

E. General Sewer Notes (to be shown on cover sheet)

All Sewer Plans

1. According to the revised "Blue Stake Law" (ARS 40-360.21 through 40-360.32), this project is subject to new private sewer lateral design and construction requirements per Pima County Regional Wastewater Reclamation Directive ENG2005-01 and revised Standard Detail WWM 401. See www.pima.gov/www/stdet/index.htm.
2. All design standards, materials and workmanship for public sanitary sewers are to be in accordance with the latest edition of the Pima County Regional Wastewater Reclamation Department's (PCRWRD) Manual of Engineering Standards and Procedures, and the Pima County / City of Tucson Standard Details and Specifications for Public Improvements. Said manuals are on file at Pima County Regional Wastewater Reclamation offices at 201 N. Stone Avenue, 8th Floor.
3. The contractor shall verify locations and elevations of all existing utilities prior to any construction. Call "Blue Stake" at 1-800-782-5348, a minimum of two (2) full working days prior to excavating.
4. Immediately report any release of sewage, and/or any damage to, or the dropping of debris into, the public sanitary sewage conveyance system to either PCRWRD Field Engineering (740-2651) or PCRWRD Field Operations (326-4333). On weekends, holidays, or between 5:00 PM and 8:00 AM, immediately call Pima County Sheriff's Communication Center at 295-4595 or 741-4900 and request a PCRWRD representative to be dispatched to the site. Take immediate action to prevent or contain the sanitary sewage overflow (SSO) from the sewer system. The contractor shall be responsible for all costs to repair the system, for all expenses to mitigate the release and to disinfect the release areas, and for any regulatory penalties levied on PCRWRD because the SSO entered a natural or constructed storm water drainage system. The contractor shall repair all damage as directed and approved by PCRWRD.
5. Sewer construction shall not commence until (a) Pima County Department of Environmental Quality (PCDEQ) has issued a "Construction Authorization" for this project AND (b) Contractor has obtained a public sewer construction permit from Pima County Development Review (740-6832) (c) Schedule a pre-construction meeting with the assigned Pima County Project Inspector at least 3 full working days prior to the start of sewer construction.
6. Standard Detail 106 applies to this project.
7. As-built plans shall be required when construction is complete. Submit three black line copies and an electronic version to the PCRWRD Inspector. Contact PCRWRD, Maps and Records, 740-6646, for acceptable electronic formats.
8. Bedding shall be in accordance with engineering directive ENG2008-16 (modified standard details 104 and 105) or as shown on the plans. Should ground water or other unanticipated soil condition be encountered, the bedding shall be modified as directed by the Engineer.
9. Benchmark elevations are based on _____ Datum. (Or similar language that includes description and elevation of an acceptable benchmark)
10. [Basis and record of bearing (horizontal control)]
11. List of lots that require backwater valves OR note indicating that no backwater valves are required for this project.
12. Whenever connecting to a live sewer, it is the responsibility of the contractor to (a) identify and include all flow management costs in the sewer construction bid submitted with the public sewer permit application, and (b) provide a flow management plan at the pre-construction meeting with PCRWRD Field Engineering prior to beginning sewer construction. Refer to detail WWM A-5 for flow management plan requirements. Call Pima County Regional Wastewater Reclamation Field Engineering at 740-2651 for all questions regarding the preparation of flow management plans.
13. All new public sewer manholes shall be 4'-dia per Standard Detail 208 unless noted otherwise. (For 5' manhole, reference Standard Detail 209)

IF re-routing live sewers

14. The contractor shall furnish, operate and maintain all equipment necessary to provide continuous 24 hr./day sewer service to all parties tributary to a live sewer to which a connection is to be made. Notify the Pima County Regional Wastewater Reclamation Department's Field Operations at (326-4333) 48 hours prior to starting any construction that could either adversely impact the flow within a live sewer, or involve connection to a sewer fifteen (15) inches (375 mm) in diameter or larger.
15. New public sewers must be tested, inspected and accepted for discharge by PCRWRD and ADEQ prior to discharging into public sewer.

IF pipes are designed at or below minimum design slopes (but, at or above minimum state requirements)

16. This public sewer is designed at minimum allowable pipe slope. Special care should be taken to assure design slope is maintained. Sewers found to be constructed at insufficient slopes will not be accepted by PCRWRD and/or ADEQ. Corrective action, including re-construction of the sewer(s) at the sole expense of the project owner/contractor would be required. As-built plans shall be required for all new public sewers prior to final acceptance.

IF abandoning public sewer lines (use the following notes or equivalent on cover or on 2nd sheet)

17. Existing manhole(s) [#s] of [PCRWRD plan #] is(are) to be removed. Contractor shall remove the rim and cover. The manhole(s) will be demolished completely and filled and compacted with select material to 95% of dry density determined in accordance with Arizona methods. The salvaged rim and cover shall be delivered to PCRWRD at the location as specified by the inspector. The contractor shall dispose of all manhole demolition material off site at a landfill or other approved location.
18. [Length] lf of existing [diameter] public sewer from manhole # [#] to manhole # [#] of [PCRWRD plan #] is to be abandoned. Remove sewer completely. Sewer shall NOT be abandoned in place.

IF using DIP

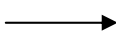
19. Add a general note to reference PCRWRD DIP/Steel Pipe Coating Specifications (Protecto 401 coating is not acceptable)

IF sewer plans include both, public and private sewers

20. The words "Pima County Sanitary Sewer" shall be imprinted only on covers of manholes which are to be part of the Pima County Regional Wastewater Reclamation (public) Sanitary Sewage conveyance system. Sewer manhole covers on conveyance systems to be owned and operated by anyone other than Pima County shall have cast into them the words "Private Sewer."

F. Plan View

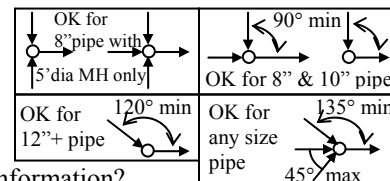
General / Annotation

- 1. If re-submittal, compare to previous redlines for requested corrections. Review all aspects of any additional changes.
- 2. Compare point of connection to existing downstream manhole number, invert elevation, plan number and blockout alignment.
- 3. Have downstream sewers been constructed and accepted for use? Plans will not be accepted until downstream plans are accepted. New public sewers will not be released for discharge until downstream sewers have been released.
- 4. Is the north arrow shown and consistent with the cover sheet overview?
- 5. Is the scale 1"=40' horizontal and 1"=4' vertical?
- 6. Indicate whether stationing is along sewer, centerline or survey line.
- 7. Are sewer line flow arrows shown on each sewer reach?
- 8. If sewer plans include public and private, are sewers labeled appropriately as public or private?
- 9. Number all manholes (as shown on cover sheet) and station to .01' (with offsets, if stationing is not along sewer line).
- 10. Are lots shown and consistent with the cover sheet?
- 11. Are distances and bearings shown for sewers between manholes?
- 12. Are all pipe lengths consistent with the table shown? 
- 13. Is all information that is shown on more than one sheet consistent across sheets?
- 14. Are match lines (and stations, as needed for clarity) shown wherever information continues to another sheet?
- 15. Indicate phasing if parts of the proposed sewer system will be permitted, inspected and released prior to other parts.
- 16. Show all areas of pavement replacement and reference Standard Detail PC/COT 216.
- 17. Indicate which areas include proposed pavement.
- 18. Show street/roadway cross section detail.
- 19. In detail sheet, show detail depicting HCSs installation with tracing tape per revised PC/COT Standard Detail WWM 401.
- 20. Show, label and station all the HCS/BCS.

Pipe size	8"-15"	18" - 30"	36"+
Max length	500'	600'	800'

Sewer Alignment

- 21. Are deflection angles at manholes $\leq 90^\circ$ for 8"-10" pipe, and $\leq 60^\circ$ for 12"+ pipe?
- 22. Are deflection angles $\leq 45^\circ$ for two or more pipes flowing into a manhole? (WWM 201)
(Exception: a maximum deflection angle of 90° is ok for two 8" or 10" pipes 90° apart.)



Manholes

- 23. Is adequate drainage information shown using flow arrows, topography, or other drainage information?
- 24. Are watertight frames and covers used where storm water infiltration is likely to occur? (WWM-213.2, 213.3, 214.1, or 214.2)
- 25. Are block-outs indicated for all intended future extensions per WWM-203? (Public stub-outs are not allowed per PCRWRD)
- 26. Are concrete collars used for all manholes placed in unpaved areas per WWM 212?
- 27. For new manholes $\leq 200'$ upstream from 18"+ lines, reference and print [manhole coating specifications](#) per WWM A3, #8.

House Connection Sewers (HCSs)

Note: Building Codes reviews (for municipal plumbing code) from the edge of ROW/easement to the inside of the house or building.

- 28. Ensure that no HCSs connect to any manhole, unless manhole is in a cul-de-sac or adjacent to another terminal MH, with no possibility of future extension (See ENG 2006-08). (For qualifying HCS connection to terminal manhole, call out WWM 402).
- 29. Are all HCS stubs (proposed AND existing) stationed or dimensioned to the nearest property corner?
- 30. Are ALL HCSs at least 5 feet apart?
- 31. Are ALL HCSs separated by at least 5 feet from the nearest manhole?
- 32. Are HCSs as short as possible (no bends in ROW) and in front of lot to the maximum extent possible (typically middle or downstream end of lot)?
- 33. Are Flat DIP HCSs used (and detail shown) when either (a) HCS inverts are $< 4'$ deep at the property line OR (b) the sewer main invert depth is $< 7.5'$ deep AND the HCS crosses a water main (resulting in $< 2'$ vertical separation)? (WWM 401)
- 34. If BWV symbols are shown (optional), do the lots with backwater valves match the list of lots on the cover sheet?
- 35. All sewer plans must include HCS and Manhole Tables for ALL HCSs and manholes (see page 5 of this checklist).
- 36. 6" or larger HCS must connect to public sewer at a manhole.

Potential Conflicts

- 37. Show all proposed and existing utilities (underground and overhead) within easements and rights of way.
- 38. Show and label all wash crossings with flow data.
- 39. Show and station all drainage structures.
- 40. Show water lines with horizontal dimensions from sewers, and any other underground or overhead utilities.
- 41. Are all parallel sewer and water lines horizontally separated by at least 6', or sewer constructed of DIP?
- 42. Are all water lines at least 6' from the centerline of the nearest manhole?
- 43. Show all areas of pavement replacement?
- 44. Show all existing structures (buildings, curbs, etc.) over or near public sewers.

Public Sewer Access & Easements (Note: "Easements" are replaced with the terms "Lease" on state land and "Use Agreement" on reservation land.)

- 45. Are all sewers designed within public rights-of-way or public sewer easements? (Sewers are not allowed in utility easements)
- 46. Show and label a stabilized surface per Standard Detail WWM 111 within all public sewer easements.
- 47. Are all public sewer easements the greater of two times the invert depth or 20' (or 30' if sewer is 24" or greater)?
- 48. Are the inner and outer return radii for all turns at least 35' and 55' respectively (including turnarounds for one-way access)?
- 49. Label public sewer easements dedicated by final plat as "XX' PUBLIC SEWER EASEMENT BY FINAL PLAT"
- 50. Label existing easements NOT dedicated by final plat: "EXISTING XX' PUBLIC SEWER EASEMENT DKT XX, PG XXX "
- 51. Label new easements NOT dedicated by final plat: "PROPOSED XX' PUBLIC SEWER EASEMENT BY SEPARATE INSTRUMENT. DKT __, PG __"
- 52. Label OFF-SITE public sewer easements as proposed/existing with owner name, address and parcel tax ID.
- 53. If easements are to be dedicated by separate instrument: Submit 8 1/2" x 11" drawing and surveyor stamped legal description for our review. We will forward to Pima County Property Management for processing. Check legal description for accuracy before you submit for our review.

G. Profile View

General

- 1. Is the horizontal scale 1"=40' and the vertical scale 1"=4' (or up to 1"=8', if unusually steep)?
- 2. Indicate phasing as needed. Ensure clarity for permitting and release.

Point of Connection

- 3. Show location & method of connection to existing public sewer.
 - a. IF connecting to an existing (same size) blockout, add note: "Remove blockout and connect." (Do not refer to a std. detail.)
 - b. IF connecting to an existing manhole, without blockout, reference WWM 301 (or WWM 302 for existing 24" or larger pipe).
 - c. IF connecting to an existing sewer with a new manhole, reference WWM 303 (and WWM 202 for 24" or larger pipe).
- 4. Add note at point of connection: "Contractor shall verify existing invert elevation(s) prior to start of public sewer construction."
- 5. Are downstream sewers likely to be accepted/constructed first? If not, consider alternatives such as phasing, making the downstream sewer part of this project, etc.
- 6. Add note at outlet of first proposed manhole, upstream of existing sewer. "Install temporary plug and secure with a chain to a manhole step. Plug to include contractor company's name. The plug to be removed after ADEQ, Approval of Construction and Post Paving Inspection." (Make sure plug is located downstream of ALL proposed HCSs.)

Manholes

- 7. Label the top of each manhole with manhole # and station and rim elevation to the nearest hundredth of a foot (.01).
- 8. Are the correct size & type of manholes used in all locations? (8"-10" pipe: 4' DIA.(ID) WWM 208 | 12"-21" pipe: 5'DIA.(ID) WWM 209, 210 or 211)
- 9. 24"-36" pipe requires 6'DIA.(ID) manholes. 42"-60" pipe requires 8'DIA.(ID) manholes. Manholes ≥ 6' DIA. require special detail. Assure MH's are large enough at points of connection between large DIA. pipes.
- 10. Label bottom of each manhole with invert elevations to the nearest hundredth of a foot (and directions, if more than 2 inverts).
- 11. ENG 2006-10 Directive allows for use of WWM Standard Detail 205/206 when sewer is ≥ 10' deep for 4'MH (and ≥ 14' deep for 5'MH) with a minimum 6' deep barrel.

Sewer Pipe

- 12. Show and label all existing sewers with plan number (G-20XX-XXX) and size.
- 13. Label each sewer reach with length (to nearest hundredth), diameter, material and slope.
- 14. Verify all slopes are accurate to 0.01% (calculate:ΔV/ΔH) & meet min. design criteria. →
- 15. Are the minimum falls at manholes consistent with this table? →
- 16. Match top of pipe (crown) elevations on pipe size changes (unless the minimum required fall would not be met).
- 17. Are all dissimilar pipes connected per Standard Detail WWM 103?

		Sewer Size	Minimum Design Slope (%)
Deflection Angle	Min Fall	8"	0.44
		10"	0.24
0°-9°	average of slopes	12"	0.19
10°-45°	0.10 ft	15"	0.14
45°-90°	0.20 ft	18"	0.11
		24"	0.077

- 18. Dimension water/sewer separation at crossings.
- 19. Show invert/top elevations for both, water AND sewer at ALL water/sewer crossings.
- 20. For pipes 8" with 10%+ slopes, submit velocity calculations and ensure that velocities do not exceed 10 fps OR use DIP. For larger size pipes, submit the same calculations for slopes in excess of 5%.
- 21. If sewer line lies under water line, do all water/sewer line crossings shown have vertical separation of no less than 2.00 feet? If not use ductile iron pipe.
- 22. If sewer line lies over water line, sewer must ALWAYS be ductile iron pipe AND ALWAYS have no less than 2.00 feet vertical separation.
- 23. Do all parallel water and sewer lines have no less than 6.00 feet of horizontal separation? If no, use ductile iron pipe. NEVER less than 2.00 feet separation. Crossing at less than 45° is considered parallel.
- 24. Is there a minimum cover of 4.00 feet for PVC or 3.00 feet for DIP?
- 25. When connecting to a public sewer, add note: "NOTE: Do not allow sewage flow to enter public sewer until released by PCRWRD."
- 26. Do all terminal 8" sewer reaches have a minimum slope of 1%, unless otherwise approved with written variance?

Public Sewer Wash Crossing, Access & miscellaneous

- 27. Show existing and finished grade at sewer center line.
- 28. Show and label all areas requiring fill: "Fill and compact to 95% of dry density determined in accordance with Arizona methods prior to trenching for sewer."
- 29. If wash crossing, calculate cover below scour depth. (All wash crossings require DIP sewer pipe and 2' clear below scour depth)
- 30. Submit scour depth calculations, sealed by the engineer (with lateral migration) for all wash crossings. Indicate scour depth and lateral migration on plans. (not needed if sewer in under paved road and/or storm drain is provided for the wash)
- 31. Is there all-weather vehicular access to all manholes with a stabilized surface (WWM 111) with slopes equal or less than 9%?

H. Plan/Profile

Plan/Profile

- Are distances/elevations, etc. shown on plans and profiles and on different sheets consistent with each other?

I. Applicable Code

1. [Pima County Wastewater Management Manual of Engineering Standards and Procedures; revised 1988.](#)
2. [City of Tucson/Pima County Standard Details for Public Improvements, 2003 Edition: www.pima.gov/wwm/stdDET/index.htm](#)
3. Pima County Code, Chapters [13.16](#) & [13.20](#).
4. ADEQ Engineering Bulletin No. 11: *Minimum Requirements for Design, Submission of Plans and Specifications of Sewage, Works*, Chapter IV; July, 1978.
5. [Arizona Administrative Code, Title 18, R18-9-E301. 4.01 General Permit: Sewage Collection Systems.](#)
6. PCRWRD ENG. DIRECTIVES (http://www.wwm.pima.gov/stdDET/eng_directives.htm)

Manhole & HCS TABLES FOR SEWER IMPROVEMENT PLANS

(Northing, Easting & Distance columns must be left blank until all as-built information is available)

MH No.	Manhole As-built info.	
	State Plane Coordinates (AZ Central) NAD 83 international feet	
	Northing	Easting

HCS As-built info.			
State Plane Coordinates (AZ Central) NAD 83 international feet at Cleanout			Distance to downstream Manhole
Lot#	Northing	Easting	