

## Compliance Checklist – Design Concept

### Job Information

|                        |  |                                   |   |
|------------------------|--|-----------------------------------|---|
| Application No.        |  | Job. No.                          |   |
| Job Engineer Name      |  | Date                              |   |
| Job Engineer Signature |  | Stage<br>Pre-Plan<br>Review (PPR) | <input type="checkbox"/> #1 Concept<br><input type="checkbox"/> #2 Design & ROW<br><input type="checkbox"/> #3 Plan Preparation<br><input type="checkbox"/> _____ |

### Other Utilities

| Utility  | Existing Utility<br>( <input type="checkbox"/> shown on plans)<br><b>Mandatory by PPR#2</b> |                             | Proposed Utility<br>( <input type="checkbox"/> shown on plans) |                          |                            | Not Existing             | Not Proposed             | N/A                      | Var Req |
|--|---|-----------------------------|--|--------------------------|----------------------------|--------------------------|--------------------------|--------------------------|---------|
|  | Variance Request  | location per field markings | MUST SUBMIT TO ADVANCE!  | Variance Request         | design approved by utility |                          |                          |                          | TBD     |
|  | rec'd record information only   |                             | not submitted to utility<br><b>HALT!</b>                       | submitted to utility     |                            |                          |                          |                          |         |
| water  | <input type="checkbox"/>  | <input type="checkbox"/>    | <input type="checkbox"/>                                       | <input type="checkbox"/> | <input type="checkbox"/>   | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |         |
| joint trench (with gas, electrical, cable)       | <input type="checkbox"/>  | <input type="checkbox"/>    | <input type="checkbox"/>                                       | <input type="checkbox"/> | <input type="checkbox"/>   | PGE trans                | <input type="checkbox"/> | <input type="checkbox"/> |         |
| OR joint trench (withOUT gas, electrical, cable) | <input type="checkbox"/>  | <input type="checkbox"/>    | <input type="checkbox"/>                                       | <input type="checkbox"/> | <input type="checkbox"/>   | PGE trans                | <input type="checkbox"/> | <input type="checkbox"/> |         |
| storm drain                                      | <input type="checkbox"/>  | <input type="checkbox"/>    | <input type="checkbox"/>                                       | <input type="checkbox"/> | <input type="checkbox"/>   | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |         |
| private streetlights                             | <input type="checkbox"/>  | <input type="checkbox"/>    | <input type="checkbox"/>                                       | <input type="checkbox"/> | <input type="checkbox"/>   | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |         |
| recycled water                                   | <input type="checkbox"/>  | <input type="checkbox"/>    | <input type="checkbox"/>                                       | <input type="checkbox"/> | <input type="checkbox"/>   | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |         |
| untreated canal water                            | <input type="checkbox"/>  | <input type="checkbox"/>    | <input type="checkbox"/>                                       | <input type="checkbox"/> | <input type="checkbox"/>   | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |         |
| other:   | <input type="checkbox"/>  | <input type="checkbox"/>    | <input type="checkbox"/>                                       | <input type="checkbox"/> | <input type="checkbox"/>   | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |         |

### Compliance with Standard Specifications

| Criteria                           | Standard  | Variance Request   |
|------------------------------------|---|--|
| <b>General</b>                     |   |  |
| <b>Sewer Shed</b>                  | <input type="checkbox"/> serves ultimate tributary area   | <input type="checkbox"/> not consistent ultimate tributary area  |
| <b>Storm Water Drainage</b>        | <input type="checkbox"/> sewers not in storm water drainage existing or new systems (natural or artificial)   | sewers are located in:<br><input type="checkbox"/> creeks/swales; <input type="checkbox"/> culverts;<br><input type="checkbox"/> valley gutters<br><input type="checkbox"/> engineered bioswales w/ subdrain ("C3")      |
| <b>Hillsides</b>                   | <input type="checkbox"/> not on hillside; or<br><input type="checkbox"/> in stable, not steep hillside is stable  | <input type="checkbox"/> steep terrain<br><input type="checkbox"/> unstable or slide areas   |
| <b>Other</b>                       | <input type="checkbox"/> not applicable   | <input type="checkbox"/> suspended or exposed pipe; <input type="checkbox"/> siphon<br><input type="checkbox"/> railroad xing; <input type="checkbox"/> special utility xing<br><input type="checkbox"/> FEMA flood zone |
| <b>Point of Connection (§8-06)</b> |   |  |
| <b>Point of Connection</b>         | manhole: <input type="checkbox"/> existing or <input type="checkbox"/> new*; and<br><input type="checkbox"/> standard or <input type="checkbox"/> trunk<br>(*replace ex Rodding Inlet with new manhole & field verify it was placed at 45° angle) | <input type="checkbox"/> existing/ new shallow manhole<br><input type="checkbox"/> buried pipe connection<br><input type="checkbox"/> did not verify if ex RI placed at 45° angle  |
| <b>Invert Verified</b>             | <input type="checkbox"/> survey (e.g., pothole or "dip" existing manhole)   | <input type="checkbox"/> interpolation of field-survey<br><input type="checkbox"/> estimated from record drawing   |

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| Criteria                        | Standard   | Variance Request   |
|---------------------------------|--|--|
| <b>Invert Elevation (IE)</b>    | <input type="checkbox"/> If connecting to main (8-12"), then IE $\leq 0.25'$ higher than IE of ex main; or<br><input type="checkbox"/> If connecting to trunk ( $\geq 15"$ ), then IE is<br><input type="checkbox"/> 3", <input type="checkbox"/> 6", <input type="checkbox"/> other, fill in _____" above crown of existing trunk   | <input type="checkbox"/> If connecting to main (8-12"), IE $> 0.25'$ higher than IE of ex main<br><input type="checkbox"/> If connecting to trunk, IE below crown of existing Trunk  |
| <b>Sewer Pipe (§8-07)</b>       |  |  |
| <b>Central San STA</b>          | <input type="checkbox"/> 0+00 at most downstream POC<br><input type="checkbox"/> Centerline stationing, no offsets<br><input type="checkbox"/> moves in upstream direction<br><input type="checkbox"/> wye STA for laterals match reqmts above   | <b>No variances allowed for Central San STA</b>  |
| <b>SS Line Designations</b>     | <input type="checkbox"/> Start with "A" at POC. "A" to continue moving upstream with the thru condition until the Terminus SSMH or until a branch that completely severs "A". "B" is the first branch off "A". Use consecutive letters moving upstream of pipe<br><input type="checkbox"/> If more than one sewer shed and A-Z are already used, then reset "A" at the different POC; or <input type="checkbox"/> N/A<br><input type="checkbox"/> For large Job or complicated configurations, then discuss with Central San during compliance acceptance stage; or <input type="checkbox"/> N/A | <b>No variances allowed for SS Line Designations</b>   |
| <b>Location of Sewer</b>        | Centerline (CL):<br><input type="checkbox"/> existing or <input type="checkbox"/> new roadway / driveway<br><input type="checkbox"/> Not in CL, legal separation from water  | <input type="checkbox"/> not in roadway / driveway<br><input type="checkbox"/> not centerline w/no legal separation from water requirements  |
| <b>Surface Improvement</b>      | regular, impervious pavement / concrete:<br><input type="checkbox"/> AC or <input type="checkbox"/> PCC  | <input type="checkbox"/> pervious pavement / pavers, etc.<br>( <input type="checkbox"/> provided detailed cross-section/details)<br><input type="checkbox"/> stamped/ coloured pavement<br><input type="checkbox"/> landscaped area or not improved            |
| <b>Pipe Size &amp; Material</b> | <input type="checkbox"/> 8" PVC SDR-26 (preferred). <span style="color: red;">(not allowed for pipe not under impervious surface, slope greater than 20%, or less than std cover.)</span><br><input type="checkbox"/> other: complies <a href="#">Table 4 &amp; 6</a> Std Specs  | <input type="checkbox"/> does not comply <a href="#">Table 4 &amp; 6</a> Std Specs   |
| <b>Slope</b>                    | <input type="checkbox"/> for 8" pipes: $0.0077 \leq \text{slope} \leq 0.20$ ;<br><input type="checkbox"/> for other: complies <a href="#">Table 4 &amp; 6</a> Std Specs  | <input type="checkbox"/> slope $< 0.0077$<br><input type="checkbox"/> slope $> 0.20$   |
| <b>Horizontal Curve</b>         | <input type="checkbox"/> Radius, Arc Length, Delta provided<br><input type="checkbox"/> mathematically correct<br><input type="checkbox"/> deflection between MHs $\leq 45^\circ$<br><input type="checkbox"/> deflection between successive straight segments of pipe $\leq 11-1/4^\circ$<br><input type="checkbox"/> deflections at each joint/end of pipe segment max 3 degrees  | <input type="checkbox"/> deflection between MHs $> 45^\circ$<br><input type="checkbox"/> deflection between successive straight segments of pipe $> 11-1/4^\circ$<br><input type="checkbox"/> deflections at each joint/end $> 3$ degree. <b>NOT APPROVED!</b> |
| <b>Vertical Curves</b>          | <input type="checkbox"/> mathematically correct<br><input type="checkbox"/> min slopes comply w/ <a href="#">Table 4</a> Std Specs<br><input type="checkbox"/> max slopes comply w/ <a href="#">Tables 6 &amp; 7</a><br>Profile, to include:<br><input type="checkbox"/> station & IE for BVI (downstream)<br><input type="checkbox"/> station & IE for PVI (midway)<br><input type="checkbox"/> station & IE for EVI (upstream)<br><input type="checkbox"/> slopes from EVI – PVI, PVI – EVI<br><input type="checkbox"/> length – minimum 200'  | <input type="checkbox"/> slopes do not comply with <a href="#">Tables</a><br><input type="checkbox"/> Vertical Length is less than 200'  |

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| Criteria   | Standard  | Variance Request   |                     |                  |  |
|--|---|--|---------------------|------------------|--|
| <b>Sewer Pipe – clearances (§8-07B)</b>  |   |  |                     |                  |  |
| <b>Horizontal Clearance</b>  | <input type="checkbox"/> ≥ 10' from outer potable water pipe<br><input type="checkbox"/> ≥ 5' from edge of pavement, lip of gutter or face of curb if no lip of gutter, valley gutter<br><input type="checkbox"/> ≥ 5' from retaining walls<br><input type="checkbox"/> ≥ 3' from outer pipe (not potable water)<br><input type="checkbox"/> ≥ 3' from outer structure/box/vault            | <input type="checkbox"/> <10' from outer potable water pipe<br><input type="checkbox"/> submitted authorization from water agency<br><input type="checkbox"/> < from edge of pavement, lip of gutter or face of curb if no lip of gutter, valley gutter<br><input type="checkbox"/> < 5' from retaining walls<br><input type="checkbox"/> < 3' from outer pipe (not potable water)<br><input type="checkbox"/> < 3' from outer structure/box/vault |                     |                  |  |
| <b>Xing Angles of Utilities</b>  | <input type="checkbox"/> ≥ 30° angle  | <input type="checkbox"/> ≤ 30° angle   |                     |                  |  |
| <b>Vertical Clearance</b>  | <input type="checkbox"/> ≥ 1' (12-inches) from other utilities or structures  | <input type="checkbox"/> < 1' (12-inches) from other utilities or structures   |                     |                  |  |
| <b>Manholes (§8-10)</b>  |   |  |                     |                  |  |
| <b>At required locations</b>   | <input type="checkbox"/> 50' < interval < 500'<br><input type="checkbox"/> change in sewer pipe size<br><input type="checkbox"/> change in sewer pipe material<br><input type="checkbox"/> sewer intersections<br><input type="checkbox"/> sewer grade breaks<br><input type="checkbox"/> last upstream lateral (no dry pipe)<br><input type="checkbox"/> Pipe Deflection Angle (PDA) < 90° | <input type="checkbox"/> < 50' or > 500'<br><input type="checkbox"/> not at change in sewer pipe size<br><input type="checkbox"/> not at change in sewer pipe material<br><input type="checkbox"/> not at sewer intersections<br><input type="checkbox"/> not at sewer grade breaks<br><input type="checkbox"/> not at last upstream lateral<br><input type="checkbox"/> PDA > 90°   |                     |                  |  |
| <b>Min/Max Depth</b>   | <input type="checkbox"/> 44" < depth* < 20'<br>(*for new roadways, min depth as measured from subgrade to top of pipe)  | <input type="checkbox"/> depth ≤ 44"<br><input type="checkbox"/> depth ≥ 20' ( <input type="checkbox"/> prepared structural detail & calcs)  |                     |                  |  |
| <b>Access to SSMHs</b>   | <input type="checkbox"/> All new SSMHs have vehicular access<br><input type="checkbox"/> All existing SSMHs have vehicular access   | <input type="checkbox"/> All new SSMHs do not have veh. access<br><input type="checkbox"/> All ex SSMHs do not have veh. Access  |                     |                  |  |
| <b>Drop across</b>   | <input type="checkbox"/> where through-flow, then no drop<br><input type="checkbox"/> where PDA>30°, then drop is exactly 0.25'<br><input type="checkbox"/> IE in at Trunk MH is 6" above crown   | <input type="checkbox"/> where through-flow, drop exists.<br><input type="checkbox"/> where PDA>30°, drop is not exactly 0.25'<br><input type="checkbox"/> IE in at Trunk MH is not 6" above crown   |                     |                  |  |
| <b>Wyes Lower Laterals</b>   |   |  |                     |                  |  |
| <b>Wyes &amp; Lower Laterals (DWG 22-02)</b>   | <input type="checkbox"/> for building approved by, or in review with, Building Department   | <input type="checkbox"/> for future building. <b>Not approved!</b>   |                     |                  |  |
| <b>Connections to Main</b>   | <input type="checkbox"/> intersect main at 90°<br><input type="checkbox"/> enter manhole min 45° apart  | <input type="checkbox"/> intersect main not at 90°<br><input type="checkbox"/> enter manhole < 45° apart   |                     |                  |  |
| <b>Material</b>  | <input type="checkbox"/> matches sewer main   | <input type="checkbox"/> does not match  |                     |                  |  |
| <b>Invert</b>  | <input type="checkbox"/> crown of lateral matches crown of main   | <input type="checkbox"/> does not match  |                     |                  |  |
| <b>Miscellaneous</b>   |   |  |                     |                  |  |
| <input type="checkbox"/> Annexation Request & Petition<br><input type="checkbox"/> Potential Reimbursable Lots<br><input type="checkbox"/> Ultimate Tributary Service Area<br><input type="checkbox"/> Capacity Study<br><input type="checkbox"/> Inside Pipe Video Inspections<br><input type="checkbox"/> Other: |   | <input type="checkbox"/> Geotechnical Report<br><input type="checkbox"/> Arborist Report<br><input type="checkbox"/> <b>Typical Cross-Sections (with utilities) MANDATORY!</b><br><input type="checkbox"/> Detail/Specific Cross-Sections<br><input type="checkbox"/> Real Property Agreement (RPA) Exhibit  |                     |                  |  |
| <b>Central San Variance Table</b>  |   |  |                     |                  |  |
| <input type="checkbox"/> Place Table on Coversheet<br><br><input type="checkbox"/> Place "V_" notation on plan/profile sheet where information is displayed.   | ID#   | Description  | Standard Spec/Dwg # | Location/Sheet # | Mitigation Measures / Approval Condition <b>AS DETERMINED BY CENTRAL SAN</b> |
|  | V1  | <b>FILL-IN INFO FROM APPROVED VARIANCES</b>  |                     |                  |  |
|  | V2  |  |                     |                  |  |

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### Attachment - Design Tables

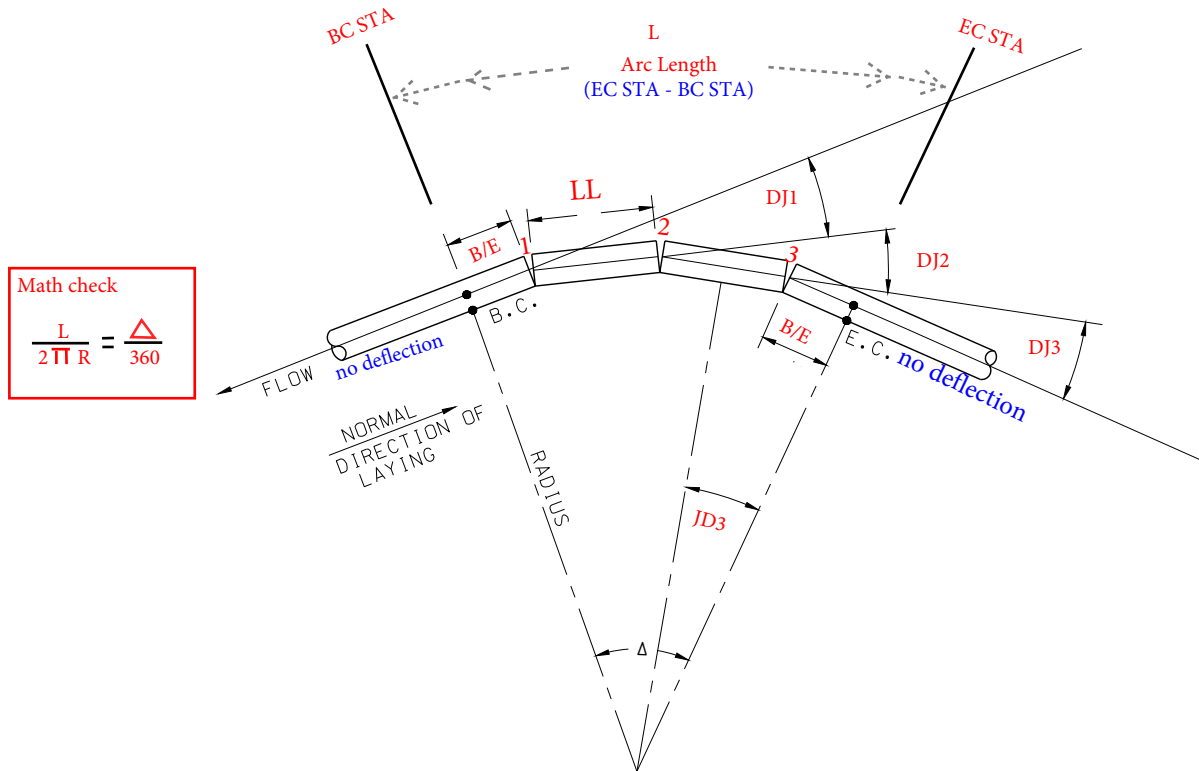
| <p><b>Manhole Table</b></p> <p><input type="checkbox"/> <b>Mandatory</b></p> <p><input type="checkbox"/> Place on plan/profile sheet where information is displayed.</p>       | <p>Provide one Table for each SS Line designation, in format shown below. <b>Do not show footnotes, use for instructions only. Blue font = sample.</b></p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th colspan="7" style="text-align: center;">SSMH Table - SS Line Segment <b>X</b><sup>1</sup> (governs if provided elsewhere)</th> </tr> <tr> <th rowspan="2">SS Sta<sup>2</sup></th> <th rowspan="2">SSMH #<sup>3</sup></th> <th rowspan="2">Type<sup>4</sup> (Dwg #)</th> <th rowspan="2">Height<sup>5</sup> (feet)</th> <th rowspan="2">PDA<sup>6</sup> (deg)</th> <th colspan="2">Drops and Flow Direction across SSMHs</th> </tr> <tr> <th>Delta<sup>7</sup> (feet)</th> <th>U/S to D/S SSMH# or Terminal<sup>8</sup> SSMH</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">0+00</td> <td style="text-align: center;">ex SSMH 24 (73C3)</td> <td style="text-align: center;">19-01</td> <td style="text-align: center;">6.0</td> <td style="text-align: center;">0</td> <td style="text-align: center;">0</td> <td style="text-align: center;">#1 to ex SSMH 24 (73C3)</td> </tr> <tr> <td style="text-align: center;">3+00</td> <td style="text-align: center;">1</td> <td style="text-align: center;">19-01</td> <td style="text-align: center;">6.0</td> <td style="text-align: center;">90</td> <td style="text-align: center;">0.25</td> <td style="text-align: center;">#2 to #1</td> </tr> </tbody> </table> <p><sup>1</sup> Use separate SSMH table for different SS Line Designations.<br/> <sup>2</sup> The most downstream Point of Connection (0+00) shall be 0+00 with no offsets.<br/> <sup>3</sup> Start with #1 for most downstream SSMH. If existing SSMH, use Central San's Tag #. Example: Ex SSMH 71 (69E4)<br/> <sup>4</sup> For trunk manholes, incoming pipe must be 6" above crown of existing trunk line.<br/> <sup>5</sup> Measured from Rim to lowest Invert Elevation Out. Use shallow SSMH if 44" and less; use trunk SSMH if greater than 20' deep.<br/> <sup>6</sup> Pipe Deflection Angle (PDA) of outgoing pipe versus incoming pipe for this line designation. Calculated acute angle (cannot be greater than 90°) as measured from upstream to downstream direction. N/A at Terminal SSMHs.<br/> <sup>7</sup> For thru conditions use 0.00'. If PDA is greater than 30°, use 0.25' exactly (between 0.25-1.0, requires Central San approval). See item #4 for connecting to existing trunks. N/A at Terminal SSMHs.<br/> <sup>8</sup> If more than one pipe in, use separate SSMH table as PDA and Deltas could be different.</p> | SSMH Table - SS Line Segment <b>X</b> <sup>1</sup> (governs if provided elsewhere) |  |                        |                                       |  |  |             | SS Sta <sup>2</sup>   | SSMH # <sup>3</sup> | Type <sup>4</sup> (Dwg #)  | Height <sup>5</sup> (feet) | PDA <sup>6</sup> (deg) | Drops and Flow Direction across SSMHs |                         | Delta <sup>7</sup> (feet) | U/S to D/S SSMH# or Terminal <sup>8</sup> SSMH | 0+00         | ex SSMH 24 (73C3) | 19-01  | 6.0 | 0 | 0 | #1 to ex SSMH 24 (73C3)                | 3+00     | 1          | 19-01   | 6.0         | 90          | 0.25          | #2 to #1 |                                     |                       |                                     |                            |     |     |              |               |                                     |     |                                     |            |        |     |                                      |            |                                     |     |                                     |              |     |     |                   |            |                          |     |                          |          |       |
|--|--|--|--|------------------------|---------------------------------------|--|--|-------------|-----------------------|---------------------|----------------------------|----------------------------|------------------------|---------------------------------------|-------------------------|---------------------------|--|--------------|-------------------|--|-----|---|---|--|----------|------------|---------|-------------|-------------|---------------|----------|-------------------------------------|-----------------------|-------------------------------------|----------------------------|-----|-----|--------------|---------------|-------------------------------------|-----|-------------------------------------|------------|--------|-----|--------------------------------------|------------|-------------------------------------|-----|-------------------------------------|--------------|-----|-----|-------------------|------------|--------------------------|-----|--------------------------|----------|-------|
| SSMH Table - SS Line Segment <b>X</b> <sup>1</sup> (governs if provided elsewhere)   |  |  |  |                        |                                       |  |  |             |                       |                     |                            |                            |                        |                                       |                         |                           |  |              |                   |  |     |   |   |  |          |            |         |             |             |               |          |                                     |                       |                                     |                            |     |     |              |               |                                     |     |                                     |            |        |     |                                      |            |                                     |     |                                     |              |     |     |                   |            |                          |     |                          |          |       |
| SS Sta <sup>2</sup>  | SSMH # <sup>3</sup>  | Type <sup>4</sup> (Dwg #)  | Height <sup>5</sup> (feet)   | PDA <sup>6</sup> (deg) | Drops and Flow Direction across SSMHs |  |  |             |                       |                     |                            |                            |                        |                                       |                         |                           |  |              |                   |  |     |   |   |  |          |            |         |             |             |               |          |                                     |                       |                                     |                            |     |     |              |               |                                     |     |                                     |            |        |     |                                      |            |                                     |     |                                     |              |     |     |                   |            |                          |     |                          |          |       |
|  |  |  |  |                        | Delta <sup>7</sup> (feet)             | U/S to D/S SSMH# or Terminal <sup>8</sup> SSMH |  |             |                       |                     |                            |                            |                        |                                       |                         |                           |  |              |                   |  |     |   |   |  |          |            |         |             |             |               |          |                                     |                       |                                     |                            |     |     |              |               |                                     |     |                                     |            |        |     |                                      |            |                                     |     |                                     |              |     |     |                   |            |                          |     |                          |          |       |
| 0+00   | ex SSMH 24 (73C3)  | 19-01  | 6.0  | 0                      | 0                                     | #1 to ex SSMH 24 (73C3)                        |  |             |                       |                     |                            |                            |                        |                                       |                         |                           |  |              |                   |  |     |   |   |  |          |            |         |             |             |               |          |                                     |                       |                                     |                            |     |     |              |               |                                     |     |                                     |            |        |     |                                      |            |                                     |     |                                     |              |     |     |                   |            |                          |     |                          |          |       |
| 3+00   | 1  | 19-01  | 6.0  | 90                     | 0.25                                  | #2 to #1                                       |  |             |                       |                     |                            |                            |                        |                                       |                         |                           |  |              |                   |  |     |   |   |  |          |            |         |             |             |               |          |                                     |                       |                                     |                            |     |     |              |               |                                     |     |                                     |            |        |     |                                      |            |                                     |     |                                     |              |     |     |                   |            |                          |     |                          |          |       |
| <p><b>Pothole Table</b></p> <p><input type="checkbox"/> If Applicable</p> <p><input type="checkbox"/> Place on plan/profile sheet where information is displayed.</p>          | <p>If applicable, provide in format shown below. <b>Blue font = sample.</b></p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th colspan="8" style="text-align: center;">Pothole Table (governs if provided elsewhere)</th> </tr> <tr> <th rowspan="3">Pothole #</th> <th colspan="2">Existing Utility</th> <th colspan="5">Reason to Pothole</th> </tr> <tr> <th rowspan="2">Type (Owner)</th> <th rowspan="2">Size/ Mat'l</th> <th colspan="4">Clearances (Relationship to SS)<br/>check off and provide measured clearance, or N/A for existing Central San</th> <th rowspan="2">For SS POC purposes, N/A or SS IE (ft)</th> </tr> <tr> <th>Vertical</th> <th>Horizontal</th> <th></th> <th></th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">PH1</td> <td style="text-align: center;">Water (EBMUD)</td> <td style="text-align: center;">6" PVC</td> <td style="text-align: center;"><input checked="" type="checkbox"/></td> <td style="text-align: center;">2'</td> <td style="text-align: center;"><input checked="" type="checkbox"/></td> <td style="text-align: center;">10'</td> <td style="text-align: center;">N/A</td> </tr> <tr> <td style="text-align: center;">PH2</td> <td style="text-align: center;">Joint trench</td> <td style="text-align: center;">24" wide</td> <td style="text-align: center;"><input checked="" type="checkbox"/></td> <td style="text-align: center;">3'</td> <td style="text-align: center;"><input checked="" type="checkbox"/></td> <td style="text-align: center;">3'</td> <td style="text-align: center;">N/A</td> </tr> <tr> <td style="text-align: center;">PH3</td> <td style="text-align: center;">Untreated canal water (Diablo Vista)</td> <td style="text-align: center;">4" PVC</td> <td style="text-align: center;"><input checked="" type="checkbox"/></td> <td style="text-align: center;">3'</td> <td style="text-align: center;"><input checked="" type="checkbox"/></td> <td style="text-align: center;">3'</td> <td style="text-align: center;">N/A</td> </tr> <tr> <td style="text-align: center;">PH3</td> <td style="text-align: center;">Central San Sewer</td> <td style="text-align: center;">8" VCP</td> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;">N/A</td> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;">N/A</td> <td style="text-align: center;">87.5'</td> </tr> </tbody> </table>  | Pothole Table (governs if provided elsewhere)                                      |  |                        |                                       |  |  |             |                       | Pothole #           | Existing Utility           |                            | Reason to Pothole      |                                       |                         |                           |  | Type (Owner) | Size/ Mat'l       | Clearances (Relationship to SS)<br>check off and provide measured clearance, or N/A for existing Central San |     |   |   | For SS POC purposes, N/A or SS IE (ft) | Vertical | Horizontal |         |             | PH1         | Water (EBMUD) | 6" PVC   | <input checked="" type="checkbox"/> | 2'                    | <input checked="" type="checkbox"/> | 10'                        | N/A | PH2 | Joint trench | 24" wide      | <input checked="" type="checkbox"/> | 3'  | <input checked="" type="checkbox"/> | 3'         | N/A    | PH3 | Untreated canal water (Diablo Vista) | 4" PVC     | <input checked="" type="checkbox"/> | 3'  | <input checked="" type="checkbox"/> | 3'           | N/A | PH3 | Central San Sewer | 8" VCP     | <input type="checkbox"/> | N/A | <input type="checkbox"/> | N/A      | 87.5' |
| Pothole Table (governs if provided elsewhere)  |  |  |  |                        |                                       |  |  |             |                       |                     |                            |                            |                        |                                       |                         |                           |  |              |                   |  |     |   |   |  |          |            |         |             |             |               |          |                                     |                       |                                     |                            |     |     |              |               |                                     |     |                                     |            |        |     |                                      |            |                                     |     |                                     |              |     |     |                   |            |                          |     |                          |          |       |
| Pothole #  | Existing Utility   |  | Reason to Pothole  |                        |                                       |  |  |             |                       |                     |                            |                            |                        |                                       |                         |                           |  |              |                   |  |     |   |   |  |          |            |         |             |             |               |          |                                     |                       |                                     |                            |     |     |              |               |                                     |     |                                     |            |        |     |                                      |            |                                     |     |                                     |              |     |     |                   |            |                          |     |                          |          |       |
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|  |  |  | Vertical   | Horizontal             |                                       |  |  |             |                       |                     |                            |                            |                        |                                       |                         |                           |  |              |                   |  |     |   |   |  |          |            |         |             |             |               |          |                                     |                       |                                     |                            |     |     |              |               |                                     |     |                                     |            |        |     |                                      |            |                                     |     |                                     |              |     |     |                   |            |                          |     |                          |          |       |
| PH1  | Water (EBMUD)  | 6" PVC   | <input checked="" type="checkbox"/>  | 2'                     | <input checked="" type="checkbox"/>   | 10'  | N/A                                    |             |                       |                     |                            |                            |                        |                                       |                         |                           |  |              |                   |  |     |   |   |  |          |            |         |             |             |               |          |                                     |                       |                                     |                            |     |     |              |               |                                     |     |                                     |            |        |     |                                      |            |                                     |     |                                     |              |     |     |                   |            |                          |     |                          |          |       |
| PH2  | Joint trench   | 24" wide   | <input checked="" type="checkbox"/>  | 3'                     | <input checked="" type="checkbox"/>   | 3'   | N/A                                    |             |                       |                     |                            |                            |                        |                                       |                         |                           |  |              |                   |  |     |   |   |  |          |            |         |             |             |               |          |                                     |                       |                                     |                            |     |     |              |               |                                     |     |                                     |            |        |     |                                      |            |                                     |     |                                     |              |     |     |                   |            |                          |     |                          |          |       |
| PH3  | Untreated canal water (Diablo Vista)   | 4" PVC   | <input checked="" type="checkbox"/>  | 3'                     | <input checked="" type="checkbox"/>   | 3'   | N/A                                    |             |                       |                     |                            |                            |                        |                                       |                         |                           |  |              |                   |  |     |   |   |  |          |            |         |             |             |               |          |                                     |                       |                                     |                            |     |     |              |               |                                     |     |                                     |            |        |     |                                      |            |                                     |     |                                     |              |     |     |                   |            |                          |     |                          |          |       |
| PH3  | Central San Sewer  | 8" VCP   | <input type="checkbox"/>   | N/A                    | <input type="checkbox"/>              | N/A  | 87.5'                                  |             |                       |                     |                            |                            |                        |                                       |                         |                           |  |              |                   |  |     |   |   |  |          |            |         |             |             |               |          |                                     |                       |                                     |                            |     |     |              |               |                                     |     |                                     |            |        |     |                                      |            |                                     |     |                                     |              |     |     |                   |            |                          |     |                          |          |       |
| <p><b>Utility Crossing Table</b></p> <p><input type="checkbox"/> If Applicable</p> <p><input type="checkbox"/> Place on plan/profile sheet where information is displayed.</p> | <p>If applicable, then provide one Table for each SS Line designation, in format shown below. <b>Do not show footnotes, use for instructions only. Blue font = sample.</b></p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th colspan="12" style="text-align: center;">Utility Crossing Table<sup>1</sup> (governs if provided elsewhere)</th> </tr> <tr> <th rowspan="2">#</th> <th rowspan="2">Angle Xing<sup>2</sup></th> <th colspan="4">Upper Pipe (bottom)</th> <th colspan="4">Lower Pipe (top)</th> <th colspan="2">Vertical Clearance</th> </tr> <tr> <th>Status</th> <th>Utility</th> <th>Size/ Mat'l</th> <th>Invert Elev</th> <th>Status</th> <th>Utility</th> <th>Size/ Mat'l</th> <th>Top Elev<sup>3</sup></th> <th>clear</th> <th>determined by<sup>4</sup></th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">X1</td> <td style="text-align: center;">90°</td> <td style="text-align: center;">new</td> <td style="text-align: center;">Water (EBMUD)</td> <td style="text-align: center;">6" PVC</td> <td style="text-align: center;">97'</td> <td style="text-align: center;">new</td> <td style="text-align: center;">SS (CCCSD)</td> <td style="text-align: center;">8" PVC</td> <td style="text-align: center;">96'</td> <td style="text-align: center;">12"</td> <td style="text-align: center;">record dwg</td> </tr> <tr> <td style="text-align: center;">X2</td> <td style="text-align: center;">45°</td> <td style="text-align: center;">ex</td> <td style="text-align: center;">Joint trench</td> <td style="text-align: center;">24"</td> <td style="text-align: center;">80'</td> <td style="text-align: center;">new</td> <td style="text-align: center;">SS (CCCSD)</td> <td style="text-align: center;">8" DIP</td> <td style="text-align: center;">85'</td> <td style="text-align: center;">5'</td> <td style="text-align: center;">potholed</td> </tr> </tbody> </table> <p><sup>1</sup> not required for services<br/> <sup>2</sup> shall be greater than 30° to the centerline of sewer<br/> <sup>3</sup> elevation of the top of pipe/utility<br/> <sup>4</sup> method to determine vertical clearance of existing utilities cannot be by design, instead determine by pothole data, record drawings, interpolations, past practice, etc. If potholed, must provide pothole table.</p>   | Utility Crossing Table <sup>1</sup> (governs if provided elsewhere)                |  |                        |                                       |  |  |             |                       |                     |                            |                            |                        | #                                     | Angle Xing <sup>2</sup> | Upper Pipe (bottom)       |  |              |                   | Lower Pipe (top)   |     |   |   | Vertical Clearance                     |          | Status     | Utility | Size/ Mat'l | Invert Elev | Status        | Utility  | Size/ Mat'l                         | Top Elev <sup>3</sup> | clear                               | determined by <sup>4</sup> | X1  | 90° | new          | Water (EBMUD) | 6" PVC                              | 97' | new                                 | SS (CCCSD) | 8" PVC | 96' | 12"                                  | record dwg | X2                                  | 45° | ex                                  | Joint trench | 24" | 80' | new               | SS (CCCSD) | 8" DIP                   | 85' | 5'                       | potholed |       |
| Utility Crossing Table <sup>1</sup> (governs if provided elsewhere)  |  |  |  |                        |                                       |  |  |             |                       |                     |                            |                            |                        |                                       |                         |                           |  |              |                   |  |     |   |   |  |          |            |         |             |             |               |          |                                     |                       |                                     |                            |     |     |              |               |                                     |     |                                     |            |        |     |                                      |            |                                     |     |                                     |              |     |     |                   |            |                          |     |                          |          |       |
| #  | Angle Xing <sup>2</sup>  | Upper Pipe (bottom)  |  |                        |                                       | Lower Pipe (top)                               |  |             |                       | Vertical Clearance  |                            |                            |                        |                                       |                         |                           |  |              |                   |  |     |   |   |  |          |            |         |             |             |               |          |                                     |                       |                                     |                            |     |     |              |               |                                     |     |                                     |            |        |     |                                      |            |                                     |     |                                     |              |     |     |                   |            |                          |     |                          |          |       |
|  |  | Status   | Utility  | Size/ Mat'l            | Invert Elev                           | Status   | Utility                                | Size/ Mat'l | Top Elev <sup>3</sup> | clear               | determined by <sup>4</sup> |                            |                        |                                       |                         |                           |  |              |                   |  |     |   |   |  |          |            |         |             |             |               |          |                                     |                       |                                     |                            |     |     |              |               |                                     |     |                                     |            |        |     |                                      |            |                                     |     |                                     |              |     |     |                   |            |                          |     |                          |          |       |
| X1   | 90°  | new  | Water (EBMUD)  | 6" PVC                 | 97'                                   | new  | SS (CCCSD)                             | 8" PVC      | 96'                   | 12"                 | record dwg                 |                            |                        |                                       |                         |                           |  |              |                   |  |     |   |   |  |          |            |         |             |             |               |          |                                     |                       |                                     |                            |     |     |              |               |                                     |     |                                     |            |        |     |                                      |            |                                     |     |                                     |              |     |     |                   |            |                          |     |                          |          |       |
| X2   | 45°  | ex   | Joint trench   | 24"                    | 80'                                   | new  | SS (CCCSD)                             | 8" DIP      | 85'                   | 5'                  | potholed                   |                            |                        |                                       |                         |                           |  |              |                   |  |     |   |   |  |          |            |         |             |             |               |          |                                     |                       |                                     |                            |     |     |              |               |                                     |     |                                     |            |        |     |                                      |            |                                     |     |                                     |              |     |     |                   |            |                          |     |                          |          |       |

## Compliance Checklist – Design Concept

| <p><b>Horizontal Curve Table</b></p> <p><input type="checkbox"/> If Applicable</p> <p><input type="checkbox"/> Place on plan/profile sheet where information is displayed.</p> | <p>If horizontal curve(s), provide one Table for each SS Line designation, in format shown below. <b>Do not show footnotes, use for instructions only. Blue font = sample.</b></p> <table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th colspan="9">Horizontal Curve<sup>1</sup> Table (governs over Plan View)</th> </tr> <tr> <th>#<sup>2</sup></th> <th>D/S MH #</th> <th>BC Station (D/S)<sup>3</sup></th> <th>EC Station (U/S)<sup>3</sup></th> <th>Delta (D) (DMS or dec. degrees)</th> <th>Radius (R) (ft)<sup>4</sup></th> <th>Arc Length (ft)</th> <th>U/S MH #</th> <th>Cumulative Angle<sup>4</sup> of Pipe Run (degrees) (D/S to U/S MH)</th> </tr> </thead> <tbody> <tr> <td>C1</td> <td>1</td> <td>13+65.18</td> <td>15+42.13</td> <td>33° 47' 42"</td> <td>300</td> <td>176.95</td> <td>2</td> <td>33° 47' 42"</td> </tr> <tr> <td>C2</td> <td>3</td> <td>2+00</td> <td>2+65.15</td> <td>20° 47' 48"</td> <td>179.50</td> <td>65.15</td> <td>4</td> <td>20° 47' 48"</td> </tr> <tr> <td>C3</td> <td>3</td> <td>3+00</td> <td>3+44.10</td> <td>16° 27' 37"</td> <td>153.50</td> <td>44.10</td> <td>4</td> <td>37° 15' 53"</td> </tr> </tbody> </table> <p><sup>1</sup> Verify curve is mathematically correct: <math>L / (2 \pi R) = \Delta / 360</math><br/> <sup>2</sup> Depict Curve ID # on plan view.<br/> <sup>3</sup> Downstream (D/S) and Upstream (U/S)<br/> <sup>3</sup> If less than allowable axial bending and/or for DIP (see Dwg 21-01), then provide fitting or straight pipe Deflection Table.<br/> <sup>4</sup> Additive of curve angles between downstream and upstream SSMHs. Max 45 degrees.<br/> <i>Reference:</i> See <a href="#">Std Specs</a> Section 8-07.C, Curves – Vertical and Horizontal for design requirements.</p>  | Horizontal Curve <sup>1</sup> Table (governs over Plan View) |                               |                                 |                              |   |   |   |  |  | # <sup>2</sup> | D/S MH # | BC Station (D/S) <sup>3</sup> | EC Station (U/S) <sup>3</sup> | Delta (D) (DMS or dec. degrees) | Radius (R) (ft) <sup>4</sup> | Arc Length (ft) | U/S MH # | Cumulative Angle <sup>4</sup> of Pipe Run (degrees) (D/S to U/S MH) | C1  | 1 | 13+65.18 | 15+42.13 | 33° 47' 42" | 300 | 176.95 | 2 | 33° 47' 42" | C2  | 3 | 2+00 | 2+65.15 | 20° 47' 48" | 179.50 | 65.15 | 4 | 20° 47' 48" | C3                                      | 3 | 3+00 | 3+44.10 | 16° 27' 37" | 153.50 | 44.10 | 4 | 37° 15' 53" |          |         |                       |             |                   |                       |   |   |           |    |         |   |      |   |      |   |   |        |                   |         |      |      |      |   |      |      |        |                   |         |   |         |       |   |      |      |        |                   |         |   |         |       |   |      |      |        |                   |         |   |         |       |   |      |       |        |                   |         |   |         |       |   |      |       |        |                   |         |   |         |       |   |      |       |        |                   |         |   |         |       |   |      |                  |        |    |         |      |      |                  |      |   |      |        |
|--|--|--|-------------------------------|---------------------------------|------------------------------|---|---|---|--|--|----------------|----------|-------------------------------|-------------------------------|---------------------------------|------------------------------|-----------------|----------|---|---|---|----------|----------|-------------|-----|--------|---|-------------|---|---|------|---------|-------------|--------|-------|---|-------------|---|---|------|---------|-------------|--------|-------|---|-------------|----------|---------|-----------------------|-------------|-------------------|-----------------------|---|---|-----------|----|---------|---|------|---|------|---|---|--------|-------------------|---------|------|------|------|---|------|------|--------|-------------------|---------|---|---------|-------|---|------|------|--------|-------------------|---------|---|---------|-------|---|------|------|--------|-------------------|---------|---|---------|-------|---|------|-------|--------|-------------------|---------|---|---------|-------|---|------|-------|--------|-------------------|---------|---|---------|-------|---|------|-------|--------|-------------------|---------|---|---------|-------|---|------|------------------|--------|----|---------|------|------|------------------|------|---|------|--------|
| Horizontal Curve <sup>1</sup> Table (governs over Plan View)   |  |  |                               |                                 |                              |   |   |   |  |  |                |          |                               |                               |                                 |                              |                 |          |   |   |   |          |          |             |     |        |   |             |   |   |      |         |             |        |       |   |             |   |   |      |         |             |        |       |   |             |          |         |                       |             |                   |                       |   |   |           |    |         |   |      |   |      |   |   |        |                   |         |      |      |      |   |      |      |        |                   |         |   |         |       |   |      |      |        |                   |         |   |         |       |   |      |      |        |                   |         |   |         |       |   |      |       |        |                   |         |   |         |       |   |      |       |        |                   |         |   |         |       |   |      |       |        |                   |         |   |         |       |   |      |                  |        |    |         |      |      |                  |      |   |      |        |
| # <sup>2</sup>   | D/S MH #   | BC Station (D/S) <sup>3</sup>                                | EC Station (U/S) <sup>3</sup> | Delta (D) (DMS or dec. degrees) | Radius (R) (ft) <sup>4</sup> | Arc Length (ft)                               | U/S MH #                                | Cumulative Angle <sup>4</sup> of Pipe Run (degrees) (D/S to U/S MH) |  |  |                |          |                               |                               |                                 |                              |                 |          |   |   |   |          |          |             |     |        |   |             |   |   |      |         |             |        |       |   |             |   |   |      |         |             |        |       |   |             |          |         |                       |             |                   |                       |   |   |           |    |         |   |      |   |      |   |   |        |                   |         |      |      |      |   |      |      |        |                   |         |   |         |       |   |      |      |        |                   |         |   |         |       |   |      |      |        |                   |         |   |         |       |   |      |       |        |                   |         |   |         |       |   |      |       |        |                   |         |   |         |       |   |      |       |        |                   |         |   |         |       |   |      |                  |        |    |         |      |      |                  |      |   |      |        |
| C1   | 1  | 13+65.18   | 15+42.13                      | 33° 47' 42"                     | 300                          | 176.95  | 2                                       | 33° 47' 42"   |  |  |                |          |                               |                               |                                 |                              |                 |          |   |   |   |          |          |             |     |        |   |             |   |   |      |         |             |        |       |   |             |   |   |      |         |             |        |       |   |             |          |         |                       |             |                   |                       |   |   |           |    |         |   |      |   |      |   |   |        |                   |         |      |      |      |   |      |      |        |                   |         |   |         |       |   |      |      |        |                   |         |   |         |       |   |      |      |        |                   |         |   |         |       |   |      |       |        |                   |         |   |         |       |   |      |       |        |                   |         |   |         |       |   |      |       |        |                   |         |   |         |       |   |      |                  |        |    |         |      |      |                  |      |   |      |        |
| C2   | 3  | 2+00   | 2+65.15                       | 20° 47' 48"                     | 179.50                       | 65.15   | 4                                       | 20° 47' 48"   |  |  |                |          |                               |                               |                                 |                              |                 |          |   |   |   |          |          |             |     |        |   |             |   |   |      |         |             |        |       |   |             |   |   |      |         |             |        |       |   |             |          |         |                       |             |                   |                       |   |   |           |    |         |   |      |   |      |   |   |        |                   |         |      |      |      |   |      |      |        |                   |         |   |         |       |   |      |      |        |                   |         |   |         |       |   |      |      |        |                   |         |   |         |       |   |      |       |        |                   |         |   |         |       |   |      |       |        |                   |         |   |         |       |   |      |       |        |                   |         |   |         |       |   |      |                  |        |    |         |      |      |                  |      |   |      |        |
| C3   | 3  | 3+00   | 3+44.10                       | 16° 27' 37"                     | 153.50                       | 44.10   | 4                                       | 37° 15' 53"   |  |  |                |          |                               |                               |                                 |                              |                 |          |   |   |   |          |          |             |     |        |   |             |   |   |      |         |             |        |       |   |             |   |   |      |         |             |        |       |   |             |          |         |                       |             |                   |                       |   |   |           |    |         |   |      |   |      |   |   |        |                   |         |      |      |      |   |      |      |        |                   |         |   |         |       |   |      |      |        |                   |         |   |         |       |   |      |      |        |                   |         |   |         |       |   |      |       |        |                   |         |   |         |       |   |      |       |        |                   |         |   |         |       |   |      |       |        |                   |         |   |         |       |   |      |                  |        |    |         |      |      |                  |      |   |      |        |
| <p><b>Curve Deflection Table</b></p> <p><input type="checkbox"/> If Applicable</p> <p><input type="checkbox"/> Place on plan/profile sheet where information is displayed.</p> | <p>Where radius is less than the allowable axial bending or for ductile iron (DIP), provide one Table for each Curve, in format shown below. Also need to include Horizontal Curve Table. See Figure below for graphical representation. <b>Do not show footnotes, use for instructions only. Blue font = sample.</b></p> <table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th colspan="9">Curve Deflection Table (governs over Plan View)</th> </tr> <tr> <th colspan="9">C2 Curve</th> </tr> <tr> <td colspan="9">Delta (D) 19°49'10" (19.81 dec. deg.); Radius (R) 147.00' (DIP PIPE); Arc Length (L) 50.85' Slope (S) .0129</td> </tr> <tr> <td colspan="9">Deflection<sup>1</sup> @ Each Joint (DJ) 2°49'52" (2.83 dec. deg.)</td> </tr> <tr> <td colspan="9">Laid Length (LL) 7.0' (greater than 5')</td> </tr> <tr> <th>Descript</th> <th>Station</th> <th>Laid Length (LL) feet</th> <th>LL Descript</th> <th>Cumul Length feet</th> <th># Deflect @ Joint (N)</th> <th>Deflect @ Joint (DJ)<sup>1,2</sup> dec. deg.</th> <th>Cumulative Angle<sup>2</sup> dec. deg.</th> <th>I.E. feet</th> </tr> </thead> <tbody> <tr> <td>BC</td> <td>1+86.58</td> <td>0</td> <td>none</td> <td>0</td> <td>none</td> <td>0</td> <td>0</td> <td>774.77</td> </tr> <tr> <td>Deflect @ Joint 1</td> <td>1+91.00</td> <td>4.42</td> <td>½ LL</td> <td>4.42</td> <td>1</td> <td>2.83</td> <td>2.83</td> <td>774.83</td> </tr> <tr> <td>Deflect @ Joint 2</td> <td>1+98.00</td> <td>7</td> <td>Full LL</td> <td>11.42</td> <td>2</td> <td>2.83</td> <td>5.66</td> <td>774.92</td> </tr> <tr> <td>Deflect @ Joint 3</td> <td>2+05.00</td> <td>7</td> <td>Full LL</td> <td>18.42</td> <td>3</td> <td>2.83</td> <td>8.49</td> <td>775.01</td> </tr> <tr> <td>Deflect @ Joint 4</td> <td>2+12.00</td> <td>7</td> <td>Full LL</td> <td>25.42</td> <td>4</td> <td>2.83</td> <td>11.32</td> <td>775.10</td> </tr> <tr> <td>Deflect @ Joint 5</td> <td>2+19.00</td> <td>7</td> <td>Full LL</td> <td>32.42</td> <td>5</td> <td>2.83</td> <td>14.15</td> <td>775.19</td> </tr> <tr> <td>Deflect @ Joint 6</td> <td>2+26.00</td> <td>7</td> <td>Full LL</td> <td>39.42</td> <td>6</td> <td>2.83</td> <td>16.98</td> <td>775.28</td> </tr> <tr> <td>Deflect @ Joint 7</td> <td>2+33.00</td> <td>7</td> <td>Full LL</td> <td>46.42</td> <td>7</td> <td>2.83</td> <td><b>19.81 = D</b></td> <td>775.37</td> </tr> <tr> <td>EC</td> <td>2+37.43</td> <td>4.42</td> <td>½ LL</td> <td><b>50.85 = L</b></td> <td>none</td> <td>0</td> <td>none</td> <td>775.42</td> </tr> </tbody> </table> <p><sup>1</sup> deflections at each joint/end of pipe segment cannot exceed 3 degrees<br/> <sup>2</sup> DMS or decimal degree units.<br/> <b>Instructions:</b><br/> A. Verify curve is mathematically correct: <math>L / (2 \pi R) = \Delta / 360</math><br/> B. Select LL (greater than 5') and Determine N: <math>L / LL</math> round down to whole integer<br/> C. Determine Beginning/End (B/E) which is ½ Laid Length: <math>(L - ((N-1) \times LL)) / 2</math><br/> D. Determine DJ: <math>D / N</math>. (see footnote 1 regarding max angle)<br/> E. Cumulative Length must = L; Cumulative Angle must = D</p> | Curve Deflection Table (governs over Plan View)              |                               |                                 |                              |   |   |   |  |  | C2 Curve       |          |                               |                               |                                 |                              |                 |          |   | Delta (D) 19°49'10" (19.81 dec. deg.); Radius (R) 147.00' (DIP PIPE); Arc Length (L) 50.85' Slope (S) .0129 |   |          |          |             |     |        |   |             | Deflection <sup>1</sup> @ Each Joint (DJ) 2°49'52" (2.83 dec. deg.) |   |      |         |             |        |       |   |             | Laid Length (LL) 7.0' (greater than 5') |   |      |         |             |        |       |   |             | Descript | Station | Laid Length (LL) feet | LL Descript | Cumul Length feet | # Deflect @ Joint (N) | Deflect @ Joint (DJ) <sup>1,2</sup> dec. deg. | Cumulative Angle <sup>2</sup> dec. deg. | I.E. feet | BC | 1+86.58 | 0 | none | 0 | none | 0 | 0 | 774.77 | Deflect @ Joint 1 | 1+91.00 | 4.42 | ½ LL | 4.42 | 1 | 2.83 | 2.83 | 774.83 | Deflect @ Joint 2 | 1+98.00 | 7 | Full LL | 11.42 | 2 | 2.83 | 5.66 | 774.92 | Deflect @ Joint 3 | 2+05.00 | 7 | Full LL | 18.42 | 3 | 2.83 | 8.49 | 775.01 | Deflect @ Joint 4 | 2+12.00 | 7 | Full LL | 25.42 | 4 | 2.83 | 11.32 | 775.10 | Deflect @ Joint 5 | 2+19.00 | 7 | Full LL | 32.42 | 5 | 2.83 | 14.15 | 775.19 | Deflect @ Joint 6 | 2+26.00 | 7 | Full LL | 39.42 | 6 | 2.83 | 16.98 | 775.28 | Deflect @ Joint 7 | 2+33.00 | 7 | Full LL | 46.42 | 7 | 2.83 | <b>19.81 = D</b> | 775.37 | EC | 2+37.43 | 4.42 | ½ LL | <b>50.85 = L</b> | none | 0 | none | 775.42 |
| Curve Deflection Table (governs over Plan View)  |  |  |                               |                                 |                              |   |   |   |  |  |                |          |                               |                               |                                 |                              |                 |          |   |   |   |          |          |             |     |        |   |             |   |   |      |         |             |        |       |   |             |   |   |      |         |             |        |       |   |             |          |         |                       |             |                   |                       |   |   |           |    |         |   |      |   |      |   |   |        |                   |         |      |      |      |   |      |      |        |                   |         |   |         |       |   |      |      |        |                   |         |   |         |       |   |      |      |        |                   |         |   |         |       |   |      |       |        |                   |         |   |         |       |   |      |       |        |                   |         |   |         |       |   |      |       |        |                   |         |   |         |       |   |      |                  |        |    |         |      |      |                  |      |   |      |        |
| C2 Curve   |  |  |                               |                                 |                              |   |   |   |  |  |                |          |                               |                               |                                 |                              |                 |          |   |   |   |          |          |             |     |        |   |             |   |   |      |         |             |        |       |   |             |   |   |      |         |             |        |       |   |             |          |         |                       |             |                   |                       |   |   |           |    |         |   |      |   |      |   |   |        |                   |         |      |      |      |   |      |      |        |                   |         |   |         |       |   |      |      |        |                   |         |   |         |       |   |      |      |        |                   |         |   |         |       |   |      |       |        |                   |         |   |         |       |   |      |       |        |                   |         |   |         |       |   |      |       |        |                   |         |   |         |       |   |      |                  |        |    |         |      |      |                  |      |   |      |        |
| Delta (D) 19°49'10" (19.81 dec. deg.); Radius (R) 147.00' (DIP PIPE); Arc Length (L) 50.85' Slope (S) .0129  |  |  |                               |                                 |                              |   |   |   |  |  |                |          |                               |                               |                                 |                              |                 |          |   |   |   |          |          |             |     |        |   |             |   |   |      |         |             |        |       |   |             |   |   |      |         |             |        |       |   |             |          |         |                       |             |                   |                       |   |   |           |    |         |   |      |   |      |   |   |        |                   |         |      |      |      |   |      |      |        |                   |         |   |         |       |   |      |      |        |                   |         |   |         |       |   |      |      |        |                   |         |   |         |       |   |      |       |        |                   |         |   |         |       |   |      |       |        |                   |         |   |         |       |   |      |       |        |                   |         |   |         |       |   |      |                  |        |    |         |      |      |                  |      |   |      |        |
| Deflection <sup>1</sup> @ Each Joint (DJ) 2°49'52" (2.83 dec. deg.)  |  |  |                               |                                 |                              |   |   |   |  |  |                |          |                               |                               |                                 |                              |                 |          |   |   |   |          |          |             |     |        |   |             |   |   |      |         |             |        |       |   |             |   |   |      |         |             |        |       |   |             |          |         |                       |             |                   |                       |   |   |           |    |         |   |      |   |      |   |   |        |                   |         |      |      |      |   |      |      |        |                   |         |   |         |       |   |      |      |        |                   |         |   |         |       |   |      |      |        |                   |         |   |         |       |   |      |       |        |                   |         |   |         |       |   |      |       |        |                   |         |   |         |       |   |      |       |        |                   |         |   |         |       |   |      |                  |        |    |         |      |      |                  |      |   |      |        |
| Laid Length (LL) 7.0' (greater than 5')  |  |  |                               |                                 |                              |   |   |   |  |  |                |          |                               |                               |                                 |                              |                 |          |   |   |   |          |          |             |     |        |   |             |   |   |      |         |             |        |       |   |             |   |   |      |         |             |        |       |   |             |          |         |                       |             |                   |                       |   |   |           |    |         |   |      |   |      |   |   |        |                   |         |      |      |      |   |      |      |        |                   |         |   |         |       |   |      |      |        |                   |         |   |         |       |   |      |      |        |                   |         |   |         |       |   |      |       |        |                   |         |   |         |       |   |      |       |        |                   |         |   |         |       |   |      |       |        |                   |         |   |         |       |   |      |                  |        |    |         |      |      |                  |      |   |      |        |
| Descript   | Station  | Laid Length (LL) feet  | LL Descript                   | Cumul Length feet               | # Deflect @ Joint (N)        | Deflect @ Joint (DJ) <sup>1,2</sup> dec. deg. | Cumulative Angle <sup>2</sup> dec. deg. | I.E. feet   |  |  |                |          |                               |                               |                                 |                              |                 |          |   |   |   |          |          |             |     |        |   |             |   |   |      |         |             |        |       |   |             |   |   |      |         |             |        |       |   |             |          |         |                       |             |                   |                       |   |   |           |    |         |   |      |   |      |   |   |        |                   |         |      |      |      |   |      |      |        |                   |         |   |         |       |   |      |      |        |                   |         |   |         |       |   |      |      |        |                   |         |   |         |       |   |      |       |        |                   |         |   |         |       |   |      |       |        |                   |         |   |         |       |   |      |       |        |                   |         |   |         |       |   |      |                  |        |    |         |      |      |                  |      |   |      |        |
| BC   | 1+86.58  | 0  | none                          | 0                               | none                         | 0   | 0                                       | 774.77  |  |  |                |          |                               |                               |                                 |                              |                 |          |   |   |   |          |          |             |     |        |   |             |   |   |      |         |             |        |       |   |             |   |   |      |         |             |        |       |   |             |          |         |                       |             |                   |                       |   |   |           |    |         |   |      |   |      |   |   |        |                   |         |      |      |      |   |      |      |        |                   |         |   |         |       |   |      |      |        |                   |         |   |         |       |   |      |      |        |                   |         |   |         |       |   |      |       |        |                   |         |   |         |       |   |      |       |        |                   |         |   |         |       |   |      |       |        |                   |         |   |         |       |   |      |                  |        |    |         |      |      |                  |      |   |      |        |
| Deflect @ Joint 1  | 1+91.00  | 4.42   | ½ LL                          | 4.42                            | 1                            | 2.83  | 2.83                                    | 774.83  |  |  |                |          |                               |                               |                                 |                              |                 |          |   |   |   |          |          |             |     |        |   |             |   |   |      |         |             |        |       |   |             |   |   |      |         |             |        |       |   |             |          |         |                       |             |                   |                       |   |   |           |    |         |   |      |   |      |   |   |        |                   |         |      |      |      |   |      |      |        |                   |         |   |         |       |   |      |      |        |                   |         |   |         |       |   |      |      |        |                   |         |   |         |       |   |      |       |        |                   |         |   |         |       |   |      |       |        |                   |         |   |         |       |   |      |       |        |                   |         |   |         |       |   |      |                  |        |    |         |      |      |                  |      |   |      |        |
| Deflect @ Joint 2  | 1+98.00  | 7  | Full LL                       | 11.42                           | 2                            | 2.83  | 5.66                                    | 774.92  |  |  |                |          |                               |                               |                                 |                              |                 |          |   |   |   |          |          |             |     |        |   |             |   |   |      |         |             |        |       |   |             |   |   |      |         |             |        |       |   |             |          |         |                       |             |                   |                       |   |   |           |    |         |   |      |   |      |   |   |        |                   |         |      |      |      |   |      |      |        |                   |         |   |         |       |   |      |      |        |                   |         |   |         |       |   |      |      |        |                   |         |   |         |       |   |      |       |        |                   |         |   |         |       |   |      |       |        |                   |         |   |         |       |   |      |       |        |                   |         |   |         |       |   |      |                  |        |    |         |      |      |                  |      |   |      |        |
| Deflect @ Joint 3  | 2+05.00  | 7  | Full LL                       | 18.42                           | 3                            | 2.83  | 8.49                                    | 775.01  |  |  |                |          |                               |                               |                                 |                              |                 |          |   |   |   |          |          |             |     |        |   |             |   |   |      |         |             |        |       |   |             |   |   |      |         |             |        |       |   |             |          |         |                       |             |                   |                       |   |   |           |    |         |   |      |   |      |   |   |        |                   |         |      |      |      |   |      |      |        |                   |         |   |         |       |   |      |      |        |                   |         |   |         |       |   |      |      |        |                   |         |   |         |       |   |      |       |        |                   |         |   |         |       |   |      |       |        |                   |         |   |         |       |   |      |       |        |                   |         |   |         |       |   |      |                  |        |    |         |      |      |                  |      |   |      |        |
| Deflect @ Joint 4  | 2+12.00  | 7  | Full LL                       | 25.42                           | 4                            | 2.83  | 11.32                                   | 775.10  |  |  |                |          |                               |                               |                                 |                              |                 |          |   |   |   |          |          |             |     |        |   |             |   |   |      |         |             |        |       |   |             |   |   |      |         |             |        |       |   |             |          |         |                       |             |                   |                       |   |   |           |    |         |   |      |   |      |   |   |        |                   |         |      |      |      |   |      |      |        |                   |         |   |         |       |   |      |      |        |                   |         |   |         |       |   |      |      |        |                   |         |   |         |       |   |      |       |        |                   |         |   |         |       |   |      |       |        |                   |         |   |         |       |   |      |       |        |                   |         |   |         |       |   |      |                  |        |    |         |      |      |                  |      |   |      |        |
| Deflect @ Joint 5  | 2+19.00  | 7  | Full LL                       | 32.42                           | 5                            | 2.83  | 14.15                                   | 775.19  |  |  |                |          |                               |                               |                                 |                              |                 |          |   |   |   |          |          |             |     |        |   |             |   |   |      |         |             |        |       |   |             |   |   |      |         |             |        |       |   |             |          |         |                       |             |                   |                       |   |   |           |    |         |   |      |   |      |   |   |        |                   |         |      |      |      |   |      |      |        |                   |         |   |         |       |   |      |      |        |                   |         |   |         |       |   |      |      |        |                   |         |   |         |       |   |      |       |        |                   |         |   |         |       |   |      |       |        |                   |         |   |         |       |   |      |       |        |                   |         |   |         |       |   |      |                  |        |    |         |      |      |                  |      |   |      |        |
| Deflect @ Joint 6  | 2+26.00  | 7  | Full LL                       | 39.42                           | 6                            | 2.83  | 16.98                                   | 775.28  |  |  |                |          |                               |                               |                                 |                              |                 |          |   |   |   |          |          |             |     |        |   |             |   |   |      |         |             |        |       |   |             |   |   |      |         |             |        |       |   |             |          |         |                       |             |                   |                       |   |   |           |    |         |   |      |   |      |   |   |        |                   |         |      |      |      |   |      |      |        |                   |         |   |         |       |   |      |      |        |                   |         |   |         |       |   |      |      |        |                   |         |   |         |       |   |      |       |        |                   |         |   |         |       |   |      |       |        |                   |         |   |         |       |   |      |       |        |                   |         |   |         |       |   |      |                  |        |    |         |      |      |                  |      |   |      |        |
| Deflect @ Joint 7  | 2+33.00  | 7  | Full LL                       | 46.42                           | 7                            | 2.83  | <b>19.81 = D</b>                        | 775.37  |  |  |                |          |                               |                               |                                 |                              |                 |          |   |   |   |          |          |             |     |        |   |             |   |   |      |         |             |        |       |   |             |   |   |      |         |             |        |       |   |             |          |         |                       |             |                   |                       |   |   |           |    |         |   |      |   |      |   |   |        |                   |         |      |      |      |   |      |      |        |                   |         |   |         |       |   |      |      |        |                   |         |   |         |       |   |      |      |        |                   |         |   |         |       |   |      |       |        |                   |         |   |         |       |   |      |       |        |                   |         |   |         |       |   |      |       |        |                   |         |   |         |       |   |      |                  |        |    |         |      |      |                  |      |   |      |        |
| EC   | 2+37.43  | 4.42   | ½ LL                          | <b>50.85 = L</b>                | none                         | 0   | none                                    | 775.42  |  |  |                |          |                               |                               |                                 |                              |                 |          |   |   |   |          |          |             |     |        |   |             |   |   |      |         |             |        |       |   |             |   |   |      |         |             |        |       |   |             |          |         |                       |             |                   |                       |   |   |           |    |         |   |      |   |      |   |   |        |                   |         |      |      |      |   |      |      |        |                   |         |   |         |       |   |      |      |        |                   |         |   |         |       |   |      |      |        |                   |         |   |         |       |   |      |       |        |                   |         |   |         |       |   |      |       |        |                   |         |   |         |       |   |      |       |        |                   |         |   |         |       |   |      |                  |        |    |         |      |      |                  |      |   |      |        |

# CENTRAL CONTRA COSTA SANITARY DISTRICT MARTINEZ, CALIFORNIA

## LAYOUT OF CURVED ALIGNMENT USING STRAIGHT PIPE SEGMENTS WITH JOINT DEFLECTIONS OR FITTINGS



Math check

$$\frac{L}{2\pi R} = \frac{\Delta}{360}$$

### PLAN

(FITTINGS REMOVED FOR CLARITY)

THE LAYING LENGTH (LL), RADIUS (R), AND INCLUDED ANGLE (Δ) ARE COMPUTED BY THE EQUATIONS:

$$LL = 2 \times R \times \tan(\Delta/2N)$$

$$R = L / (2 \times \tan(\Delta/2N))$$

$$\Delta = 2 \times N \times \tan^{-1}(LL/2R)$$

WHERE:

R = RADIUS OF CURVATURE, FEET

LL = LAID LENGTH OF EACH PIPE SEGMENT MEASURED ALONG THE CENTERLINE, FEET

Δ = TOTAL DEFLECTION ANGLE OF CURVE, DEGREES

N = NUMBER OF DEFLECTED JOINTS (Arc Length / LL) round down to whole integer

DJ = TOTAL DEFLECTION AT EACH JOINT, DEGREES do not exceed 3 degrees

NOTE: LL SHALL BE EQUAL TO OR GREATER THAN 5 FEET.