility Lines" per plan quantity.</li> </ul> </li> <li>27 and measured as provided under "Measurement" will be paid for at the unit price bid per cubic yard of "Concrete Encasement for Utility Lines" per plan quantity.</li> <li>34 c. The price bid shall include:</li> <li>35 1) Furnishing, hauling, placing and finishing concrete in accordance with Section 03 30 00</li> <li>27 2) Clean-up</li> <li>38 4. Ground Water Control</li>	12		a. Measurement
14       ticket provided to the City         15       b. Payment         16       1) Imported fill shall only be paid when using materials for embedment and backfill other than those identified in the Drawings. The work performed and materials furnished in accordance with pre-bid time and measured as provided under "Measurement" will be paid for at the unit price bid per cubic yard of "Imported Embedment/Backfill" delivered to the Site for:         21       a) Various embedment/Backfill materials         22       c. The price bid shall include:         23       1) Furnishing backfill or embedment as specified by this Specification         24       2) Hauling to the site         25       3) Placement and compaction of backfill or embedment         26       3. Concrete Encasement for Utility Lines         a. Measurement       1) Measured by the cubic yard per plan quantity.         29       b. Payment         30       1) The work performed and materials furnished in accordance with this Item and measured as provided under "Measurement" will be paid for at the unit price bid per cubic yard of "Concrete Encasement for Utility Lines" per plan quantity.         34       c. The price bid shall include:         35       1) Furnishing, hauling, placing and finishing concrete in accordance with Section 03 30 00         37       2) Clean-up         38       4. Ground Water Control         39       a. Measurement <t< td=""><td>13</td><td></td><td>1) Measured by the cubic yard as delivered to the site and recorded by truck</td></t<>	13		1) Measured by the cubic yard as delivered to the site and recorded by truck
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16       1) Imported fill shall only be paid when using materials for embedment and backfill other than those identified in the Drawings. The work performed and materials furnished in accordance with pre-bid item and measured as provided under "Measurement" will be paid for at the unit price bid per cubic yard of "Imported Embedment/Backfill" delivered to the Site for:         21       a) Various embedment/backfill materials         22       c. The price bid shall include:         23       1) Furnishing backfill or embedment as specified by this Specification         24       2) Hauling to the site         25       3) Placement and compaction of backfill or embedment         26       3. Concrete Encasement for Utility Lines         a       Measurement         10       Measured by the cubic yard per plan quantity.         29       b. Payment         30       1) The work performed and materials furnished in ac cordance with this Item and measured as provided under "Measurement" will be paid for at the unit price bid per cubic yard of "Concrete Encasement for Utility Lines" per plan quantity.         34       c. The price bid shall include:         35       1) Furnishing, hauling, placing and finishing concrete in ac cordance with Section 03 30 00         37       2) Clean-up         38       4. Ground Water Control         39       a. Measurement shall be lump sum when a ground water control plan is specifically required by the Contract Documents. </td <td>15</td> <td></td> <td>b. Payment</td>	15		b. Payment
17       backfill other than those identified in the Drawings. The work performed         18       and materials furnished in accordance with pre-bid item and measured as         19       provided under "Measurement" will be paid for at the unit price bid per         20       cubic yard of "Imported Embedment/Backfill" delivered to the Site for:         21       a) Various embedment/backfill materials         22       c. The price bid shall include:         23       1) Furnishing backfill or embedment as specified by this Specification         24       2) Hauling to the site         25       3) Placement and compaction of backfill or embedment         26       3. Concrete Encasement for Utility Lines         27       a. Measurement         28       1) Measured by the cubic yard per plan quantity.         29       b. Payment         30       1) The work performed and materials furnished in accordance with this Item         31       and measured as provided under "Measurement" will be paid for at the unit         32       plan quantity.         34       c. The price bid shall include:         35       1) Furnishing, hauling, placing and finishing concrete in accordance with         36       Section 03 30 00         37       2) Clean-up         38       4. Ground Water Control </td <td>16</td> <td></td> <td>1) Imported fill shall only be paid when using materials for embedment and</td>	16		1) Imported fill shall only be paid when using materials for embedment and
18       and materials furnished in accordance with pre-bid item and measured as         19       provided under "Measurement" will be paid for at the unit price bid per         20       cubic yard of "Imported Embedment/Backfill" delivered to the Site for:         21       a) Various embedment/backfill materials         22       c. The price bid shall include:         23       1) Furnishing backfill or embedment as specified by this Specification         24       2) Hauling to the site         25       3) Placement and compaction of backfill or embedment         26       3. Concrete Encasement for Utility Lines         27       a. Measurement         28       1) Measured by the cubic yard per plan quantity.         29       b. Payment         30       10 Measured as provided under "Measurement" will be paid for at the unit price bid per cubic yard of "Concrete Encasement for Utility Lines" per plan quantity.         29       b. Payment         30       1) The work performed and materials furnished in accordance with this Item and measured as provided under "Measurement" will be paid for at the unit price bid per cubic yard of "Concrete Encasement for Utility Lines" per plan quantity.         34       c. The price bid shall include:         35       1) Furnishing, hauling, placing and finishing concrete in accordance with Section 03 30 00         37       2) Clean-up <t< td=""><td>17</td><td></td><td>backfill other than those identified in the Drawings. The work performed</td></t<>	17		backfill other than those identified in the Drawings. The work performed
19       provided under "Measurement" will be paid for at the unit price bid per cubic yard of "Imported Embedment/Backfill" delivered to the Site for:         21       a) Various embedment/backfill materials         22       c. The price bid shall include:         23       1) Furnishing backfill or embedment as specified by this Specification         24       2) Hauling to the site         25       3) Placement and compaction of backfill or embedment         26       3. Concrete Encasement for Utility Lines         27       a. Measurement         28       1) Measured by the cubic yard per plan quantity.         29       b. Payment         30       1) The work performed and materials furnished in accordance with this Item         31       and measured as provided under "Measurement" will be paid for at the unit         32       plan quantity.         34       c. The price bid shall include:         35       1) Furnishing, hauling, placing and finishing concrete in accordance with         36       section 03 30 00         37       2) Clean-up         38       4. Ground Water Control         40       1) Measurement shall be lump sum when a ground water control plan is specifically required by the Contract Documents.         42       b. Payment         33       1) Payment shall be per the	18		and materials furnished in accordance with pre-bid item and measured as
20       cubic yard of "Imported Embedment/Backfill" delivered to the Site for:         21       a) Various embedment/backfill materials         22       c. The price bid shall include:         23       1) Furnishing backfill or embedment as specified by this Specification         24       2) Hauling to the site         25       3) Placement and compaction of backfill or embedment         26       3. Concrete Encasement for Utility Lines         27       a. Measurement         28       1) Measured by the cubic yard per plan quantity.         29       b. Payment         30       1) The work performed and materials furnished in accordance with this Item         31       and measured as provided under "Measurement" will be paid for at the unit         32       price bid shall include:         33       plan quantity.         34       c. The price bid shall include:         35       1) Furnishing, hauling, placing and finishing concrete in accordance with         36       Section 03 30 00         37       2) Clean-up         38       4. Ground Water Control         41       b. Payment         42       b. Payment shall be lump sum when a ground water control plan is specifically required by the Contract Documents.         43       1) Measurement shall be pe	19		provided under "Measurement" will be paid for at the unit price bid per
21       a) Various embedment/backfill materials         22       c. The price bid shall include:         23       1) Furnishing backfill or embedment as specified by this Specification         24       2) Hauling to the site         25       3) Placement and compaction of backfill or embedment         26       3. Concrete Encasement for Utility Lines         27       a. Measurement         28       1) Measured by the cubic yard per plan quantity.         29       b. Payment         30       1) The work performed and materials furnished in accordance with this Item         31       and measured as provided under "Measurement" will be paid for at the unit         32       price bid per cubic yard of "Concrete Encasement for Utility Lines" per         33       plan quantity.         34       c. The price bid shall include:         35       1) Furnishing, hauling, placing and finishing concrete in accordance with         36       Section 03 30 00         37       2) Clean-up         38       4. Ground Water Control         39       a. Measurement         40       1) Measurement shall be lump sum when a ground water control plan is specifically required by the Contract Documents.         42       b. Payment         43       1) Payment shall be per the lum	20		cubic yard of "Imported Embedment/Backfill" delivered to the Site for:
22       c. The price bid shall include:         23       1) Furnishing backfill or embedment as specified by this Specification         24       2) Hauling to the site         25       3) Placement and compaction of backfill or embedment         26       3. Concrete Encasement for Utility Lines         27       a. Measurement         28       1) Measured by the cubic yard per plan quantity.         29       b. Payment         30       1) The work performed and materials furnished in accordance with this Item         31       and measured as provided under "Measurement" will be paid for at the unit         32       price bid per cubic yard of "Concrete Encasement for Utility Lines" per         33       plan quantity.         34       c. The price bid shall include:         35       1) Furnishing, hauling, placing and finishing concrete in accordance with         36       Section 03 30 00         37       2) Clean-up         38       4. Ground Water Control         39       a. Measurement         40       1) Measurement shall be lump sum when a ground water control plan is         41       specifically required by the Contract Documents.         42       b. Payment         43       1) Payment shall be per the lump sum price bid for "Ground Water Contro	21		a) Various embedment/backfill materials
<ol> <li>Furnishing backfill or embedment as specified by this Specification</li> <li>Hauling to the site</li> <li>Placement and compaction of backfill or embedment</li> <li>Concrete Encasement for Utility Lines</li> <li>Measurement</li> <li>Measured by the cubic yard per plan quantity.</li> <li>Payment</li> <li>The work performed and materials furnished in accordance with this Item and measured as provided under "Measurement" will be paid for at the unit price bid per cubic yard of "Concrete Encasement for Utility Lines" per plan quantity.</li> <li>The price bid shall include:</li> <li>Furnishing, hauling, placing and finishing concrete in accordance with Section 03 30 00</li> <li>Clean-up</li> <li>Ground Water Control</li> <li>Measurement</li> <li>Measurement</li> <li>Measurement</li> <li>Measurement</li> <li>Sectification 23 00</li> <li>Payment</li> <li>Sectification 23 00</li> <li>Payment</li> <li>Payment</li> <li>Hauling, hauling, placing and finishing concrete in accordance with Section 03 30 00</li> <li>Clean-up</li> <li>Ground Water Control</li> <li>Measurement shall be lump sum when a ground water control plan is specifically required by the Contract Documents.</li> <li>Payment</li> <li>Payment</li> <li>Payment</li> <li>Payment</li> <li>Payment</li> <li>Additional Testing</li> <li>Ground water control system installation</li> <li>Ground water control system operations and maintenance</li> <li>Disposal of water</li> </ol>	22		c. The price bid shall include:
24       2) Hauling to the site         25       3) Placement and compaction of backfill or embedment         26       3. Concrete Encasement for Utility Lines         27       a. Measured by the cubic yard per plan quantity.         28       1) Measured by the cubic yard per plan quantity.         29       b. Payment         30       1) The work performed and materials furnished in accordance with this Item         31       and measured as provided under "Measurement" will be paid for at the unit         32       price bid per cubic yard of "Concrete Encasement for Utility Lines" per         33       plan quantity.         34       c. The price bid shall include:         35       1) Furnishing, hauling, placing and finishing concrete in accordance with         36       Section 03 30 00         37       2) Clean-up         38       4. Ground Water Control         39       a. Measurement         40       1) Measurement shall be lump sum when a ground water control plan is         41       specifically required by the Contract Documents.         42       b. Payment         43       1) Payment shall be per the lump sum price bid for "Ground Water Control"         44       a) Submittals         45       a) Submittals         46 </td <td>23</td> <td></td> <td>1) Furnishing backfill or embedment as specified by this Specification</td>	23		1) Furnishing backfill or embedment as specified by this Specification
<ul> <li>3) Placement and compaction of backfill or embedment</li> <li>3. Concrete Encasement for Utility Lines <ul> <li>a. Measurement</li> <li>1) Measured by the cubic yard per plan quantity.</li> </ul> </li> <li>b. Payment <ul> <li>1) The work performed and materials furnished in accordance with this Item and measured as provided under "Measurement" will be paid for at the unit price bid per cubic yard of "Concrete Encasement for Utility Lines" per plan quantity.</li> <li>c. The price bid shall include: <ul> <li>1) Furnishing, hauling, placing and finishing concrete in accordance with Section 03 30 00</li> <li>2) Clean-up</li> </ul> </li> <li>38 4. Ground Water Control <ul> <li>a. Measurement shall be lump sum when a ground water control plan is specifically required by the Contract Documents.</li> <li>b. Payment</li> </ul> </li> <li>1) Payment shall be per the lump sum price bid for "Ground Water Control" including: <ul> <li>a. Submittals</li> <li>b. Payment</li> </ul> </li> </ul></li></ul>	24		2) Hauling to the site
<ul> <li>3. Concrete Encasement for Utility Lines <ol> <li>Measurement <ol> <li>Measured by the cubic yard per plan quantity.</li> </ol> </li> <li>b. Payment <ol> <li>The work performed and materials furnished in accordance with this Item and measured as provided under "Measurement" will be paid for at the unit price bid per cubic yard of "Concrete Encasement for Utility Lines" per plan quantity.</li> <li>c. The price bid shall include: <ol> <li>Furnishing, hauling, placing and finishing concrete in accordance with Section 03 30 00</li> <li>Clean-up</li> </ol> </li> <li>4. Ground Water Control <ol> <li>Measurement</li> <li>Measurement</li> <li>Measurement</li> </ol> </li> <li>Measurement <ol> <li>Measurement</li> <li>Measurement</li> <li>Measurement</li> <li>Measurement</li> </ol> </li> <li>1) Measurement shall be lump sum when a ground water control plan is specifically required by the Contract Documents.</li> <li>Payment</li> <li>Payment</li> <li>Submittals</li> <li>Additional Testing</li> <li>Ground water control system installation</li> <li>Ground water control system operations and maintenance</li> <li>Disposal of water</li> </ol> </li> </ol></li></ul>	25		3) Placement and compaction of backfill or embedment
<ul> <li>a. Measurement <ol> <li>Measured by the cubic yard per plan quantity.</li> </ol> </li> <li>b. Payment <ol> <li>The work performed and materials furnished in accordance with this Item and measured as provided under "Measurement" will be paid for at the unit price bid per cubic yard of "Concrete Encasement for Utility Lines" per plan quantity.</li> <li>c. The price bid shall include: <ol> <li>Furnishing, hauling, placing and finishing concrete in accordance with Section 03 30 00</li> <li>Clean-up</li> </ol> </li> <li>4. Ground Water Control <ol> <li>Measurement</li> <li>Measurement</li> <li>Measurement</li> </ol> </li> <li>Measurement shall be lump sum when a ground water control plan is specifically required by the Contract Documents.</li> <li>Payment <ol> <li>Payment</li> <li>Payment</li> <li>Payment</li> <li>Payment</li> <li>Control Testing</li> </ol> </li> </ol></li></ul>	26	3.	Concrete Encasement for Utility Lines
<ul> <li>1) Measured by the cubic yard per plan quantity.</li> <li>b. Payment</li> <li>1) The work performed and materials furnished in accordance with this Item and measured as provided under "Measurement" will be paid for at the unit price bid per cubic yard of "Concrete Encasement for Utility Lines" per plan quantity.</li> <li>c. The price bid shall include:</li> <li>1) Furnishing, hauling, placing and finishing concrete in accordance with Section 03 30 00</li> <li>2) Clean-up</li> <li>4. Ground Water Control <ul> <li>a. Measurement</li> <li>b. Payment</li> <li>c. The payment shall be lump sum when a ground water control plan is specifically required by the Contract Documents.</li> <li>b. Payment</li> <li>c. Payment</li> <li>d. Ground Water Control system installation</li> <li>d. Ground water control system operations and maintenance</li> <li>e. Disposal of water</li> </ul> </li> </ul>	27	0.	a. Measurement
<ul> <li>b. Payment</li> <li>and measured as provided under "Measurement" will be paid for at the unit price bid per cubic yard of "Concrete Encasement for Utility Lines" per plan quantity.</li> <li>c. The price bid shall include:</li> <li>Furnishing, hauling, placing and finishing concrete in accordance with Section 03 30 00</li> <li>Clean-up</li> <li>Ground Water Control</li> <li>Measurement</li> <li>Measurement shall be lump sum when a ground water control plan is specifically required by the Contract Documents.</li> <li>Payment</li> <li>Payment</li> <li>Payment</li> <li>Payment</li> <li>Control as Submittals</li> <li>Control and the perite bid for "Ground Water Control" including:</li> <li>Ground water control system installation</li> <li>Ground water control system operations and maintenance</li> <li>Disposal of water</li> </ul>	28		1) Measured by the cubic vard per plan quantity.
<ul> <li>1) The work performed and materials furnished in accordance with this Item and measured as provided under "Measurement" will be paid for at the unit price bid per cubic yard of "Concrete Encasement for Utility Lines" per plan quantity.</li> <li>c. The price bid shall include:</li> <li>1) Furnishing, hauling, placing and finishing concrete in accordance with Section 03 30 00</li> <li>2) Clean-up</li> <li>4. Ground Water Control</li> <li>a. Measurement</li> <li>1) Measurement shall be lump sum when a ground water control plan is specifically required by the Contract Documents.</li> <li>b. Payment</li> <li>1) Payment shall be per the lump sum price bid for "Ground Water Control" including:</li> <li>a) Submittals</li> <li>b) Additional Testing</li> <li>c) Ground water control system installation</li> <li>d) Ground water control system operations and maintenance</li> <li>e) Disposal of water</li> </ul>	29		b. Payment
31and measured as provided under "Measurement" will be paid for at the unit32price bid per cubic yard of "Concrete Encasement for Utility Lines" per33plan quantity.34c. The price bid shall include:351) Furnishing, hauling, placing and finishing concrete in accordance with36Section 03 30 00372) Clean-up384. Ground Water Control39a. Measurement401) Measurement shall be lump sum when a ground water control plan is specifically required by the Contract Documents.42b. Payment431) Payment shall be per the lump sum price bid for "Ground Water Control" including:44a) Submittals46b) Additional Testing c) Ground water control system installation48d) Ground water control system operations and maintenance e) Disposal of water	30		1) The work performed and materials furnished in accordance with this Item
<ul> <li>price bid per cubic yard of "Concrete Encasement for Utility Lines" per plan quantity.</li> <li>c. The price bid shall include: <ol> <li>Furnishing, hauling, placing and finishing concrete in accordance with Section 03 30 00</li> <li>Clean-up</li> </ol> </li> <li>4. Ground Water Control <ol> <li>Measurement</li> <li>Measurement shall be lump sum when a ground water control plan is specifically required by the Contract Documents.</li> <li>Payment</li> <li>Payment</li> <li>Payment shall be per the lump sum price bid for "Ground Water Control" including: <ol> <li>Ground water control system installation</li> <li>Ground water control system operations and maintenance</li> <li>Disposal of water</li> </ol> </li> </ol></li></ul>	31		and measured as provided under "Measurement" will be paid for at the unit
<ul> <li>plan quantity.</li> <li>c. The price bid shall include:</li> <li>i) Furnishing, hauling, placing and finishing concrete in accordance with Section 03 30 00</li> <li>2) Clean-up</li> <li>4. Ground Water Control <ul> <li>a. Measurement</li> <li>b. Measurement shall be lump sum when a ground water control plan is specifically required by the Contract Documents.</li> <li>b. Payment</li> <li>c) Payment shall be per the lump sum price bid for "Ground Water Control" including:</li> <li>a) Submittals</li> <li>b) Additional Testing</li> <li>c) Ground water control system installation</li> <li>d) Ground water control system operations and maintenance</li> <li>e) Disposal of water</li> </ul> </li> </ul>	32		price bid per cubic vard of "Concrete Encasement for Utility Lines" per
<ul> <li>c. The price bid shall include:</li> <li>1) Furnishing, hauling, placing and finishing concrete in accordance with Section 03 30 00</li> <li>2) Clean-up</li> <li>4. Ground Water Control <ul> <li>a. Measurement</li> <li>1) Measurement shall be lump sum when a ground water control plan is specifically required by the Contract Documents.</li> <li>b. Payment</li> <li>1) Payment shall be per the lump sum price bid for "Ground Water Control" including:</li> <li>a) Submittals</li> <li>b) Additional Testing</li> <li>c) Ground water control system installation</li> <li>d) Ground water control system operations and maintenance</li> <li>e) Disposal of water</li> </ul> </li> </ul>	33		plan quantity.
<ul> <li>1) Furnishing, hauling, placing and finishing concrete in accordance with Section 03 30 00</li> <li>2) Clean-up</li> <li>4. Ground Water Control <ul> <li>a. Measurement</li> <li>1) Measurement shall be lump sum when a ground water control plan is specifically required by the Contract Documents.</li> <li>b. Payment</li> <li>c) Payment shall be per the lump sum price bid for "Ground Water Control" including:</li> <li>a) Submittals</li> <li>b) Additional Testing</li> <li>c) Ground water control system installation</li> <li>d) Ground water control system operations and maintenance</li> <li>e) Disposal of water</li> </ul> </li> </ul>	34		c. The price bid shall include:
<ul> <li>Section 03 30 00</li> <li>Clean-up</li> <li>Ground Water Control <ul> <li>Measurement</li> <li>Measurement shall be lump sum when a ground water control plan is specifically required by the Contract Documents.</li> <li>Payment</li> <li>Payment</li> <li>Payment shall be per the lump sum price bid for "Ground Water Control" including: <ul> <li>a) Submittals</li> <li>b) Additional Testing</li> <li>c) Ground water control system installation</li> <li>d) Ground water control system operations and maintenance</li> <li>e) Disposal of water</li> </ul> </li> </ul></li></ul>	35		1) Furnishing, hauling, placing and finishing concrete in accordance with
<ul> <li>2) Clean-up</li> <li>4. Ground Water Control <ul> <li>a. Measurement</li> <li>1) Measurement shall be lump sum when a ground water control plan is specifically required by the Contract Documents.</li> <li>b. Payment</li> <li>c) Payment shall be per the lump sum price bid for "Ground Water Control" including: <ul> <li>a) Submittals</li> <li>b) Additional Testing</li> <li>c) Ground water control system installation</li> <li>d) Ground water control system operations and maintenance</li> <li>e) Disposal of water</li> </ul> </li> </ul></li></ul>	36		Section 03 30 00
<ul> <li>4. Ground Water Control</li> <li>a. Measurement</li> <li>h) Measurement shall be lump sum when a ground water control plan is specifically required by the Contract Documents.</li> <li>b. Payment</li> <li>b. Payment</li> <li>c) Payment shall be per the lump sum price bid for "Ground Water Control" including:</li> <li>a) Submittals</li> <li>b) Additional Testing</li> <li>c) Ground water control system installation</li> <li>d) Ground water control system operations and maintenance</li> <li>e) Disposal of water</li> </ul>	37		2) Clean-up
<ul> <li>a. Measurement</li> <li>a. Measurement</li> <li>a. Measurement shall be lump sum when a ground water control plan is specifically required by the Contract Documents.</li> <li>b. Payment</li> <li>c) Payment shall be per the lump sum price bid for "Ground Water Control" including:</li> <li>a) Submittals</li> <li>b) Additional Testing</li> <li>c) Ground water control system installation</li> <li>d) Ground water control system operations and maintenance</li> <li>e) Disposal of water</li> </ul>	38	Δ	Ground Water Control
<ul> <li>40</li> <li>40</li> <li>1) Measurement shall be lump sum when a ground water control plan is specifically required by the Contract Documents.</li> <li>42</li> <li>43</li> <li>43</li> <li>44</li> <li>45</li> <li>46</li> <li>47</li> <li>47</li> <li>48</li> <li>49</li> <li>47</li> <li>48</li> <li>49</li> <li>47</li> <li>44</li> <li>45</li> <li>46</li> <li>47</li> <li>47</li> <li>48</li> <li>49</li> <li>47</li> <li>47</li> <li>48</li> <li>49</li> <li>47</li> <li>47</li> <li>47</li> <li>47</li> <li>48</li> <li>49</li> <li>47</li> <li>47</li> <li>48</li> <li>49</li> <li>47</li> <li>48</li> <li>49</li> <li>47</li> <li>48</li> <li>49</li> <li>47</li> <li>47</li> <li>48</li> <li>49</li> <li>47</li> <li>47</li> <li>48</li> <li>49</li> <li>47</li> <li>47</li> <li>48</li> <li>49</li> <li>47</li> <li>48</li> <li>49</li> <li>47</li> <li>47</li> <li>48</li> <li>49</li> <li>47</li> <li>47</li> <li>48</li> <li>49</li> <li>47</li> <li>48</li> <li>49</li> <li>49</li> <li>49</li> <li>40</li> <li>41</li> <li>41</li> <li>42</li> <li>43</li> <li>44</li> <li>44</li> <li>45</li> <li>45</li> <li>46</li> <li>47</li> <li>47</li> <li>48</li> <li>49</li> <li>49</li> <li>49</li> <li>40</li> <li>41</li> <li>41</li> <li>42</li> <li>44</li> <li>45</li> <li>46</li> <li>47</li> <li>47</li> <li>47</li> <li>48</li> <li>49</li> <li>49</li> <li>49</li> <li>49</li> <li>49</li> <li>40</li> <li>40</li> <li>41</li> <li>41</li> <li>41</li> <li>42</li> <li>42</li> <li>44</li> <li>44</li> <li>45</li> <li>45</li> <li>46</li> <li>47</li> <li>47</li> <li>48</li> <li>49</li> <li>49</li> <li>49</li> <li>49</li> <li>49</li> <li>40</li> <li>40</li> <li>41</li> <li>41</li> <li>41</li> <li>42</li> <li>44</li> <li>45</li> <li>46</li> <li>47</li> <li>48</li> <li>49</li> <li>49</li> <li>49</li> <li>49</li> <li>49</li> <li>40</li> <li>40</li> <li>41</li> <li>41</li> <li>41</li> <li>42</li> <li>42</li> <li>44</li> <li>44</li></ul>	39	ч.	a Measurement
<ul> <li>1) Accounter of an observe of an observe of an observe of a ground water control pair is specifically required by the Contract Documents.</li> <li>42 b. Payment</li> <li>43 1) Payment shall be per the lump sum price bid for "Ground Water Control" including:</li> <li>44 a) Submittals</li> <li>46 b) Additional Testing</li> <li>47 c) Ground water control system installation</li> <li>48 d) Ground water control system operations and maintenance</li> <li>49 e) Disposal of water</li> </ul>	40		1) Measurement shall be lump sum when a ground water control plan is
<ul> <li>b. Payment</li> <li>b) Payment</li> <li>c) Payment shall be per the lump sum price bid for "Ground Water Control" including:</li> <li>a) Submittals</li> <li>b) Additional Testing</li> <li>c) Ground water control system installation</li> <li>d) Ground water control system operations and maintenance</li> <li>e) Disposal of water</li> </ul>	41		specifically required by the Contract Documents
<ul> <li>43</li> <li>43</li> <li>43</li> <li>44</li> <li>45</li> <li>45</li> <li>46</li> <li>46</li> <li>47</li> <li>47</li> <li>48</li> <li>48</li> <li>49</li> <li>47</li> <li>48</li> <li>49</li> <li>49</li> <li>49</li> <li>41</li> <li>41</li> <li>42</li> <li>43</li> <li>44</li> <li>45</li> <li>45</li> <li>46</li> <li>47</li> <li>48</li> <li>49</li> &lt;</ul>	42		h Payment
<ul> <li>44 including:</li> <li>45 a) Submittals</li> <li>46 b) Additional Testing</li> <li>47 c) Ground water control system installation</li> <li>48 d) Ground water control system operations and maintenance</li> <li>49 e) Disposal of water</li> </ul>	43		1) Payment shall be per the lump sum price bid for "Ground Water Control"
<ul> <li>45 a) Submittals</li> <li>46 b) Additional Testing</li> <li>47 c) Ground water control system installation</li> <li>48 d) Ground water control system operations and maintenance</li> <li>49 e) Disposal of water</li> </ul>	44		including.
<ul> <li>46</li> <li>46</li> <li>47</li> <li>47</li> <li>48</li> <li>48</li> <li>49</li> <li>49</li> <li>49</li> <li>40</li> <li>41</li> <li>42</li> <li>43</li> <li>44</li> <li>44</li> <li>44</li> <li>45</li> <li>46</li> <li>47</li> <li>48</li> <li>49</li> <li>48</li> <li>49</li> <li>40</li> <li>40</li> <li>40</li> <li>41</li> <li>41</li> <li>42</li> <li>43</li> <li>44</li> <li>44</li> <li>44</li> <li>45</li> <li>46</li> <li>47</li> <li>48</li> <li>49</li> &lt;</ul>	45		a) Submittals
<ul> <li>47</li> <li>48</li> <li>49</li> <li>b) Findmining Feeding</li> <li>c) Ground water control system installation</li> <li>d) Ground water control system operations and maintenance</li> <li>e) Disposal of water</li> </ul>	46		b) Additional Testing
<ul> <li>48</li> <li>49</li> <li>49</li> <li>49</li> <li>40</li> <li>41</li> <li>41</li> <li>42</li> <li>43</li> <li>44</li> <li>44</li> <li>44</li> <li>45</li> <li>44</li> <li>44</li> <li>44</li> <li>45</li> <li>44</li> <li>44</li> <li>45</li> <li>45</li> <li>46</li> <li>46</li> <li>47</li> <li>48</li> <li>49</li> &lt;</ul>	47		c) Ground water control system installation
49 e) Disposal of water	48		d) Ground water control system operations and maintenance
	49		e) Disposal of water

1	f) Removal of ground water control system
2	5. Trench Safety
3	a. Measurement
4	1) Measured per linear foot of excavation for all trenches that require trench
5	safety in accordance with OSHA excavation safety standards (29 CFR Part
6	1926 Subpart P Safety and Health regulations for Construction)
7	b. Payment
8	1) The work performed and materials furnished in accordance with this Item
9	and measured as provided under "Measurement" will be paid for at the unit
10	price bid per linear foot of excavation to comply with OSHA excavation
11	safety standards (29 CFR Part 1926.650 Subpart P), including, but not
12	limited to, all submittals, labor and equipment.
13	1.3 REFERENCES
14	A. Definitions
15	1. General – Definitions used in this section are in accordance with Terminologies
16	ASTM F412 and ASTM D8 and Terminology ASTM D653, unless otherwise
17	noted.
18	2. Definitions for trench width, backfill, embedment, initial backfill, pipe zone,
19	haunching bedding, springline, pipe zone and foundation are defined as shown in
20	the following schematic:



21

1 2			3.	Deleterious materials – Harmful materials such as clay lumps, silts and organic material
3 1			4.	Excavated Trench Depth – Distance from the surface to the bottom of the bedding or the trench foundation
4 5			5	Final Backfill Danth
5 6			5.	a Unpaved Areas – The depth of the final backfill measured from the top of the
7				initial backfill to the surface
8				b. Paved Areas – The depth of the final backfill measured from the top of the
9				initial backfill to bottom of permanent or temporary pavement repair
10		B.	Re	ference Standards
11			1.	Reference standards cited in this Specification refer to the current reference
12				standard published at the time of the latest revision date logged at the end of this
13			_	Specification, unless a date is specifically cited.
14			2.	ASTM Standards:
15				a. ASTM C33-08 Standard Specifications for Concrete Aggregates
16				b. ASTM C88-05 Soundness of Aggregate by Use of Sodium Sulfate or
17				Magnesium Sulfate
18				c. ASTM C136-01 Test Method for Sieve Analysis of Fine and Coarse Aggregate
19				d. ASTM D448-08 Standard Classification for Sizes of Aggregate for Road and
20				Bridge Construction.
21				e. ASTM CSSS-09 Standard Test Method for Resistance to Degradation of Large-
22				f ASTM D588 Standard Test method for Moisture Density Polations of Soil
23				1. AS I W D588 – Standard Test method for Wolsture-Density Relations of Soli- Comment Mixture
24 25				a ASTM D698-07 Test Method for Laboratory Compaction Characteristics of
26				Soil Using Stand Efforts (12 400 ft-lb/ft3 600 Kn-m/M3))
27				h. ASTM 1556 Standard Test Methods for Density and Unit Weight of Soils in
28				Place by Sand Cone Method.
29				i. ASTM 2487 – 10 Standard Classification of Soils for Engineering Purposes
30				(Unified Soil Classification System)
31				j. ASTM 2321-09 Underground Installation of Thermoplastic Pipe for Sewers
32				and Other Gravity-Flow Applications
33				k. ASTM D2922 - Standard Test Methods for Density of Soils and Soil
34				Aggregate in Place by Nuclear Methods (Shallow Depth)
35				1. ASTM 3017 - Standard Test Method for Water Content of Soil and Rock in
36				place by Nuclear Methods (Shallow Depth)
37				m. ASTM D4254 - Standard Test Method for Minimum Index Density and Unit
38				Weight of Soils and Calculations of Relative Density
39			3.	OSHA
40				a. Occupational Safety and Health Administration CFR 29, Part 1926-Safety
41				Regulations for Construction, Subpart P - Excavations
42	1.4	AI	)MI	NISTRATIVE REQUIREMENTS
43		A.	Co	ordination
44			1.	Utility Company Notification
45				a. Notify area utility companies at least 48 hours in advance, excluding weekends
46				and holidays, before starting excavation.

1 2			b. Request the location of buried lines and cables in the vicinity of the proposed work.
3		B.	Sequencing
4 5			1. Sequence work for each section of the pipe installed to complete the embedment and backfill placement on the day the pipe foundation is complete.
6 7			2. Sequence work such that proctors are complete in accordance with ASTM D698 prior to commencement of construction activities.
8	1.5	SUB	BMITTALS
9		A.	Submittals shall be in accordance with Section 01 33 00.
10		<b>B</b> .	All submittals shall be approved by the City prior to construction.
11	1.6	AC	TION SUBMITTALS/INFORMATIONAL SUBMITTALS
12		A.	Shop Drawings
13 14			1. Provide detailed drawings and explanation for ground water and surface water control, if required.
15 16 17			<ol> <li>Trench Safety Plan in accordance with Occupational Safety and Health Administration CFR 29, Part 1926-Safety Regulations for Construction, Subpart P - Excavations</li> </ol>
18 19 20 21			<ol> <li>Stockpiled excavation and/or backfill material         <ol> <li>Provide a description of the storage of the excavated material only if the                 Contract Documents do not allow storage of materials in the right-of-way of the                 easement</li> </ol> </li> </ol>
<u>~1</u>			cusoment.
22	1.7	CLO	DSEOUT SUBMITTALS [NOT USED]
22 23	1.7 1.8	CLO MA	DSEOUT SUBMITTALS [NOT USED] INTENANCE MATERIAL SUBMITTALS [NOT USED]
22 22 23 24	1.7 1.8 1.9	CLO MA QU	DSEOUT SUBMITTALS [NOT USED] INTENANCE MATERIAL SUBMITTALS [NOT USED] ALITY ASSURANCE [NOT USED]
22 23 24 25	1.7 1.8 1.9 1.10	CLO MA QU DEI	DSEOUT SUBMITTALS [NOT USED] INTENANCE MATERIAL SUBMITTALS [NOT USED] ALITY ASSURANCE [NOT USED] JVERY, STORAGE, AND HANDLING
22 22 23 24 25 26	1.7 1.8 1.9 1.10	CLO MAX QUA DEI A.	DSEOUT SUBMITTALS [NOT USED] INTENANCE MATERIAL SUBMITTALS [NOT USED] ALITY ASSURANCE [NOT USED] LIVERY, STORAGE, AND HANDLING Storage
22 22 23 24 25 26 27	1.7 1.8 1.9 1.10	CLO MA QU DEI A.	DSEOUT SUBMITTALS [NOT USED] INTENANCE MATERIAL SUBMITTALS [NOT USED] ALITY ASSURANCE [NOT USED] JVERY, STORAGE, AND HANDLING Storage 1. Within Existing Rights-of-Way (ROW)
22 23 24 25 26 27 28	1.7 1.8 1.9 1.10	CLO MAX QUA DEI A.	DSEOUT SUBMITTALS [NOT USED] INTENANCE MATERIAL SUBMITTALS [NOT USED] ALITY ASSURANCE [NOT USED] LIVERY, STORAGE, AND HANDLING Storage 1. Within Existing Rights-of-Way (ROW) a. Spoil, imported embedment and backfill materials may be stored within
22 22 23 24 25 26 27 28 29	1.7 1.8 1.9 1.10	CLO MAX QUA DEI A.	<ul> <li>DSEOUT SUBMITTALS [NOT USED]</li> <li>INTENANCE MATERIAL SUBMITTALS [NOT USED]</li> <li>ALITY ASSURANCE [NOT USED]</li> <li>JVERY, STORAGE, AND HANDLING</li> <li>Storage</li> <li>1. Within Existing Rights-of-Way (ROW) <ul> <li>a. Spoil, imported embedment and backfill materials may be stored within existing ROW, easements or temporary construction easements, unless</li> </ul> </li> </ul>
22 22 23 24 25 26 27 28 29 30 21	1.7 1.8 1.9 1.10	CLO MAX QUA DEI A.	<ul> <li>DSEOUT SUBMITTALS [NOT USED]</li> <li>INTENANCE MATERIAL SUBMITTALS [NOT USED]</li> <li>ALITY ASSURANCE [NOT USED]</li> <li>JVERY, STORAGE, AND HANDLING</li> <li>Storage</li> <li>1. Within Existing Rights-of-Way (ROW) <ul> <li>a. Spoil, imported embedment and backfill materials may be stored within existing ROW, easements or temporary construction easements, unless specifically disallowed in the Contract Documents.</li> </ul> </li> </ul>
22 22 23 24 25 26 27 28 29 30 31 22	1.7 1.8 1.9 1.10	CLO MAX QUA DEI A.	<ul> <li>DSEOUT SUBMITTALS [NOT USED]</li> <li>INTENANCE MATERIAL SUBMITTALS [NOT USED]</li> <li>ALITY ASSURANCE [NOT USED]</li> <li>LIVERY, STORAGE, AND HANDLING</li> <li>Storage</li> <li>1. Within Existing Rights-of-Way (ROW) <ul> <li>a. Spoil, imported embedment and backfill materials may be stored within existing ROW, easements or temporary construction easements, unless specifically disallowed in the Contract Documents.</li> <li>b. Do not block drainage ways, inlets or driveways.</li> <li>a. Bravide arcsion apartrel in generated and set Specifically 21 25 00</li> </ul> </li> </ul>
22 22 23 24 25 26 27 28 29 30 31 32 33	1.7 1.8 1.9 1.10	CLO MA QU DEI A.	<ul> <li>DSEOUT SUBMITTALS [NOT USED]</li> <li>INTENANCE MATERIAL SUBMITTALS [NOT USED]</li> <li>ALITY ASSURANCE [NOT USED]</li> <li>JVERY, STORAGE, AND HANDLING</li> <li>Storage</li> <li>1. Within Existing Rights-of-Way (ROW) <ul> <li>a. Spoil, imported embedment and backfill materials may be stored within existing ROW, easements or temporary construction easements, unless specifically disallowed in the Contract Documents.</li> <li>b. Do not block drainage ways, inlets or driveways.</li> <li>c. Provide erosion control in accordance with Section 31 25 00.</li> </ul> </li> </ul>
22 22 23 24 25 26 27 28 29 30 31 32 33 34	1.7 1.8 1.9 1.10	CLO MAX QUA DEI A.	<ul> <li>DSEOUT SUBMITTALS [NOT USED]</li> <li>INTENANCE MATERIAL SUBMITTALS [NOT USED]</li> <li>ALITY ASSURANCE [NOT USED]</li> <li>JVERY, STORAGE, AND HANDLING</li> <li>Storage</li> <li>1. Within Existing Rights-of-Way (ROW) <ul> <li>a. Spoil, imported embedment and backfill materials may be stored within existing ROW, easements or temporary construction easements, unless specifically disallowed in the Contract Documents.</li> <li>b. Do not block drainage ways, inlets or driveways.</li> <li>c. Provide erosion control in accordance with Section 31 25 00.</li> <li>d. Store materials only in areas barricaded as provided in the traffic control plans.</li> </ul> </li> </ul>
22 22 23 24 25 26 27 28 29 30 31 32 33 34 35	1.7 1.8 1.9 1.10	CLO MAX QUA DEI A.	<ul> <li>DSEOUT SUBMITTALS [NOT USED]</li> <li>INTENANCE MATERIAL SUBMITTALS [NOT USED]</li> <li>ALITY ASSURANCE [NOT USED]</li> <li>JVERY, STORAGE, AND HANDLING</li> <li>Storage</li> <li>1. Within Existing Rights-of-Way (ROW) <ul> <li>a. Spoil, imported embedment and backfill materials may be stored within existing ROW, easements or temporary construction easements, unless specifically disallowed in the Contract Documents.</li> <li>b. Do not block drainage ways, inlets or driveways.</li> <li>c. Provide erosion control in accordance with Section 31 25 00.</li> <li>d. Store materials only in areas barricaded as provided in the traffic control plans.</li> <li>e. In non-paved areas, do not store material on the root zone of any trees or in landscaped areas.</li> </ul> </li> </ul>
22 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36	1.7 1.8 1.9 1.10	CLO MA QU DEI A.	<ul> <li>DSEOUT SUBMITTALS [NOT USED]</li> <li>INTENANCE MATERIAL SUBMITTALS [NOT USED]</li> <li>ALITY ASSURANCE [NOT USED]</li> <li>JVERY, STORAGE, AND HANDLING</li> <li>Storage</li> <li>1. Within Existing Rights-of-Way (ROW) <ul> <li>a. Spoil, imported embedment and backfill materials may be stored within existing ROW, easements or temporary construction easements, unless specifically disallowed in the Contract Documents.</li> <li>b. Do not block drainage ways, inlets or driveways.</li> <li>c. Provide erosion control in accordance with Section 31 25 00.</li> <li>d. Store materials only in areas barricaded as provided in the traffic control plans.</li> <li>e. In non-paved areas, do not store material on the root zone of any trees or in landscaped areas.</li> </ul> </li> </ul> <li>2. Designated Storage Areas</li>
22 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37	1.7 1.8 1.9 1.10	CLO MAX QUA DEI A.	<ul> <li>DSEOUT SUBMITTALS [NOT USED]</li> <li>INTENANCE MATERIAL SUBMITTALS [NOT USED]</li> <li>ALITY ASSURANCE [NOT USED]</li> <li>JVERY, STORAGE, AND HANDLING</li> <li>Storage</li> <li>1. Within Existing Rights-of-Way (ROW) <ul> <li>a. Spoil, imported embedment and backfill materials may be stored within existing ROW, easements or temporary construction easements, unless specifically disallowed in the Contract Documents.</li> <li>b. Do not block drainage ways, inlets or driveways.</li> <li>c. Provide erosion control in accordance with Section 31 25 00.</li> <li>d. Store materials only in areas barricaded as provided in the traffic control plans.</li> <li>e. In non-paved areas, do not store material on the root zone of any trees or in landscaped areas.</li> </ul> </li> <li>2. Designated Storage Areas <ul> <li>a. If the Contract Documents do not allow the storage of spoils, embedment or</li> </ul> </li> </ul>
22 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38	1.7 1.8 1.9 1.10	CLO MAX QUA DEI A.	<ul> <li>DSEOUT SUBMITTALS [NOT USED]</li> <li>INTENANCE MATERIAL SUBMITTALS [NOT USED]</li> <li>ALITY ASSURANCE [NOT USED]</li> <li>JVERY, STORAGE, AND HANDLING</li> <li>Storage</li> <li>1. Within Existing Rights-of-Way (ROW) <ul> <li>a. Spoil, imported embedment and backfill materials may be stored within existing ROW, easements or temporary construction easements, unless specifically disallowed in the Contract Documents.</li> <li>b. Do not block drainage ways, inlets or driveways.</li> <li>c. Provide erosion control in accordance with Section 31 25 00.</li> <li>d. Store materials only in areas barricaded as provided in the traffic control plans.</li> <li>e. In non-paved areas, do not store material on the root zone of any trees or in landscaped areas.</li> </ul> </li> <li>2. Designated Storage Areas <ul> <li>a. If the Contract Documents do not allow the storage of spoils, embedment or backfill materials within the ROW, easement or temporary construction</li> </ul> </li> </ul>
22 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39	1.7 1.8 1.9 1.10	CLO MA QU DEI A.	<ul> <li>DSEOUT SUBMITTALS [NOT USED]</li> <li>INTENANCE MATERIAL SUBMITTALS [NOT USED]</li> <li>ALITY ASSURANCE [NOT USED]</li> <li>JVERY, STORAGE, AND HANDLING</li> <li>Storage</li> <li>1. Within Existing Rights-of-Way (ROW) <ul> <li>a. Spoil, imported embedment and backfill materials may be stored within existing ROW, easements or temporary construction easements, unless specifically disallowed in the Contract Documents.</li> <li>b. Do not block drainage ways, inlets or drivew ays.</li> <li>c. Provide erosion control in accordance with Section 31 25 00.</li> <li>d. Store materials only in areas barricaded as provided in the traffic control plans.</li> <li>e. In non-paved areas, do not store material on the root zone of any trees or in landscaped areas.</li> </ul> </li> <li>2. Designated Storage Areas <ul> <li>a. If the Contract Documents do not allow the storage of spoils, embedment or backfill materials within the ROW, easement or temporary construction easement, then secure and maintain an adequate storage location.</li> </ul> </li> </ul>
22 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40	1.7 1.8 1.9 1.10	CLO MA QU DEI A.	<ul> <li>DSEOUT SUBMITTALS [NOT USED]</li> <li>INTENANCE MATERIAL SUBMITTALS [NOT USED]</li> <li>ALITY ASSURANCE [NOT USED]</li> <li>JVERY, STORAGE, AND HANDLING</li> <li>Storage</li> <li>1. Within Existing Rights-of-Way (ROW) <ul> <li>a. Spoil, imported embedment and backfill materials may be stored within existing ROW, easements or temporary construction easements, unless specifically disallowed in the Contract Documents.</li> <li>b. Do not block drainage ways, inlets or driveways.</li> <li>c. Provide erosion control in accordance with Section 31 25 00.</li> <li>d. Store materials only in areas barricaded as provided in the traffic control plans.</li> <li>e. In non-paved areas, do not store material on the root zone of any trees or in landscaped areas.</li> </ul> </li> <li>2. Designated Storage Areas <ul> <li>a. If the Contract Documents do not allow the storage of spoils, embedment or backfill materials within the ROW, easement or temporary construction easement, then secure and maintain an adequate storage location.</li> <li>b. Provide an affidavit that rights have been secured to store the materials on</li> </ul> </li> </ul>
22 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41	1.7 1.8 1.9 1.10	CLO MAX QU/ DEI A.	<ul> <li>DSEOUT SUBMITTALS [NOT USED]</li> <li>INTENANCE MATERIAL SUBMITTALS [NOT USED]</li> <li>ALITY ASSURANCE [NOT USED]</li> <li>JVERY, STORAGE, AND HANDLING</li> <li>Storage</li> <li>1. Within Existing Rights-of-Way (ROW) <ul> <li>a. Spoil, imported embedment and backfill materials may be stored within existing ROW, easements or temporary construction easements, unless specifically disallowed in the Contract Documents.</li> <li>b. Do not block drainage ways, inlets or driveways.</li> <li>c. Provide erosion control in accordance with Section 31 25 00.</li> <li>d. Store materials only in areas barricaded as provided in the traffic control plans.</li> <li>e. In non-paved areas, do not store material on the root zone of any trees or in landscaped areas.</li> </ul> </li> <li>2. Designated Storage Areas <ul> <li>a. If the Contract Documents do not allow the storage of spoils, embedment or backfill materials within the ROW, easement or temporary construction easement, then secure and maintain an adequate storage location.</li> <li>b. Provide an affidavit that rights have been secured to store the materials on private property.</li> </ul> </li> </ul>

- d. Do not block drainage ways.
  - e. Only materials used for 1 working day will be allowed to be stored in the work zone.
- 4 B. Deliveries and haul-off Coordinate all deliveries and haul-off.

# 5 1.11 FIELD [SITE] CONDITIONS

6 A. Existing Conditions

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- Any data which has been or may be provided on subsurface conditions is not intended as a representation or warranty of accuracy or continuity between soils. It is expressly understood that neither the City nor the Engineer will be responsible for interpretations or conclusions drawn there from by the Contractor.
- 11 2. Data is made available for the convenience of the Contractor.

## 12 1.12 WARRANTY [NOT USED]

13 PART 2 - PRODUCTS

## 14 2.1 OWNER-FURNISHED [OR] OWNER-SUPPLIED PRODUCTS

#### 15 2.2 MATERIALS

16 A. Materials

#### 1. Utility Sand

- a. Granular and free flowing
- b. Generally meets or exceeds the limits on deleterious substances per Table 1 for fine aggregate according to ASTM C 33
  - c. Reasonably free of organic material
- d. Gradation: sand material consisting of durable particles, free of thin or
  elongated pieces, lumps of clay, loam or vegetable matter and meets the
  following gradation may be used for utility sand embedment/backfill

Sieve Size	Percent <u>Retained</u>
1⁄2"	0
1/4"	0-5
#4	0-10
#16	0-20
#50	20-70
#100	60-90
#200	90-100

- 26 27 The City has a pre-approved list of sand sources for utility embedment. The e. pre-approved list can be found on the City website, Project Resources page. 28 29 The utility sand sources in the pre-approved list have demonstrated continued 30 quality and uniformity on City of Fort Worth projects. Sand from these sources are pre-approved for use on City projects without project specific testing. 31 32 2. Crushed Rock a. Durable crushed rock or recycled concrete 33
  - b. Meets the gradation of ASTM D448 size numbers 56, 57 or 67

1		c. May be unwashed
2		d. Free from significant silt clay or unsuitable materials
3		e. Percentage of wear not more than 40 percent per ASTM C131 or C535
4		f. Not more than a 12 percent maximum loss when subjective to 5 cycles of
5		sodium sulfate soundness per ASTM C88
6	3	Fine Crushed Rock
7	5.	a Durable crushed rock
8		h Meets the gradation of ASTM D448 size numbers 8 or 89
9		c May be unwashed
10		d Free from significant silt clay or unsuitable materials
11		e Have a percentage of wear not more than 40 percent per ASTM C131 or C535
12		f Not more than a 12 percent maximum loss when subjective to 5 cycles of
12		sodium sulfate soundness per ASTM C88
1.4	4	
14	4.	Ballast Stone
15		a. Stone ranging from 3 inches to 6 inches in greatest dimension.
16		b. May be unwashed
1/		c. Free from significant silt clay or unsuitable materials
18		d. Percentage of wear not more than 40 percent per ASTM C131 or C535
19		e. Not more than a 12 percent maximum loss when subjected to 5 cycles of
20		sodium sulfate soundness per ASTM C88
21	5.	Acceptable Backfill Material
22		a. In-situ or imported soils classified as CL, CH, SC or GC in accordance with
23		ASTM D2487
24		b. Free from deleterious materials, boulders over 6 inches in size and organics
25		c. Can be placed free from voids
26		d. Must have 20 percent passing the number 200 sieve
27	6.	Blended Backfill Material
28		a. In-situ soils classified as SP, SM, GP or GM in accordance with ASTM D2487
29		b. Blended with in-situ or imported acceptable backfill material to meet the
30		requirements of an Acceptable Backfill Material
31		c. Free from deleterious materials, boulders over 6 inches in size and organics
32		d. Must have 20 percent passing the number 200 sieve
33	7	Unaccentable Backfill Material
34	7.	a In-situ soils classified as ML MH PT OL or OH in accordance with ASTM
35		D2487
26	0	Soloot Fill
30 27	ð.	Select Fill Classified as SC or CL in accordance with ASTM D2487
57 29		a. Classified as SC of CL in accordance with ASTIVI D2467
30 20		D. Elquid limit less than 55 a. Dissibility index between 8 and 20
39	_	c. Plasticity index between 8 and 20
40	9.	Cement Stabilized Sand (CSS)
41		a. Sand
42		1) Shall be clean, durable sand meeting grading requirements for fine
43		aggregates of ASTM C33 and the following requirements:
44		a) Classified as SW, SP, or SM by the United Soil Classification System
45		of ASTM D2487
46		b) Deleterious materials
47		(1) Clay lumps, ASTM C142, less than 0.5 percent
48		(2) Lightweight pieces, ASTM C123, less than 5.0 percent

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1	(3) Organic impurities, ASTM C40, color no darker than standard
2	color
3	(4) Plasticity index of 4 or less when tested in accordance with ASTM
4	D4318.
5	b. Minimum of 4 percent cement content of Type I/II portland cement
6	c. Water
7	1) Potable water, free of soils, acids, alkalis, organic matter or other
8	deleterious substances, meeting requirements of ASTM C94
9	d. Mix in a stationary pug mill, weigh-batch or continuous mixing plant.
10	e. Strength
11	1) 50 to 150 psi compressive strength at 2 days in accordance with ASTM
12	D1633, Method A
13	2) 200 to 250 psi compressive strength at 28 days in accordance with ASTM
14	D1633, Method A
15	3) The maximum compressive strength in / days shall be 400 psi. Backfill
16	that exceeds the maximum compressive strength shall be removed by the
17	Contractor for no additional compensation.
18	f. Random samples of delivered product will be taken in the field at point of
19	delivery for each day of placement in the work area. Specimens will be prepared
20	in accordance with ASTM D1632.
21	10. Controlled Low Strength Material (CLSM)
22	a. Conform to Section 03 34 13
23	11. Trench Geotextile Fabric
24	a. Soils other than ML or OH in accordance with ASTM D2487
25	1) Needle punch, nonwoven geotextile composed of polypropylene fibers
26	2) Fibers shall retain their relative position
27	3) Inert to biological degradation
28	4) Resist naturally occurring chemicals
29	5) UV Resistant
30	6) Mirafi 140N by Tencate, or approved equal
31	b. Soils Classified as ML or OH in accordance with ASTM D2487
32	1) High-tenacity monofilament polypropylene woven yarn
33	2) Percent open area of 8 percent to10 percent
34	3) Fibers shall retain their relative position
35	4) Inert to biological degradation
36	5) Resist naturally occurring chemicals
37	6) UV Resistant
38	7) Mirafi FW402 by Tencate, or approved equal
39	12. Concrete Encasement
40	a. Conform to Section 03 30 00.

1 2.3 ACCESSORIES [NOT USED] 2.4 SOURCE QUALITY CONTROL [NOT USED] 2 PART 3 - EXECUTION 3 4 3.1 INSTALLERS [NOT USED] 5 3.2 EXAMINATION A. Verification of Conditions 6 7 1. Review all known, identified or marked utilities, whether public or private, prior to 8 excavation. 2. Locate and protect all known, identified and marked utilities or underground 9 facilities as excavation progresses. 10 11 3. Notify all utility owners within the project limits 48 hours prior to beginning excavation. 12 4. The information and data shown in the Drawings with respect to utilities is 13 14 approximate and based on record information or on physical appurtenances observed within the project limits. 15 5. Coordinate with the Owner(s) of underground facilities. 16 17 6. Immediately notify any utility owner of damages to underground facilities resulting 18 from construction activities. 7. Repair any damages resulting from the construction activities. 19 B. Notify the City immediately of any changed condition that impacts excavation and 20 installation of the proposed utility. 21 22 3.3 PREPARATION A. Protection of In-Place Conditions 23 24 1. Pavement 25 a. Conduct activities in such a way that does not damage existing pavement that is 26 designated to remain. 1) Where desired to move equipment not licensed for operation on public 27 roads or across pavement, provide means to protect the pavement from all 28 damage. 29 b. Repair or replace any pavement damaged due to the negligence of the 30 31 contractor outside the limits designated for pavement removal at no additional 32 cost to the City. 33 2. Drainage 34 a. Maintain positive drainage during construction and re-establish drainage for all swales and culverts affected by construction. 35 36 3. Trees 37 a. When operating outside of existing ROW, stake permanent and temporary 38 construction easements. b. Restrict all construction activities to the designated easements and ROW. 39 40 c. Flag and protect all trees designated to remain in accordance with Section 31 10 00. 41

- 10 UTILITY TRENCH EXCAVATION, EMBEDMENT, AND BACKFILL Page 10 of 21

1 2				d. Conduct excavation, embedment and backfill in a manner such that there is no damage to the tree canopy
3				e. Prune or trim tree limbs as specifically allowed by the Drawings or as
4				specifically allowed by the City.
5				1) Pruning or trimming may only be accomplished with equipments
6 7				specifically designed for tree pruning or trimming.
8				accordance with Section 31 10 00.
9			4.	Above ground Structures
10				a. Protect all above ground structures adjacent to the construction.
11 12				b. Remove above ground structures designated for removal in the Drawings in accordance with Section 02 41 13
13			5.	Traffic
14 15				a. Maintain existing traffic, except as modified by the traffic control plan, and in accordance with Section 34 71 13.
16 17				<ul> <li>b. Do not block access to driveways or alleys for extended periods of time unless:</li> <li>1) Alternative access has been provided</li> </ul>
18				2) Proper notification has been provided to the property owner or resident
19				3) It is specifically allowed in the traffic control plan
20				c. Use traffic rated plates to maintain access until access is restored.
21			6.	Traffic Signal-Poles, Mast Arms, Pull boxes, Detector loops
22				a. Notify the City's Transportation Management Division a minimum of 48 hours
23 24				prior to any excavation that could impact the operations of an existing traffic signal.
25 26				b. Protect all traffic signal poles, mast arms, pull boxes, traffic cabinets, conduit and detector loops
27				c. Immediately notify the City's Transportation Management Division if any
28				damage occurs to any component of the traffic signal due to the contractors
29				activities.
30 31				d. Repair any damage to the traffic signal poles, mast arms, pull boxes, traffic cabinets, conduit and detector loops as a result of the construction activities.
32			7.	Fences
33				a. Protect all fences designated to remain.
34				b. Leave fence in the equal or better condition as prior to construction.
35	3.4	IN	STA	LLATION
36		A.	Exc	cavation
37			1.	Excavate to a depth indicated on the Drawings.
38			2.	Trench excavations are defined as unclassified. No additional payment shall be
39				granted for rock or other in-situ materials encountered in the trench.
40 41			3.	Excavate to a width sufficient for laying the pipe in accordance with the Drawings and bracing in accordance with the Excavation Safety Plan.
42			4.	The bottom of the excavation shall be firm and free from standing water.
43				a. Notify the City immediately if the water and/or the in-situ soils do not provide
44				for a firm trench bottom.
45				b. The City will determine if any changes are required in the pipe foundation or
46				bedding.

1 2 3		5.	Unless otherwise permitted by the Drawings or by the City, the limits of the excavation shall not advance beyond the pipe placement so that the trench may be backfilled in the same day.
4		6.	Over Excavation
5			a. Fill over excavated areas with the specified bedding material as specified for
6 7			the specific pipe to be installed.
8			material
9		7	Unaccentable Backfill Materials
10		/.	a. In-situ soils classified as unacceptable backfill material shall be separated from
11			acceptable backfill materials.
12			b. If the unacceptable backfill material is to be blended in accordance with this
13			Specification, then store material in a suitable location until the material is
14			blended.
15			c. Remove all unacceptable material from the project site that is not intended to be
10		0	Deale. No additional componentian will be noted for neal evenuation or other
17		ð.	changed field conditions.
19	B.	Sho	oring, Sheeting and Bracing
20		1.	Engage a Licensed Professional Engineer in the State of Texas to design a site
21			specific excavation safety system in accordance with Federal and State
22			requirements.
23 24		2.	Excavation protection systems shall be designed according to the space limitations as indicated in the Drawings.
25 26		3.	Furnish, put in place and maintain a trench safety system in accordance with the Excavation Safety Plan and required by Federal, State or local safety requirements.
27		4.	If soil or water conditions are encountered that are not addressed by the current
28			Excavation Safety Plan, engage a Licensed Professional Engineer in the State of
29 20			Texas to modify the Excavation Safety Plan and provide a revised submittal to the
30		_	City.
31		5.	Do not allow soil, or water containing soil, to migrate through the Excavation
32 22			Safety System in sufficient quantities to adversely affect the suitability of the
33 34			used to support the sides of the trench excavation shall not:
35			a. Disturb the embedment located in the pipe zone or lower
36			b. Alter the pipe's line and grade after the Excavation Protection System is
37			removed
38			c. Compromise the compaction of the embedment located below the spring line of
39			the pipe and in the haunching
40	C.	Wa	iter Control
41		1.	Surface Water
42			a. Furnish all materials and equipment and perform all incidental work required to
43			direct surface water away from the excavation.
44		2.	Ground Water
45			a. Furnish all materials and equipment to dewater ground water by a method
46			which preserves the undisturbed state of the subgrade soils.
4/			b. Do not allow the pipe to be submerged within 24 hours after placement.

3         Control Plan it any of the following conditions are encountered:           4         1) A Ground Water Control Plan is specifically required by the Contract Documents           6         2) If in the sole judgment of the City, ground water is so severe that an Engineered Ground Water Control Plan is required to protect the trench or the installation of the pipe which may include:           9         a) Ground water levels in the trench are unable to be maintained below the top of the bedding           11         b) A firm trench bottom cannot be maintained due to ground water           12         c) Ground water entering the excavation undermines the stability of the excavation.           13         d) Ground water entering the excavation stransporting unacceptable quantities of soils through the Excavation Safety System.           14         d) Ground water entering the excavation suffy system.           15         quartities of soils through the Excavation and the City requires an Engineered Ground Water Control Plan due to conditions discovered at the site, the contractor will be eligible to submit a change order.           10         f. Control of ground water shall be considered subsidiary to the excavation when:           11         No Ground Water Control Plan installation, operation and maintenance           12         g. Ground Water Control Plan.           13         nariatian the Ground Water Control Plan.           14         Dispose of ground water in acordance with City policy or Ordinance.	1 2		0	<ul><li>c. Do not allow water to flow over concrete until it has sufficiently cured.</li><li>d. Engage a Licensed Engineer in the State of Texas to prepare a Ground Water</li></ul>
<ul> <li>1) A Ground Water Control Plan is specifically required by the Contract Documents</li> <li>2) If in the sole judgment of the City, ground water is so severe that an Engineered Ground Water Control Plan is required to protect the trench or the installation of the pipe which may include:</li> <li>a) Ground water levels in the trench are unable to be maintained below the top of the bedding</li> <li>b) A firm trench bottom cannot be maintained due to ground water</li> <li>c) Ground water entering the excavation undermines the stability of the excavation.</li> <li>d) Ground water entering the excavation Safety System.</li> <li>e. In the event that there is no bid iem for a Ground Water Control and the City requires an Engineered Ground Water Control Plan due to conditions discovered at the site, the contractor will be eligible to submit a change order.</li> <li>f. Control of ground Water Control Plan is specifically identified and required in the Contract Documents</li> <li>g. Ground Water Control Plan is specifically identified and required in the Contract Documents</li> <li>g. Ground Water Control Plan is specifically identified and required in the Contract Documents</li> <li>g. Once the excavation is complete, remove all ground water control equipment not called to be incorporated into the work.</li> <li>h. Water Disposal</li> <li>l) Dispose of ground water in accordance with City policy or Ordinance.</li> <li>2) Do not discharge ground water onto or across private property without written permission.</li> <li>3) Permission from the City is required prior to disposal into the Sanitary Sewer.</li> <li>4) Disposal shall not violate any Federal, State or local regulations.</li> <li>J) Dispose of sing water is in sufficient quantity to cause sand to pump, then use crushed rock shall be generally used for embedment.</li> <li>c. If ground water is in sufficient quantity to cause sand to pump, then use crushed rock shall be generally used for embedment.</li> <li>d. Place eigne on the bedding in accordance with</li></ul>	3			Control Plan if any of the following conditions are encountered:
<ul> <li>Documents</li> <li>2) If in the sole judgment of the City, ground water is so severe that an Engineered Ground Water Control Plan is required to protect the trench or the installation of the pipe which may include: <ul> <li>a) Ground Water keels in the trench are unable to be maintained below the top of the bedding</li> <li>b) A firm trench bottom cannot be maintained due to ground water</li> <li>c) Ground water keels in the trench are unable to be maintained below water</li> <li>c) Ground water entering the excavation undermines the stability of the excavation.</li> </ul> </li> <li>d) Ground water entering the excavation Stafety System.</li> <li>e. In the event that there is no bid item for a Ground Water Control and the City requires an Engineered Ground Water Control Plan due to conditions discovered at the site, the contractor will be eligible to submit a change order.</li> <li>f) Control of ground water shall be considered subsidiary to the excavation when:</li> <li>1) No Ground Water Control Plan installation, operation and maintenance</li> <li>g) Ground Water Control Plan installation, operation and maintenance</li> <li>g) Ground Water Control Plan.</li> <li>g) Once the excavation is complete, remove all ground water control equipment not called to be incorporated into the work.</li> <li>f) Disposed ground water in accordance with City policy or Ordinance.</li> <li>2) Do not discharge ground water onto or across private property without written permission.</li> <li>g) Permission from the City is required prior to disposal into the Sanitary Sewer.</li> <li>d) Disposal shall not violate any Federal, State or local regulations.</li> <li>j) H water Lines less than, or equal to, 12 inches in diameter:</li> <li>a. The entire embedment zone shall be of uniform material.</li> <li>b) Uility sand shall be generally used for embedment.</li> <li>c) If ground water is in sufficient quantity to cause sand to pump, then use crushed rock is hall be grifically identified in the Contract Documents, then crushed r</li></ul>	4			1) A Ground Water Control Plan is specifically required by the Contract
<ul> <li>2) If in the sole judgment of the City, ground water is so severe that an Engineered Ground Water Control Plan is required to protect the trench or the installation of the pipe which may include:</li> <li>a) Ground water levels in the trench are unable to be maintained below the top of the bedding</li> <li>b) A firm trench bottom cannot be maintained due to ground water</li> <li>c) Ground water entering the excavation undermines the stability of the excavation.</li> <li>d) Ground water entering the excavation is transporting unacceptable quantities of soils through the Excavation Safety System.</li> <li>e. In the event that there is no bid item for a Ground Water Control and the City requires an Engineered Ground Water Control Plan due to conditions discovered at the site, the contractor will be eligible to submit a change order.</li> <li>f. Control of ground water shall be considered subsidiary to the excavation when:</li> <li>1) No Ground Water Control Plan is specifically identified and required in the Contractor could water control Plan.</li> <li>g. Ground Water Control Plan installation, operation and maintenance</li> <li>1) Furnish all materials and equipment necessary to implement, operate and maintain the Ground Water Control Plan.</li> <li>2) Once the excavation is complete, remove all ground water control equipment not called to be incorporated into the work.</li> <li>h. Water Disposal</li> <li>1) Dispose of ground water in accordance with City policy or Ordinance.</li> <li>2) Donot discharge ground water onto or across private property without written permission.</li> <li>3) Permission from the City is required prior to disposal into the Sanitary Sever.</li> <li>4) Disposal shall not violate any Federal, State or local regulations.</li> <li>4) Disposal shall not violate any Federal, State or local regulations.</li> <li>4) Disposal shall not violate any Federal, State or local regulations.</li> <li>4) Disposal shall not violate any Federal, State or local regulations.</li> <li>4) Disposal sha</li></ul>	5			Documents
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11       b) A firm trench bottom cannot be maintained due to ground water         12       c) Ground water entering the excavation undermines the stability of the excavation.         14       d) Ground water entering the excavation is transporting unacceptable quantities of soils through the Excavation Safety System.         16       e. In the event that there is no bid item for a Ground Water Control and the City requires an Engineered Ground Water Control Plan due to conditions discovered at the site, the contractor will be eligible to submit a change order.         17       requires an Engineered Ground Water Control Plan due to conditions discovered at the site, the contractor will be eligible to submit a change order.         18       at the site, the control Plan is specifically identified and required in the Contract Documents         20       g. Ground Water Control Plan installation, operation and maintenance         21       b. Furnish all materials and equipment necessary to implement, operate and maintain the Ground Water Control Plan.         22       g. Ground Water Control Plan is specifically identified and required in the equipment not called to be incorporated into the work.         23       h. Water Disposal         24       maintain the Ground water onto or across private property without written permission.         31       3) Permission from the City is required prior to disposal into the Sanitary Sewer.         34       D. Embedment and Pipe Placement         37       b. Utility sand shall be generally	9 10			a) Ground water levels in the trench are unable to be maintained below the top of the bedding
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<ul> <li>a) Creation.</li> <li>b) Creation.</li> <li>c) Ground water entering the excavation is transporting unacceptable</li> <li>quantities of soils through the Excavation Safety System.</li> <li>e) In the event that there is no bid item for a Ground Water Control and the City</li> <li>requires an Engineered Ground Water Control Plan due to conditions discovered</li> <li>at the site, the contractor will be eligible to submit a change order.</li> <li>f) Control of ground water shall be considered subsidiary to the excavation when:</li> <li>1) No Ground Water Control Plan is specifically identified and required in the Contract Documents</li> <li>g) Ground Water Control Plan installation, operation and maintenance</li> <li>1) Furnish all materials and equipment necessary to implement, operate and maintain the Ground Water Control Plan.</li> <li>2) Once the excavation is complete, remove all ground water control equipment not called to be incorporated into the work.</li> <li>h) Water Disposal</li> <li>1) Dispose of ground water in accordance with City policy or Ordinance.</li> <li>2) Do not discharge ground water onto or across private property without written permission.</li> <li>3) Permission from the City is required prior to disposal into the Sanitary Sewer.</li> <li>4) Disposal shall not violate any Federal, State or local regulations.</li> <li>J) Builty sand shall be generally used for embedment.</li> <li>c) If ground water is nufficient quantity to cause sand to pump, then use crushed rock shall be paid by the pre-bid unit price.</li> <li>d) Place evenly spread bedding material on a firm trench bottom.</li> <li>e) Provide firm, uniform bedding.</li> <li>f) Place pipe on the bedding material on a firm trench bottom.</li> <li>e) Provide firm, uniform bedding.</li> <li>f) Place eighe on the bedding material on a firm trench bottom.</li> <li>e) rovide firm, uniform bedding.</li> <li>f) Place enpley nues specifically called for in the Drawings.</li> <li>f) Place enpley nues specifically called for in the Drawin</li></ul>	12			c) Ground water entering the excavation undermines the stability of the
<ul> <li>14 (a) Oroma water chang the excavation is a darger data of its dat</li></ul>	13			d) Ground water entering the exception is transporting unaccentable
<ul> <li>e. In the event that there is in bolg item for a Groun Mater Control and the City requires an Engineered Ground Water Control Plan due to conditions discovered at the site, the contractor will be eligible to submit a change order.</li> <li>f. Control of ground water shall be considered subsidiary to the excavation when:</li> <li>1) No Ground Water Control Plan is specifically identified and required in the Contract Documents</li> <li>g. Ground Water Control Plan is specifically identified and required in the Contract Documents</li> <li>a. Once the excavation is complete, remove all ground water control equipment not called to be incorporated into the work.</li> <li>h. Water Disposal</li> <li>1) Dispose of ground water in accordance with City policy or Ordinance.</li> <li>2) Do not discharge ground water onto or across private property without written permission.</li> <li>3) Permission from the City is required prior to disposal into the Sanitary Sewer.</li> <li>4) Disposal shall not violate any Federal, State or local regulations.</li> <li>D. Embedment and Pipe Placement</li> <li>I. Water Lines less than, or equal to, 12 inches in diameter:</li> <li>a. The entire embedment zone shall be of uniform material.</li> <li>b. Utility sand shall be generally used for embedment.</li> <li>c. If ground water is in sufficient quantity to cause sand to pump, then use crushed rock is not specifically identified in the Contract Documents, then crushed rock shall be paid by the pre-bid unit price.</li> <li>d. Place evenly spread bedding material on a firm trench bottom.</li> <li>e. Provide firm, uniform bedding.</li> <li>f. Place pipe on the bedding in accordance with the alignment of the Drawings.</li> <li>h. Place embedment, including initial backfill, to a minimum of 6 inches, but not more than 12 inches, show the mine.</li> </ul>	14			quantities of soils through the Excavation Safety System
<ul> <li>17 In the event have the form of a bost form a control Plan due to conditions discovered at the site, the contractor will be eligible to submit a change order.</li> <li>19 f. Control of ground water Control Plan is specifically identified and required in the Contract Documents</li> <li>29 g. Ground Water Control Plan is specifically identified and required in the Contract Documents</li> <li>20 Once the excavation is complete, remove all ground water control equipment not called to be incorporated into the work.</li> <li>21 Donce the excavation is complete, remove all ground water control equipment not called to be incorporated into the work.</li> <li>22 Don to discharge ground water onto or across private property without written permission.</li> <li>23 Permission from the City is required prior to disposal into the Sanitary Sewer.</li> <li>24 Disposal shall not violate any Federal, State or local regulations.</li> <li>25 D. Embedment and Pipe Placement</li> <li>26 Utility sand shall be generally used for embedment.</li> <li>27 B. Utility sand shall be generally used for embedment.</li> <li>28 C. If ground water is in sufficient quantity to cause sand to pump, then use crushed rock as embedment.</li> <li>29 J. Provide firm, uniform bedding material on a firm trench bottom.</li> <li>29 Provide firm, uniform bedding.</li> <li>20 Place epipe on the bedding in accordance with the alignment of the Drawings.</li> <li>30 Provide firm, uniform bedding.</li> <li>31 Place epipe on the bedding in accordance with the alignment of the Drawings.</li> <li>32 Provide firm, uniform bedding.</li> <li>33 Provide firm, uniform bedding.</li> <li>34 Place epipe on the bedding in accordance with the alignment of the Drawings.</li> <li>34 Place embedment, including initial backfill, to a minimum of 6 inches, but not more than 12 inches. above the nine.</li> </ul>	15		e	e In the event that there is no bid item for a Ground Water Control and the City
18       at the site, the contractor will be eligible to submit a charge order.         19       f. Control of ground water shall be considered subsidiary to the excavation when:         10       No Ground Water Control Plan is specifically identified and required in the Contract Documents         22       g. Ground Water Control Plan installation, operation and maintenance         23       1) Furnish all materials and equipment necessary to implement, operate and maintain the Ground Water Control Plan.         24       20         25       2) Once the excavation is complete, remove all ground water control equipment not called to be incorporated into the work.         26       1) Dispose of ground water in accordance with City policy or Ordinance.         29       2) Do not discharge ground water onto or across private property without written permission.         31       3) Permission from the City is required prior to disposal into the Sanitary Sewer.         33       4) Disposal shall not violate any Federal, State or local regulations.         34       D. Embedment and Pipe Placement         35       1. Water Lines less than, or equal to, 12 inches in diameter:         36       a. The entire embedment zone shall be of uniform material.         37       b. Utility sand shall be generally used for embedment.         38       c. If ground water is in sufficient quantity to cause sand to pump, then use crushed rock as embedment.	10			requires an Engineered Ground Water Control Plan due to conditions discovered
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<ol> <li>No Ground Water Control Plan is specifically identified and required in the Contract Documents</li> <li>Ground Water Control Plan installation, operation and maintenance</li> <li>Furnish all materials and equipment necessary to implement, operate and maintain the Ground Water Control Plan.</li> <li>Once the excavation is complete, remove all ground water control equipment not called to be incorporated into the work.</li> <li>Mater Disposal</li> <li>Dispose of ground water in accordance with City policy or Ordinance.</li> <li>Do not discharge ground water onto or across private property without written permission.</li> <li>Permission from the City is required prior to disposal into the Sanitary Sewer.</li> <li>Disposal shall not violate any Federal, State or local regulations.</li> <li>Disposal shall not violate any Federal, State or local regulations.</li> <li>Disposal shall not violate any Federal, State or local regulations.</li> <li>Utility sand shall be generally used for embedment.</li> <li>Utility sand shall be generally used for embedment.</li> <li>If ground water is in sufficient quantity to cause sand to pump, then use crushed rock as embedment.</li> <li>Hace evenly spread bedding material on a firm trench bottom.</li> <li>Place epipe on the bedding in accordance with the alignment of the Drawings.</li> <li>Flace pipe on the bedding in accordance with the alignment of the Drawings.</li> <li>Place embedment, including initial backfill, to a minimum of 6 inches, but not more than 12 inches, above the pipe.</li> </ol>	19		f	f. Control of ground water shall be considered subsidiary to the excavation when:
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<ol> <li>Furnish all materials and equipment necessary to implement, operate and maintain the Ground Water Control Plan.</li> <li>Once the excavation is complete, remove all ground water control equipment not called to be incorporated into the work.</li> <li>h. Water Disposal</li> <li>Dispose of ground water in accordance with City policy or Ordinance.</li> <li>Do not discharge ground water onto or across private property without written permission.</li> <li>Permission from the City is required prior to disposal into the Sanitary Sewer.</li> <li>Disposal shall not violate any Federal, State or local regulations.</li> <li>Disposal shall not violate any Federal, State or local regulations.</li> <li>Disposal shall not violate any Federal, State or local regulations.</li> <li>Water Lines less than, or equal to, 12 inches in diameter:         <ul> <li>The entire embedment zone shall be of uniform material.</li> <li>Utility sand shall be generally used for embedment.</li> <li>If ground water is in sufficient quantity to cause sand to pump, then use crushed rock as embedment.</li> <li>If crushed rock shall be paid by the pre-bid unit price.</li> <li>Place evenly spread bedding material on a firm trench bottom.</li> <li>Provide firm, uniform bedding.</li> <li>Place pipe on the bedding in accordance with the alignment of the Drawings.</li> <li>In no case shall the top of the pipe be less than 42 inches from the surface of the proposed grade, unless specifically called for in the Drawings.</li> <li>Place embedment, including initial backfill, to a minimum of 6 inches, but not more than 12 inches, above the pine.</li> </ul> </li> </ol>	22		ç	g. Ground Water Control Plan installation, operation and maintenance
<ul> <li>maintain the Ground Water Control Plan.</li> <li>2) Once the excavation is complete, remove all ground water control equipment not called to be incorporated into the work.</li> <li>h. Water Disposal</li> <li>1) Dispose of ground water in accordance with City policy or Ordinance.</li> <li>2) Do not discharge ground water onto or across private property without written permission.</li> <li>3) Permission from the City is required prior to disposal into the Sanitary Sewer.</li> <li>4) Disposal shall not violate any Federal, State or local regulations.</li> <li>34 D. Embedment and Pipe Placement</li> <li>1. Water Lines less than, or equal to, 12 inches in diameter: <ul> <li>a. The entire embedment zone shall be of uniform material.</li> <li>b. Utility sand shall be generally used for embedment.</li> <li>c. If ground water is in sufficient quantity to cause sand to pump, then use crushed rock as embedment.</li> <li>1) If crushed rock shall be paid by the pre-bid unit price.</li> </ul> </li> <li>d. Place evenly spread bedding material on a firm trench bottom.</li> <li>e. Provide firm, uniform bedding.</li> <li>f. Place pipe on the bedding in accordance with the alignment of the Drawings.</li> <li>g. In no case shall the top of the pipe be less than 42 inches from the surface of the proposed grade, unless specifically called for in the Drawings.</li> <li>h. Place embedment, including initial backfill, to a minimum of 6 inches, but not more than 12 inches, above the pine.</li> </ul>	23			1) Furnish all materials and equipment necessary to implement, operate and
<ul> <li>25</li> <li>2) Once the excavation is complete, remove all ground water control equipment not called to be incorporated into the work.</li> <li>h. Water Disposal</li> <li>1) Dispose of ground water in accordance with City policy or Ordinance.</li> <li>2) Do not discharge ground water onto or across private property without written permission.</li> <li>3) Permission from the City is required prior to disposal into the Sanitary Sewer.</li> <li>4) Disposal shall not violate any Federal, State or local regulations.</li> <li>34</li> <li>D. Embedment and Pipe Placement</li> <li>1. Water Lines less than, or equal to, 12 inches in diameter: <ul> <li>a. The entire embedment zone shall be of uniform material.</li> <li>b. Utility sand shall be generally used for embedment.</li> <li>c. If ground water is in sufficient quantity to cause sand to pump, then use crushed rock as embedment.</li> <li>1) If crushed rock is not specifically identified in the Contract Documents, then crushed rock shall be paid by the pre-bid unit price.</li> <li>42</li> <li>d. Place evenly spread bedding material on a firm trench bottom.</li> <li>e. Provide firm, uniform bedding.</li> <li>f. Place pipe on the bedding in accordance with the alignment of the Drawings.</li> <li>g. In no case shall the top of the pipe be less than 42 inches from the surface of the proposed grade, unless specifically called for in the Drawings.</li> <li>h. Place embedment, including initial backfill, to a minimum of 6 inches, but not more than 12 inches, above the nine.</li> </ul></li></ul>	24			maintain the Ground Water Control Plan.
<ul> <li>equipment not called to be incorporated into the work.</li> <li>h. Water Disposal</li> <li>1) Dispose of ground water in accordance with City policy or Ordinance.</li> <li>2) Do not discharge ground water onto or across private property without written permission.</li> <li>3) Permission from the City is required prior to disposal into the Sanitary Sewer.</li> <li>3) Permission from the City is required prior to disposal into the Sanitary Sewer.</li> <li>4) Disposal shall not violate any Federal, State or local regulations.</li> <li>D. Embedment and Pipe Placement</li> <li>I. Water Lines less than, or equal to, 12 inches in diameter: <ul> <li>a. The entire embedment zone shall be of uniform material.</li> <li>b. Utility sand shall be generally used for embedment.</li> <li>c. If ground water is in sufficient quantity to cause sand to pump, then use crushed rock as embedment.</li> <li>I) If crushed rock is not specifically identified in the Contract Documents, then crushed rock shall be paid by the pre-bid unit price.</li> <li>d. Place evenly spread bedding material on a firm trench bottom.</li> <li>e. Provide firm, uniform bedding.</li> <li>f. Place pipe on the bedding in accordance with the alignment of the Drawings.</li> <li>g. In no case shall the top of the pipe be less than 42 inches from the surface of the proposed grade, unless specifically called for in the Drawings.</li> <li>h. Place embedment, including initial backfill, to a minimum of 6 inches, but not more than 12 inches, above the pipe.</li> </ul></li></ul>	25			2) Once the excavation is complete, remove all ground water control
<ul> <li>h. Water Disposal</li> <li>1) Dispose of ground water in accordance with City policy or Ordinance.</li> <li>2) Do not discharge ground water onto or across private property without written permission.</li> <li>3) Permission from the City is required prior to disposal into the Sanitary Sewer.</li> <li>3) Disposal shall not violate any Federal, State or local regulations.</li> <li>Disposal shall not violate any Federal, State or local regulations.</li> <li>D. Embedment and Pipe Placement</li> <li>Water Lines less than, or equal to, 12 inches in diameter: <ul> <li>a. The entire embedment zone shall be of uniform material.</li> <li>b. Utility sand shall be generally used for embedment.</li> <li>c. If ground water is in sufficient quantity to cause sand to pump, then use crushed rock as embedment.</li> <li>I) If crushed rock is not specifically identified in the Contract Documents, then crushed rock shall be paid by the pre-bid unit price.</li> <li>Place evenly spread bedding material on a firm trench bottom.</li> <li>Provide firm, uniform bedding.</li> <li>Flace pipe on the bedding in accordance with the alignment of the Drawings.</li> <li>J. In o case shall the top of the pipe be less than 42 inches from the surface of the proposed grade, unless specifically called for in the Drawings.</li> <li>A. Place embedment, including initial backfill, to a minimum of 6 inches, but not more than 12 inches, above the pipe.</li> </ul></li></ul>	26			equipment not called to be incorporated into the work.
<ol> <li>Dispose of ground water in accordance with City policy or Ordinance.</li> <li>Do not discharge ground water onto or across private property without written permission.</li> <li>Permission from the City is required prior to disposal into the Sanitary Sewer.</li> <li>Disposal shall not violate any Federal, State or local regulations.</li> <li>Disposal shall not violate any Federal, State or local regulations.</li> <li>Disposal shall not violate any Federal, State or local regulations.</li> <li>Disposal shall not violate any Federal, State or local regulations.</li> <li>Disposal shall not violate any Federal, State or local regulations.</li> <li>Disposal shall not violate any Federal, State or local regulations.</li> <li>Disposal shall be placement</li> <li>Water Lines less than, or equal to, 12 inches in diameter:         <ul> <li>The entire embedment zone shall be of uniform material.</li> <li>Utility sand shall be generally used for embedment.</li> <li>If ground water is in sufficient quantity to cause sand to pump, then use crushed rock as embedment.</li> <li>If crushed rock is not specifically identified in the Contract Documents, then crushed rock shall be paid by the pre-bid unit price.</li> <li>Place evenly spread bedding material on a firm trench bottom.</li> <li>Provide firm, uniform bedding.</li> <li>Place pipe on the bedding in accordance with the alignment of the Drawings.</li> <li>In no case shall the top of the pipe be less than 42 inches from the surface of the proposed grade, unless specifically called for in the Drawings.</li> <li>Place embedment, including initial backfill, to a minimum of 6 inches, but not more than 12 inches, above the pipe.</li> </ul> </li> </ol>	27		ł	h. Water Disposal
<ul> <li>29 2) Do not discharge ground water onto or across private property without written permission.</li> <li>31 3) Permission from the City is required prior to disposal into the Sanitary Sewer.</li> <li>33 4) Disposal shall not violate any Federal, State or local regulations.</li> <li>34 D. Embedment and Pipe Placement</li> <li>35 1. Water Lines less than, or equal to, 12 inches in diameter: <ul> <li>a. The entire embedment zone shall be of uniform material.</li> <li>b. Utility sand shall be generally used for embedment.</li> <li>c. If ground water is in sufficient quantity to cause sand to pump, then use crushed rock as embedment.</li> <li>1) If crushed rock is not specifically identified in the Contract Documents, then crushed rock shall be paid by the pre-bid unit price.</li> <li>d. Place evenly spread bedding material on a firm trench bottom.</li> <li>e. Provide firm, uniform bedding.</li> <li>f. Place pipe on the bedding in accordance with the alignment of the Drawings.</li> <li>g. In no case shall the top of the pipe be less than 42 inches from the surface of the proposed grade, unless specifically called for in the Drawings.</li> <li>h. Place embedment, including initial backfill, to a minimum of 6 inches, but not more than 12 inches, above the pipe.</li> </ul> </li> </ul>	28			1) Dispose of ground water in accordance with City policy or Ordinance.
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<ul> <li>Sewer.</li> <li>4) Disposal shall not violate any Federal, State or local regulations.</li> <li>D. Embedment and Pipe Placement</li> <li>Water Lines less than, or equal to, 12 inches in diameter: <ul> <li>a. The entire embedment zone shall be of uniform material.</li> <li>b. Utility sand shall be generally used for embedment.</li> <li>c. If ground water is in sufficient quantity to cause sand to pump, then use crushed rock as embedment.</li> <li>1) If crushed rock is not specifically identified in the Contract Documents, then crushed rock shall be paid by the pre-bid unit price.</li> <li>d. Place evenly spread bedding material on a firm trench bottom.</li> <li>e. Provide firm, uniform bedding.</li> <li>f. Place pipe on the bedding in accordance with the alignment of the Drawings.</li> <li>g. In no case shall the top of the pipe be less than 42 inches from the surface of the proposed grade, unless specifically called for in the Drawings.</li> <li>h. Place embedment, including initial backfill, to a minimum of 6 inches, but not more than 12 inches, above the pipe.</li> </ul> </li> </ul>	31			3) Permission from the City is required prior to disposal into the Sanitary $\vec{a}$
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<ul> <li>D. Embedment and Pipe Placement</li> <li>Water Lines less than, or equal to, 12 inches in diameter: <ul> <li>a. The entire embedment zone shall be of uniform material.</li> <li>b. Utility sand shall be generally used for embedment.</li> <li>c. If ground water is in sufficient quantity to cause sand to pump, then use crushed rock as embedment.</li> <li>1) If crushed rock is not specifically identified in the Contract Documents, then crushed rock shall be paid by the pre-bid unit price.</li> <li>d. Place evenly spread bedding material on a firm trench bottom.</li> <li>e. Provide firm, uniform bedding.</li> <li>f. Place pipe on the bedding in accordance with the alignment of the Drawings.</li> <li>g. In no case shall the top of the pipe be less than 42 inches from the surface of the proposed grade, unless specifically called for in the Drawings.</li> <li>h. Place embedment, including initial backfill, to a minimum of 6 inches, but not more than 12 inches, above the pipe.</li> </ul> </li> </ul>	33			4) Disposal shall not violate any Federal, State or local regulations.
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<ul> <li>b. Utility sand shall be generally used for embedment.</li> <li>c. If ground water is in sufficient quantity to cause sand to pump, then use crushed rock as embedment.</li> <li>1) If crushed rock is not specifically identified in the Contract Documents, then crushed rock shall be paid by the pre-bid unit price.</li> <li>d. Place evenly spread bedding material on a firm trench bottom.</li> <li>e. Provide firm, uniform bedding.</li> <li>f. Place pipe on the bedding in accordance with the alignment of the Drawings.</li> <li>g. In no case shall the top of the pipe be less than 42 inches from the surface of the proposed grade, unless specifically called for in the Drawings.</li> <li>h. Place embedment, including initial backfill, to a minimum of 6 inches, but not more than 12 inches, above the pipe.</li> </ul>	36		8	a. The entire embedment zone shall be of uniform material.
<ul> <li>c. If ground water is in sufficient quantity to cause sand to pump, then use crushed rock as embedment.</li> <li>1) If crushed rock is not specifically identified in the Contract Documents, then crushed rock shall be paid by the pre-bid unit price.</li> <li>d. Place evenly spread bedding material on a firm trench bottom.</li> <li>e. Provide firm, uniform bedding.</li> <li>f. Place pipe on the bedding in accordance with the alignment of the Drawings.</li> <li>g. In no case shall the top of the pipe be less than 42 inches from the surface of the proposed grade, unless specifically called for in the Drawings.</li> <li>h. Place embedment, including initial backfill, to a minimum of 6 inches, but not more than 12 inches, above the pipe.</li> </ul>	37		ł	b. Utility sand shall be generally used for embedment.
<ul> <li>39 crushed rock as embedment.</li> <li>40 <ol> <li>If crushed rock is not specifically identified in the Contract Documents, then crushed rock shall be paid by the pre-bid unit price.</li> </ol> </li> <li>42 <ol> <li>Place evenly spread bedding material on a firm trench bottom.</li> <li>Provide firm, uniform bedding.</li> <li>Place pipe on the bedding in accordance with the alignment of the Drawings.</li> <li>In no case shall the top of the pipe be less than 42 inches from the surface of the proposed grade, unless specifically called for in the Drawings.</li> <li>Place embedment, including initial backfill, to a minimum of 6 inches, but not more than 12 inches, above the pipe.</li> </ol> </li></ul>	38		0	c. If ground water is in sufficient quantity to cause sand to pump, then use
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<ul> <li>then crushed rock shall be paid by the pre-bid unit price.</li> <li>d. Place evenly spread bedding material on a firm trench bottom.</li> <li>e. Provide firm, uniform bedding.</li> <li>f. Place pipe on the bedding in accordance with the alignment of the Drawings.</li> <li>g. In no case shall the top of the pipe be less than 42 inches from the surface of the proposed grade, unless specifically called for in the Drawings.</li> <li>h. Place embedment, including initial backfill, to a minimum of 6 inches, but not more than 12 inches, above the pipe.</li> </ul>	40			1) If crushed rock is not specifically identified in the Contract Documents,
<ul> <li>d. Place evenly spread bedding material on a firm trench bottom.</li> <li>e. Provide firm, uniform bedding.</li> <li>f. Place pipe on the bedding in accordance with the alignment of the Drawings.</li> <li>g. In no case shall the top of the pipe be less than 42 inches from the surface of the proposed grade, unless specifically called for in the Drawings.</li> <li>h. Place embedment, including initial backfill, to a minimum of 6 inches, but not more than 12 inches, above the pipe.</li> </ul>	41			then crushed rock shall be paid by the pre-bid unit price.
<ul> <li>45</li> <li>44</li> <li>44</li> <li>45</li> <li>45</li> <li>46</li> <li>46</li> <li>47</li> <li>47</li> <li>48</li> <li>48</li> <li>45</li> <li>46</li> <li>46</li> <li>47</li> <li>47</li> <li>48</li> <li>48</li> <li>46</li> <li>47</li> <li>47</li> <li>48</li> <li>47</li> <li>48</li> <li>48</li> <li>47</li> <li>47</li> <li>48</li> <li>47</li> <li>48</li> <li>47</li> <li>47</li> <li>48</li> <li>47</li> <li>48</li> <li>47</li> <li>48</li> <li>47</li> <li>47</li> <li>47</li> <li>48</li> <li>47</li> <li>48</li> <li>47</li> <li>47</li> <li>48</li> <li>47</li> <li>47</li> <li>48</li> <li>47</li> <li>48</li> <li>48</li> <li>48</li> <li>47</li> <li>48</li> <li>48</li> <li>47</li> <li>48</li> <li>48</li> <li>47</li> <li>48</li> <li>48</li> <li>47</li> <li>48</li> <li>48</li> <li>48</li> <li>47</li> <li>48</li> <li>48</li> <li>47</li> <li>48</li> <li>47</li> <li>48</li> <li>47</li> <li>48</li> <li>47</li> <li>48</li> <li>47</li> <li>48</li> <li>48</li> <li>48</li> <li>48</li> <li>49</li> &lt;</ul>	42		(	u. Frace evenily spread bedding material on a firm trench bottom.
<ul> <li>45</li> <li>45</li> <li>46</li> <li>47</li> <li>48</li> <li>48</li> <li>46</li> <li>47</li> <li>48</li> </ul>	43 44		4	t. FIOVAGE FIELD, UNITOTIN Deduting.
<ul> <li>45 g. In no case shall the top of the pipe beliess than 42 inches from the sufface of the proposed grade, unless specifically called for in the Drawings.</li> <li>47 h. Place embedment, including initial backfill, to a minimum of 6 inches, but not more than 12 inches, above the pipe.</li> </ul>	44 45		1	I. I not pipe on the beauing in accordance with the alignment of the DIawings.
<ul> <li>47</li> <li>48</li> <li>48</li> <li>47 proposed grade, uness spectrically called for in the Drawings.</li> <li>48</li> <li>48</li> <li>49</li> <li>49</li> <li>40</li> <li>40</li> <li>41</li> <li>41</li> <li>42</li> <li>43</li> <li>44</li> <li>44</li> <li>45</li> <li>45</li> <li>46</li> <li>47</li> <li>48</li> <li>48</li> <li>47</li> <li>48</li> <li>47</li> <li>48</li> <li>49</li> <li>49<td>4J 46</td><td></td><td>Ę</td><td>proposed grade unless specifically called for in the Drawings</td></li></ul>	4J 46		Ę	proposed grade unless specifically called for in the Drawings
48 more than 12 inches, above the pipe.	47		1	h Place embedment including initial backfill to a minimum of 6 inches but not
	48		1	more than 12 inches, above the pipe.

- 13 UTILITY TRENCH EXCAVATION, EMBEDMENT, AND BACKFILL Page 13 of 21

1		i. Where gate valves are present, the initial backfill shall extend to 6 inches above
2		the elevation of the valve nut.
3		J. Form all blocking against undisturbed trench wall to the dimensions in the
4		Drawnigs.
5		K. Compact embedment and initial backfill. Deac merker tane on top of the initial trench healtfill in eccordence with
0		Section 33.05.26
7	2	Weter Lines 16 inches three h 24 in ches in dispectory
8	2.	water Lines 16-inches through 24-inches in diameter:
9		a. The entire embedment zone shall be of uniform material.
10		b. Utility sand may be used for embedment when the excavated trench depth is
11		ess than 15 feet deep.
12		tranch denths 15 feet, or greater
13		d Crushed rock shall be used for embedment for steel pine
14		a. Crushed rock shall be used for embedment for steer pipe.
15		crushed rock come into contact with utility sand
10		f Place evenly spread bedding material on a firm trench bottom
18		g Provide firm uniform bedding
19		1) Additional hedding may be required if ground water is present in the
20		trench
20		2) If additional crushed rock is required not specifically identified in the
22		Contract Documents then crushed rock shall be paid by the pre-bid unit
23		price.
24		h. Place pipe on the bedding according to the alignment shown on the Drawings.
25		i. The pipe line shall be within:
26		1) $\pm 3$ inches of the elevation on the Drawings for 16-inch and 24-inch water
27		lines
28		j. Place and compact embedment material to adequately support haunches in
29		accordance with the pipe manufacturer's recommendations.
30		k. Place remaining embedment including initial backfill to a minimum of 6 inches,
31		but not more than 12 inches, above the pipe.
32		l. Where gate valves are present, the initial backfill shall extend to up to the valve
33		nut.
34		m. Compact the embedment and initial backfill to 95 percent Standard Proctor
35		ASTM D 698.
36		n. Density test performed by a commercial testing firm approved by the City to
37		verify that the compaction of embedment meets requirements.
38		o. Place trench geotextile fabric on top of the initial backfill.
39		p. Place marker tape on top of the trench geotextile fabric in accordance with
40		Section 33 05 26.
41	3.	Water Lines 30-inches and greater in diameter
42		a. The entire embedment zone shall be of uniform material.
43		b. Crushed rock shall be used for embedment.
44		c. Provide trench geotextile fabric at any location where crushed rock or fine
45		crushed rock come into contact with utility sand.
46		d. Place evenly spread bedding material on a firm trench bottom.
47		e. Provide firm, uniform bedding.
48		1) Additional bedding may be required if ground water is present in the
49		trench.

1		2) If additional crushed rock is required which is not specifically identified in
2		the Contract Documents, then crushed rock shall be paid by the pre-bid unit
3		price.
4		The give shall be existing to the alignment shown on the Drawings.
5		g. The pipe line shall be within:
6		1) $\pm 1$ inch of the elevation on the Drawings for 30-inch and larger water lines
7		h. Place and compact embedment material to adequately support haunches in
8		i Equated ring greater than 20 in along in diameter, the initial such admost lift shall
9		1. For steel pipe greater than 50 inches in diameter, the initial embedment int shall
10		not exceed the spring line prior to compaction.
11		j. Place remaining embedment, including initial backful, to a minimum of 6
12		inches, but not more than 12 inches, above the pipe.
13		k. where gate valves are present, the initial backful shall extend to up to the valve
14		
15		I. Compact the embedment and initial backfill to 95 percent Standard Proctor
16		ASTM D 698.
17		m. Density test may be performed by a commercial testing firm approved by the
18		City to verify that the compaction of embedment meets requirements.
19		n. Place trench geotextile fabric on top of the initial backfill.
20		o. Place marker tape on top of the trench geotextile fabric in accordance with
21		Section 33 05 26.
22	4.	Sanitary Sewer Lines and Storm Sewer Lines (HDPE)
23		a. The entire embedment zone shall be of uniform material.
24		b. Crushed rock shall be used for embedment.
25		c. Place evenly spread bedding material on a firm trench bottom.
26		d. Spread bedding so that lines and grades are maintained and that there are no
27		sags in the sanitary sewer pipe line.
28		e. Provide firm, uniform bedding.
29		1) Additional bedding may be required if ground water is present in the
30		trench.
31		2) If additional crushed rock is required which is not specifically identified in
32		the Contract Documents, then crushed rock shall be paid by the pre-bid unit
33		price.
34		f. Place pipe on the bedding according to the alignment shown in the Drawings.
35		g. The pipe line shall be within $\pm 0.1$ inches of the elevation, and be consistent
36		with the grade shown on the Drawings.
37		h. Place and compact embedment material to adequately support haunches in
38		accordance with the pipe manufacturer's recommendations.
39		i. For sewer lines greater than 30 inches in diameter, the embedment lift shall not
40		exceed the spring line prior to compaction.
41		j. Place remaining embedment including initial backfill to a minimum of 6 inches,
42		but not more than 12 inches, above the pipe.
43		k. Compact the embedment and initial backfill to 95 percent Standard Proctor
44		ASTM D 698.
45		1. Density test may be performed by a commercial testing firm approved by the
46		City to verify that the compaction of embedment meets requirements.
47		m. Place trench geotextile fabric on top of the initial backfill.
48		n. Place marker tape on top of the trench geotextile fabric in accordance with
49		Section 33 05 26.

1	5. Storm Sewer (RCP)
2	a. The bedding and the pipe zone up to the spring line shall be of uniform
3	material.
4	b. Crushed rock shall be used for embedment up to the spring line.
5	c. The specified backfill material may be used above the spring line.
6	d. Place evenly spread bedding material on a firm trench bottom.
7	e. Spread bedding so that lines and grades are maintained and that there are no
8	sags in the storm sewer pipe line.
9	f. Provide firm, uniform bedding.
10	1) Additional bedding may be required if ground water is present in the
11	trench.
12	2) If additional crushed rock is required which is not specifically identified in
13	the Contract Documents, then crushed rock shall be paid by the pre-bid unit
14	price.
15	g. Place pipe on the bedding according to the alignment of the Drawings.
16	h. The pipe line shall be within $\pm 0.1$ inches of the elevation, and be consistent
17	with the grade, shown on the Drawings.
18	<ol> <li>Place embedment material up to the spring line.</li> <li>Diago amb adment to answer that adapted suggest is abtained in the boundh</li> </ol>
19	i) Place embedment to ensure that adequate support is obtained in the nation.
20	J. Compact the embedment and initial backful to 95 percent Standard Proctor
21	ASTM D 096.
22	K. Density test may be performed by a commercial testing firm approved by the
23 24	Diversional time compaction of embedment meets requirements.
24	$f_{1}$ The effective function of the first
25	6. Storm Sewer (PP - Polypropylene)
20	a. The entire embedment zone shall be or uniform material.
27	b. Crushed rock shall be used for embedment up to top of pipe.
20	d. Spread badding so that lines and grades are maintained and that there are no sage
29	u. Spread bedding so that miles and grades are maintained and that there are no sags
30	a Provide firm uniform bedding
32	1) Additional bedding may be required if ground water is present in the
33	trench
34	2) If additional crushed rock is required which is not specifically
35	identified in the Contract Documents, then crushed rock shall be paid
36	by the pre-bid unit price.
37	f. Place pipe on the bedding according to the alignment shown in the Drawings.
38	g. The pipe line shall be within $\pm 0.1$ inches of the elevation, and be consistent with
39	the grade shown on the Drawings.
40	h. Place and compact embedment material to adequately support haunches in
41	accordance with the pipe manufacturer's recommendations.
42	i. Compact the embedment and initial backfill to 95 percent Standard Proctor
43	ASTM D 698.
44	j. Density test may be performed by City to verify that the compaction of
45	embedment meets requirements.
46	k. Place trench geotextile fabric on top of the initial backfill.
47	7. Storm Sewer Reinforced Concrete Box
48	a. Crushed rock shall be used for bedding.
49	b. The pipe zone and the initial backfill shall be:

1			1) Crushed rock, or			
2			2) Acceptable backfill material compacted to 95 percent Standard Proctor			
3			density			
4			c. Place evenly spread compacted bedding material on a firm trench bottom.			
5			d. Spread bedding so that lines and grades are maintained and that there are no			
6			sags in the storm sewer pipe line.			
7			e. Provide firm, uniform bedding.			
8			1) Additional bedding may be required if ground water is present in the			
9			trench.			
10			2) If additional crushed rock is required which is not specifically identified in			
11			the Contract Documents, then crushed rock shall be paid by the pre-bid unit			
12			price.			
13			f. Fill the annular space between multiple boxes with crushed rock, CLSM			
14			according to 03 34 13.			
15			g. Place pipe on the bedding according to the alignment of the Drawings.			
16			h. The pipe shall be within $\pm 0.1$ inches of the elevation, and be consistent with the			
17			grade, shown on the Drawings.			
18			i. Compact the embedment initial backfill to 95 percent Standard Proctor ASTM			
19			D698.			
20		8.	Water Services (Less than 2 Inches in Diameter)			
21			a. The entire embedment zone shall be of uniform material.			
22			b. Utility sand shall be generally used for embedment.			
23			c. Place evenly spread bedding material on a firm trench bottom.			
24			d. Provide firm, uniform bedding.			
25			e. Place pipe on the bedding according to the alignment of the Plans.			
26			f. Compact the initial backfill to 95 percent Standard Proctor ASTM D698.			
27		9.	Sanitary Sewer Services			
28			a. The entire embedment zone shall be of uniform material.			
29			b. Crushed rock shall be used for embedment.			
30			c. Place evenly spread bedding material on a firm trench bottom.			
31			d. Spread bedding so that lines and grades are maintained and that there are no			
32			sags in the sanitary sewer pipe line.			
33			e. Provide firm, uniform bedding.			
34			1) Additional bedding may be required if ground water is present in the			
35			trench.			
36			2) If additional crushed rock is required which is not specifically identified in			
37			the Contract Documents, then crushed rock shall be paid by the pre-bid unit			
38			price.			
39			f. Place pipe on the bedding according to the alignment of the Drawings.			
40			g. Place remaining embedment, including initial backfill, to a minimum of 6			
41			inches, but not more than 12 inches, above the pipe.			
42			h. Compact the initial backfill to 95 percent Standard Proctor ASTM D698.			
43			i. Density test may be required to verify that the compaction meets the density			
44			requirements.			
45	F	Tre	ench Backfill			
15	ц.	1	At a minimum place backfill in such a manner that the required in place density			
40 17		1.	and moisture content is obtained and so that there will be no damage to the surface			
т, Л8			payement or structures due to any trench settlement or trench movement			
UT			pavement of structures due to any trenen settement of trenen movement.			

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1 2		a. Meeting the requirement herein does not relieve the responsibility to damages associated with the Work.
3	2	Backfill Material
4		a Final backfill (not under existing payement or future payement)
5		1) Backfill with
6		a) Acceptable backfill material
7		b) Blended backfill material. or
8		c) Select backfill material, CSS, or CLSM when specifically required
9		b. Final backfill depth 15 feet or greater (under existing or future payement)
10		1) Backfill depth from 0 to 15 feet deep
11		a) Backfill with:
12		(1) Acceptable backfill material
13		(2) Blended backfill material, or
14		(3) Select backfill material. CSS. or CLSM when specifically required
15		2) Backfill depth from 15 feet and greater
16		a) Backfill with:
17		(1) Select Fill
18		(2) CSS, or
19		(3) CLSM when specifically required
20		b)
21		c. Backfill for service lines:
22		1) Backfill for water or sewer service lines shall be the same as the
23		requirement of the main that the service is connected to.
24	3	Required Compaction and Density
25	5.	a Final backfill (depths less than 15 feet/under existing or future payement)
25		1) Compact acceptable backfill material blended backfill material or select
27		backfill to a minimum of 95 percent Standard Proctor per ASTM D698 at
28		moisture content within $-2$ to $+5$ percent of the optimum moisture.
29		2) CSS or CLSM requires no compaction.
30		b. Final backfill (depths 15 feet and greater/under existing or future pavement)
31		1) Compact select backfill to a minimum of 98 percent Standard Proctor per
32		ASTM D 698 at moisture content within $-2$ to $+5$ percent of the optimum
33		moisture up to the final grade.
34		2) CSS or CLSM requires no compaction.
35		c. Final backfill ( <u>not</u> under existing or future pavement)
36		1) Compact acceptable backfill material blended backfill material, or select
37		backfill to a minimum of 95 percent Standard Proctor per ASTM D 698 at
38		moisture content within -2 to +5 percent of the optimum moisture.
39	4.	Saturated Soils
40		a. If in-situ soils consistently demonstrate that they are greater than 5 percent over
41		optimum moisture content, the soils are considered saturated.
42		b. Flooding the trench or water jetting is strictly prohibited.
43		c. If saturated soils are identified in the Drawings or Geotechnical Report in the
44		Appendix, Contractor shall proceed with Work following all backfill procedures
45		outlined in the Drawings for areas of soil saturation greater than 5 percent.
46		d. If saturated soils are encountered during Work but not identified in Drawings or
47		Geotechnical Report in the Appendix:
48		1) The Contractor shall:
49		a) Immediately notify the City.

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1		b) Submit a Contract Claim for Extra Work associated with direction from City
3		2) The City shall:
4		a) Investigate soils and determine if Work can proceed in the identified
5		location.
6		b) Direct the Contractor of changed backfill procedures associated with
/		(1) Interpreted hearst include:
8		(1) Imported backfill (2) A gite grooifie beeltfill degion
9	_	(2) A site specific backfill design
10	5.	Placement of Backfill
11		a. Use only compaction equipment specifically designed for compaction of a
12		particular soli type and within the space and depth limitation experienced in the
13		trench.
14		b. Flooding the trench or water setting is strictly prohibited.
15		c. Place in loose lifts not to exceed 12 inches.
10 17		a. Compact to specified densities.
1/		e. Compact only on top of initial backfill, undisturbed trench of previously
10		f Demote any losse metarials due to the movement of any tranch how or shoring
19		1. Remove any loose materials due to the movement of any trench box of shoring or due to sloughing of the trench well
20		a Install appropriate tracking halls for water and sonitary sower tranches in
21		accordance with Section 33.05.26
22	6	Deal-fill Means and Mathoda Demonstration
25	0.	Notify the City in writing with sufficient time for the City to obtain semples
24 25		a. Notify the City in writing with sufficient time for the City to obtain samples and perform standard proctor test in accordance with ASTM D698
25		The results of the standard proctor test must be received prior to beginning
20 27		excavation
28		c Upon commencing of backfill placement for the project the Contractor shall
20		demonstrate means and methods to obtain the required densities
30		d Demonstrate Means and Methods for compaction including:
31		1) Denth of lifts for backfill which shall not exceed 12 inches
32		2) Method of moisture control for excessively dry or wet backfill
33		3) Placement and moving trench box, if used
34		4) Compaction techniques in an open trench
35		5) Compaction techniques around structure
36		e. Provide a testing trench box to provide access to the recently backfilled
37		material.
38		f. The City will provide a qualified testing lab full time during this period to
39		randomly test density and moisture continent.
40		1) The testing lab will provide results as available on the job site.
41	7.	Varying Ground Conditions
42		a. Notify the City of varying ground conditions and the need for additional
43		proctors.
44		b. Request additional proctors when soil conditions change.
45		c. The City may acquire additional proctors at its discretion.
46		d. Significant changes in soil conditions will require an additional Means and
47		Methods demonstration.

## 1 3.5 REPAIR [NOT USED]

### 2 3.6 RE-INSTALLATION [NOT USED]

# 3 3.7 FIELD QUALITY CONTROL

4	A.	Field Tests and Inspections
5		1. Proctors
6		a. The City will perform Proctors in accordance with ASTM D698.
7		b. Test results will generally be available to within 4 calendar days and distributed
8		to:
9		1) Contractor
10		2) City Project Manager
11		3) City Inspector
12		4) Engineer
13		c. Notify the City if the characteristic of the soil changes.
14		d. City will perform new proctors for varying soils:
15		1) When indicated in the geotechnical investigation in the Appendix
16		2) If notified by the Contractor
17		3) At the convenience of the City
18		e. Trenches where different soil types are present at different depths, the proctors
19		shall be based on the mixture of those soils.
20		2 Density Testing of Backfill
20		a Density Tests shall be in conformance with ASTM D2922
21		<ul> <li>b Provide a testing trench protection for trench denths in excess of 5 feet</li> </ul>
22		c Place move and remove testing trench protection as necessary to facilitate all
23		test conducted by the commercial testing firm approved by the City
25		d The commercial testing lab will perform moisture/density test for every 200-ft
26		or less of trench length, as measured along the length of the pipe. A minimum of
27		one test shall be performed for every 2 vertical feet of compacted backfill
28		material, independent of the contractor's lift thickness for compaction. Test
29		locations shall be staggered within each lift so that successive lifts are not tested
30		in the same location. A random number generator may be used to determine test
31		locations. Moisture/density tests shall be performed at a depth not more than 2
32		feet above the top of the pipe bedding and in 2-foot increments up to the final
33		grade. The project inspector or project manager may request testing at an
34		increased frequency and/or at specific locations.
35		e. The contractor can proceed with subsequent earthwork only after test results for
36		previously completed work comply with requirements. If the required
37		compaction density has not been obtained, the backfill should be scarified and
38		moistened or aerated, or removed to a depth required, and be replaced with
39		approved backfill, and re-compacted to the specified density at the contractor's
40		expense. In no case will excavation, pipe-laying, or other operation be allowed
41		to proceed until the specified compaction is attained.
42		f. The testing lab will provide results to Contractor and the City's Inspector upon
43		completion of the testing.
44		g. A formal report will be posted to the City's Accela (Developer Projects) and
45		BIM 360 (City Projects) site within 48 hours.
46		h. Test reports shall include:
47		1) Location of test by station number

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1		2) Time and date of test
2		3) Depth of testing
3		4) Field moisture
4		5) Dry density
5		6) Proctor identifier
6		7) Percent Proctor Density
7		3. Density of Embedment
8		a. Storm sewer boxes that are embedded with acceptable backfill material,
9		blended backfill material, cement modified backfill material or select material
10		will follow the same testing procedure as backfill.
11		b. The City may test fine crushed rock or crushed rock embedment in accordance
12		with ASTM D2922 or ASTM 1556.
13		B. Non-Conforming Work
14		1. All non-conforming work shall be removed and replaced.
15	3.8	SYSTEM STARTUP [NOT USED]
16	3.9	ADJUSTING [NOT USED]
17	3.10	CLEANING [NOT USED]
18	3.11	CLOSEOUT ACTIVITIES [NOT USED]
-		

- 19 3.12 PROTECTION [NOT USED]
- 20 3.13 MAINTENANCE [NOT USED]
- 21 3.14 ATTACHMENTS [NOT USED]
- 22

#### **END OF SECTION**

Revision Log			
DATE	NAME	SUMMARY OF CHANGE	
12/20/2012	D. Johnson	<ul> <li>1.2 - Added Item for Concrete Encasement for Utility Lines</li> <li>Various Sections - Revised Depths to Include 15' and greater</li> <li>3.3.A - Additional notes for pavement protection and positive drainage.</li> <li>3.4.E.2 - Added requirements for backfill of service lines.</li> <li>3.4.E.5 - Added language prohibiting flooding of trench</li> </ul>	
6/18/2013	D. Johnson	<ul> <li>1.2.A.3 – Clarified measurement and payment for concrete encasement as per plan quantity</li> <li>2.2.A – Added language for concrete encasement</li> </ul>	
11/09/16	Z. Arega	2.2.A.1.d Modify gradation for sand material	
2/26/2021	Z. Arega	<ul> <li>2.2 A. 1. E Added reference to pre-approved list of sand sources for embedment;</li> <li>3.3 A. 6 Changed reference to Transportation Management Division; 3.4 -</li> <li>Provided clarification re: use of commercial testing firms approved by City and backfill requirements; and 3.7 A. 2. Provided clarification re: backfill testing requirements.</li> </ul>	

4/2/2021	M Owen	3.4 D. 6. Add requirements Storm Sewer (PP - Polypropylene)
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