Compliance Checklist – Design Concept

Job Information

Application No.		**Job. No.**	
Job Engineer Name		**Date**	
Job Engineer Signature		**Stage Pre-Plan Review (PPR)**	☐ #1 Concept ☐ #2 Design & ROW ☐ #3 Plan Preparation ☐ _____

Other Utilities

Utility	Existing Utility (☐ shown on plans)		Proposed Utility (☐ shown on plans)				Not Existing	Not Proposed	N/A	TBD **Var Req**
	Mandatory by PPR#1		**MUST SUBMIT TO ADVANCE!**	**Variance Request**	design approved					
	rec'd record information **Variance Request**	location per field markings	not submitted	In design						
water	☐	☐	☐	☐	☐		☐	☐	☐	☐
joint trench (with gas, electrical, cable) **OR** **joint trench** (with**OUT** gas, electrical, cable)	☐	☐	☐	☐	☐	PGE trans	☐	☐	☐	☐
	☐	☐	☐	☐	☐	PGE trans	☐	☐	☐	☐
storm drain	☐	☐	☐	☐	☐		☐	☐	☐	☐
private streetlights	☐	☐	☐	☐	☐		☐	☐	☐	☐
recycled water	☐	☐	☐	☐	☐		☐	☐	☐	☐
untreated canal water	☐	☐	☐	☐	☐		☐	☐	☐	☐
other:	☐	☐	☐	☐	☐		☐	☐	☐	☐

Compliance with Standard Specifications

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

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Criteria	Standard	Variance Request
Invert Elevation (IE)	☐ If connecting to main (8-12"), then IE ≤0.25' higher than IE of ex main; or ☐ If connecting to trunk (≥15"), then IE is ☐ 3", ☐ 6", ☐ other, fill in_____" above crown of existing trunk	☐ If connecting to main (8-12"), IE > 0.25' higher than IE of ex main ☐ If connecting to trunk, IE below crown of existing Trunk
Sewer Pipe (§8-07)		
Central San STA	☐ 0+00 at most downstream POC ☐ Centerline stationing, no offsets ☐ moves in upstream direction ☐ wye STA for laterals match reqmts above	No variances allowed for Central San STA
SS Line Designations	☐ 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 ☐ If more than one sewer shed and A-Z are already used, then reset "A" at the different POC; or ☐ N/A ☐ For large Job or complicated configurations, then discuss with Central San during compliance acceptance stage; or ☐ N/A	No variances allowed for SS Line Designations
Location of Sewer	Centerline (CL): ☐ existing or ☐ new roadway / driveway ☐ Not in CL, legal separation from water	☐ not in roadway / driveway ☐ not centerline w/no legal separation from water requirements
Surface Improvement	regular, impervious pavement / concrete: ☐ AC or ☐ PCC	☐ pervious pavement / pavers, etc. (☐ prepared detailed cross-section) ☐ stamped/ coloured pavement ☐ landscaped area or not improved
Pipe Size & Material	☐ 8" PVC SDR-26 (preferred). (not allowed for pipe not under impervious surface, slope greater than 20%, or less than std cover.) ☐ other: complies Table 4 & 6 Std Specs	☐ does not comply Table 4 & 6 Std Specs
Slope	☐ for 8" pipes: 0.0077 ≤ slope ≤ 0.20; ☐ for other: complies Table 4 & 6 Std Specs	☐ slope < 0.0077 ☐ slope > 0.20
Horizontal Curve	☐ Radius, Arc Length, Delta provided ☐ mathematically correct ☐ deflection between MHs ≤ 45° ☐ deflection between successive straight segments of pipe ≤ 11-1/4° ☐ deflections at each joint/end of pipe segment complies Approved Materials List	☐ deflection between MHs > 45° ☐ deflection between successive straight segments of pipe > 11-1/4° ☐ deflections at each joint/end does not comply
Vertical Curves	☐ mathematically correct ☐ min slopes comply w/Table 4 Std Specs ☐ max slopes comply w/ Tables 6 & 7 Profile, to include: ☐ station & IE for BVI (downstream) ☐ station & IE for PVI (midway) ☐ station & IE for EVI (upstream) ☐ slopes from EVI – PVI, PVI – EVI ☐ length – minimum 100'	☐ slopes do not comply with Tables ☐ Vertical Length is less than 100'

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Criteria	Standard	Variance Request
Sewer Pipe – clearances (§8-07B)		
Horizontal Clearance	☐ ≥ 10’ from outer potable water pipe ☐ ≥ 5’ from edge of pavement, lip of gutter or face of curb if no lip of gutter, valley gutter ☐ ≥ 5’ from retaining walls ☐ ≥ 3’ from outer pipe (not potable water) ☐ ≥ 3’ from outer structure/box/vault	☐ <10’ from outer potable water pipe (☐ submitted authorization from water agency) ☐ < from edge of pavement, lip of gutter or face of curb if no lip of gutter, valley gutter ☐ < 5’ from retaining walls ☐ < 3’ from outer pipe (not potable water) ☐ < 3’ from outer structure/box/vault
Xing Angles of Utilities	☐ ≥ 30° angle	☐ ≤ 30° angle
Vertical Clearance	☐ ≥ 1’ (12-inches) from other utilities or structures	☐ < 1’ (12-inches) from other utilities or structures
Manholes (§8-10)		
At required locations	☐ 50’ < interval < 500’ ☐ change in sewer pipe size ☐ change in sewer pipe material ☐ sewer intersections ☐ sewer grade breaks ☐ last upstream lateral (no dry pipe) ☐ Pipe Deflection Angle (PDA) < 90°	☐ < 50’ or > 500’ ☐ not at change in sewer pipe size ☐ not at change in sewer pipe material ☐ not at sewer intersections ☐ not at sewer grade breaks ☐ not at last upstream lateral ☐ PDA > 90°
Min/Max Depth	☐ 44” < depth* < 20’ (*min depth as measured from subgrade to top of pipe)	☐ depth ≤ 44” ☐ depth ≥ 20’ (☐ prepared structural detail & calcs)
Access to SSMHs	☐ All new SSMHs have vehicular access ☐ All existing SSMHs have vehicular access	☐ All new SSMHs do not have veh. access ☐ All ex SSMHs do not have veh. Access
Drop across	☐ where through-flow, then no drop ☐ where PDA>30°, then drop is exactly 0.25’ ☐ IE in at Trunk MH is 6” above crown	☐ where through-flow, drop exists. ☐ where PDA>30°, drop is not exactly 0.25’ ☐ IE in at Trunk MH is not 6” above crown
Wyes Lower Laterals		
Wyes & Lower Laterals (DWG 22-02)	☐ for building approved by, or in review with, Building Department	☐ for future building. **Not approved!**
Connections to Main	☐ intersect main at 90° ☐ enter manhole min 45° apart	☐ intersect main not at 90° ☐ enter manhole < 45° apart
Material	☐ matches sewer main	☐ does not match
Invert	☐ crown of lateral matches crown of main	☐ does not match

Required Exhibits/Reports

☐ Annexation Request & Petition	☐ Geotechnical Report
☐ Potential Reimbursable Lots	☐ Arborist Report
☐ Ultimate Tributary Service Area	☐ Typical Cross-Sections
☐ Capacity Study	☐ Detail/Specific Cross-Sections
☐ Inside Pipe Video Inspections	☐ Real Property Agreement (RPA) Exhibit
☐ Other:	

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Criteria	Standard	Variance Request

Variances

Submitted? **MUST SUBMIT TO ADVANCE!**	Variance ID#	Description	Standard Spec/Dwg #	Location/Sheet #	If Approved: Mitigation Measures / Approval Condition **AS DETERMINED BY CENTRAL SAN**
	V1				
	V2				

Attachment - Design Tables

Manhole Table

Mandatory. Provide one Table for each SS Line designation, in format shown below, on most appropriate sheet.

SSMH Table - SS Line Segment X[1] (governs if provided elsewhere)						
SS Sta[2]	SSMH #[3]	Type[4] (Dwg #)	Height[5] (feet)	PDA[6] (deg)	Drops and Flow Direction across SSMHs	
					Delta[7] (feet)	U/S to D/S SSMH# or Terminal[8] 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

[1] Use separate SSMH table for different SS Line Designations
[2] The most downstream Point of Connection (0+00) shall be 0+00 with no offsets.
[3] Start with #1 for most downstream SSMH. If existing SSMH, use Central San's Tag #. Example: Ex SSMH 71 (69Es)
[4] For trunk manholes, incoming pipe must be above crown of existing trunk line.
[5] Measured from Rim to lowest Invert Elevation Out. Use shallow SSMH if 44" and less; use trunk SSMH if greater than 20' deep.
[6] Pipe Deflection Angle (PDA) of pipe out versus pipe in for this line designation. Calculated acute angle (cannot be greater than 90^{o}) as measured from upstream to downstream direction. N/A at Terminal SSMHs.
[7] For thru conditions use 0.00'. If PDA is greater than 30^{0}, 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.
[8] If more than one pipe in, use separate SSMH table as PDA and Deltas could be different.

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Pothole Table

If applicable, then provide, in format shown below, on most appropriate sheet.

Pothole Table (governs if provided elsewhere)							
Pothole #	Existing Utility		Reason to Pothole				
	Type (Owner)	Size/ Mat'l	Clearances (Relationship to SS) 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	☒	2'	☒	10'	N/A
PH2	Joint trench	24" wide	☒	3'	☒	3'	N/A
PH3	Untreated canal water (Diablo Vista)	4" PVC	☒	3'	☒	3'	N/A
PH3	Central San Sewer	8" VCP	☐	N/A	☐	N/A	87.5'

Utility Crossing Table

If applicable, then provide one Table for each SS Line designation, in format shown below, on most appropriate sheet.

Utility Crossing Table[1] (governs if provided elsewhere)											
#	Angle Xing[2]	Upper Pipe (bottom)				Lower Pipe (top)				Vertical Clearance	
		Status	Utility	Size/ Mat'l	Invert Elev	Status	Utility	Size/ Mat'l	Top Elev[3]	clear	determined by[4]
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

[1] not required for services
[2] shall be greater than 30° to the centerline of sewer
[3] elevation of the top of pipe/utility
[4] 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.

Horizontal Curve Table

If alignment includes horizontal curves, then provide one Table for each SS Line designation, in format shown below, on most appropriate sheet.

Horizontal Curve[1] Table (governs over Plan View)								
#[2]	**D/S MH #**	**BC Station (D/S)**[3]	**EC Station (U/S)**[3]	**Delta (D)** (DMS or dec. degrees)	**Radius (R) (ft)**[4]	**Arc Length (ft)**	**U/S MH #**	**Cumulative Angle**[4] **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''

[1] Verify curve is mathematically correct: $L / (2 \pi R) = \Delta / 360$
[2] Depict Curve ID # on profile
[3] Downstream (D/S) and Upstream (U/S)
[3] If less than allowable axial bending and/or for DIP (see Dwg 21-01), then provide fitting or straight pipe Deflection Table.
[4] Additive of curve angles between downstream and upstream SSMHs.
Reference: See Std Specs Section 8-07.C, Curves – Vertical and Horizontal for design requirements.

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Curve Deflection Table

Where radius is less than the allowable axial bending or for ductile iron (DIP), provide one Table for each Curve, in format shown below, on most appropriate sheet. Also need to include Horizontal Curve Table. See Figure below for graphical representation.

Curve Deflection Table (governs over Plan View)

C2 Curve
Delta (D) $10^0 17'39"$ (10.289 dec. deg.); Radius (R) 260.00' (DIP PIPE); Arc Length (L) 46.71'
Slope (S) 0.0124
Deflection[1] @ Each Joint (DJ) 3^o 25' 53'' (3.426 dec. deg.)
Laid Length (LL) 15.56' (greater than 5')

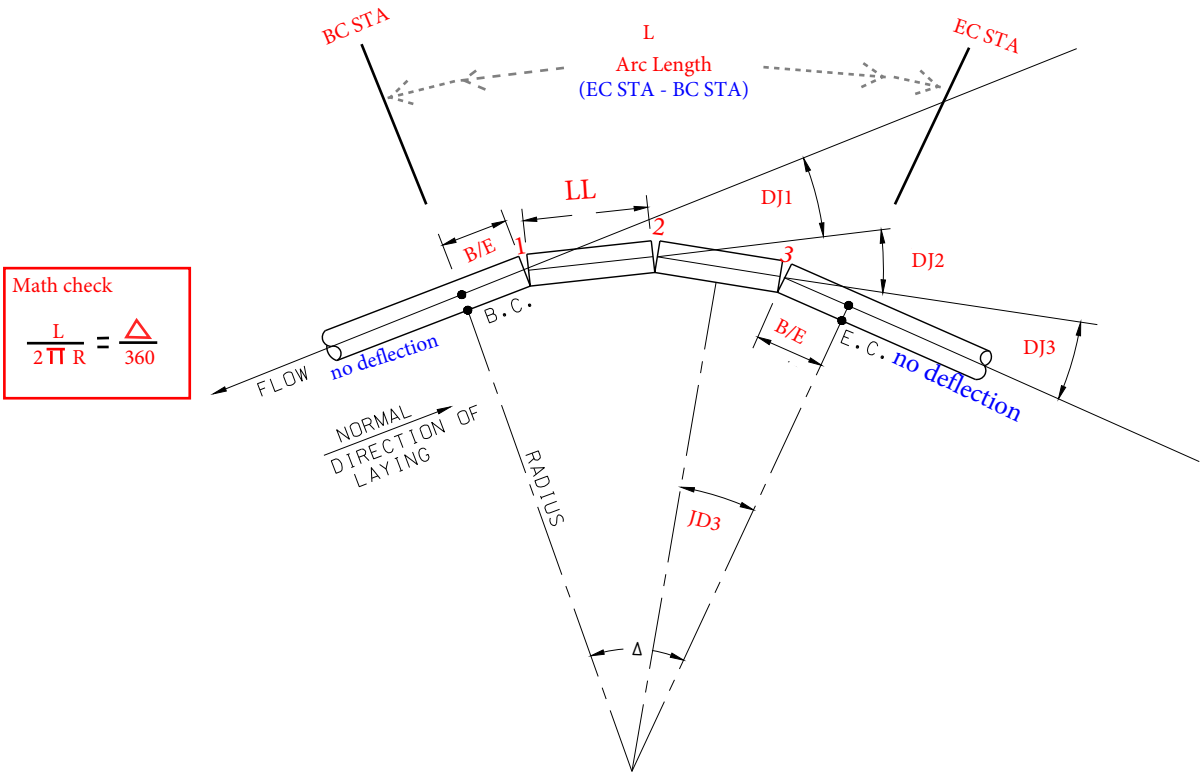
Descript	**Station**	**Laid Length (LL)** feet	**LL Descript**	**Cumul Length** feet	**# Deflect @ Joint (N)**	**Deflect @ Joint (DJ)** [1,2] dec. deg.	**Cumulative Angle** [2] dec. deg.	**I.E.** feet
BC	0+66.85	0	none	0	none	0	0	760.42
Deflect @ Joint 1	0+74.60	7.78	½ LL	7.78	1	3.43	3.43	760.52
Deflect @ Joint 2	0+90.10	15.56 (LL)	Full LL	23.34	2	3.43	6.86	760.71
Deflect @ Joint 3	1+05.60	15.56 (LL)	Full LL	38.90	3	3.43	10.29	760.88
EC	1+13.56	7.78 (1/2 LL)	½ LL	46.68 = L	none	0	10.29 = D	761.00

[1] deflections at each joint/end of pipe segment to not exceed allowable deflection as shown on latest "Approved Materials List" located https://www.centralsan.org/standard-specifications-and-approved-materials
[2] DMS or decimal degree units.

Guides:
1. Verify curve is mathematically correct: $L / (2 \pi R) = \Delta / 360$
2. Select LL (greater than 5') and Determine N: L / LL round down to whole integer
3. Determine Beginning/End (B/E) which is ½ Laid Length: $(L - ((N-1)xLL)) / 2$
4. Determine DJ: D / N. (see footnote 1 regarding max angle)
5. Cumulative Length must = L; Cumulative Angle must = D

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:

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

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 Max Deflection per "Approved Matls List"

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