

Section
3

Standard Specifications

3.1 Earthwork

3.1.1 Description

Any Work under the *Standard Specifications and Details* shall consist of performing all operations necessary to excavate all materials, regardless of character and subsurface conditions; to excavate trenches for Public Sewers; to excavate all materials necessary for the construction of Public Sewer manholes and other structures; to place backfill for Public Sewer lines; to backfill holes, pits and other depressions; to remove and replace unsuitable material; and compaction requirements. These operations shall be performed in accordance with the lines, grades and typical sections designated in the Sewer Plans and the *Standard Specifications and Details* unless otherwise approved by the Field Engineer.

3.1.2 Materials

A. Crushed Stone

Crushed stone shall conform to the requirements of Table 1 in S.D. RWRD-104. This material shall consist of durable particles of crushed stone free of silt, clay, or other unsuitable material, and have a percentage of wear of not more than 40% when tested in accordance with ASTM C131 or C535. When material is subjected to five cycles of the sodium sulfate soundness test in accordance with ASTM C88 - Sodium Sulfate Solution, the weighted percentage of loss shall not exceed 12%. Additional tests for pH and minimum resistivity, in accordance with Arizona Test Method 236b, shall be required for sewer lines where ductile iron pipe and/or ductile iron fittings are used. The value of resistivity shall not be less than that for the existing in-place material or 2,000 ohm-cm ~~whichever is smaller~~.

Prior to the start of construction, documentation for materials testing shall be certified for conformance and submitted to the Field Engineer. When this material is obtained from excavation or a source selected by the Contractor, it must be Approved by the Field Engineer and require documentation for materials testing by a third party Geotechnical Engineer.

B. Sand

Sand shall conform to the requirements of Table 1 in S.D. RWRD-104. Additional tests for pH and minimum resistivity, in accordance with Arizona Test Method 236b, shall be required for sewer lines where ductile iron pipe and/or ductile iron fittings are used. The value of resistivity shall not be less than that for the existing in-place material or 2,000 ohm-cm ~~whichever is smaller~~.

Prior to the start of construction, documentation for materials testing shall be certified for conformance and submitted to the Field Engineer. When this material is obtained from excavation or a source selected by the Contractor, it must be Approved by the Field Engineer and require documentation for materials testing by a third party Geotechnical Engineer.

C. Excavated Native Material

Excavated native material used for backfill shall conform to the requirements of Table 1 in S.D. RWRD-104. This material shall not contain organic material, rubbish, debris or deleterious material. It shall not contain rocks, frozen earth or solid material larger than 6 inches in greatest dimension. Excavated material shall be well-graded and capable of meeting the compaction requirements of Subsection 3.1.3(F). Additional tests for pH and minimum resistivity, in accordance with Arizona Test Method 236b, shall be required for sewer lines where ductile iron pipe and/or ductile iron fittings are used in conjunction with the rigid pipe trench detail, per S.D. RWRD-104. The value of resistivity shall not be less than that for the existing in-place material or 2,000 ohm-cm-~~whichever is smaller.~~

Excavated material from an offsite source selected by the Contractor must be Approved by the Field Engineer and require documentation for materials testing certification by a third party Geotechnical Engineer.

D. Select Import Material

Select import material shall conform to the requirements of Table 1 in S.D. RWRD-104. This material shall not contain frozen lumps, rocks larger than 3 inches in diameter, chunks of clay or other objectionable material. Additional tests for pH and minimum resistivity, in accordance with Arizona Test Method 236b, shall be required for sewer lines where ductile iron pipe and/or ductile iron fittings are used in conjunction with the rigid pipe trench detail per S.D. RWRD-104. The value of resistivity shall not be less than that for the existing in-place material or 2,000 ohm-cm-~~whichever is smaller.~~

Prior to the start of construction, documentation for materials testing shall be certified for conformance and submitted to the Field Engineer. When this material is obtained from excavation or a source selected by the Contractor, it must be Approved by the Field Engineer and require documentation for materials testing by a third party Geotechnical Engineer.

E. Controlled Low-Strength Material (CLSM)

Materials comprised of CLSM shall conform to the requirements of Section 1006 of the *PAG Standard Specifications*. CLSM mix designs shall conform to Section 501-~~2-03-2-04 Table 501-1~~ of the *PAG Standard Specifications*, unless otherwise indicated in the Sewer Plans, or as directed by the Field Engineer.

For constructed slopes of sewer lines that are not within the slope tolerances specified by the Department, the Contractor may request a Variance in accordance with the *Design Standards*, Subsection 2.3. The Department will review the request and elect one of the following options:

- Approve the Variance request;
- Require the As-Built Plans to be certified by the Design Engineer with a statement indicating that the constructed sewer meets the intent of the design and conforms to R18-9-E301 –~~4.10~~4.01 General Permit; or
- Require unacceptable sewer construction to be removed and reconstructed in accordance with the Sewer Plans.

SEWER PLANS
 RWRD 001 GENERAL NOTES

GRAVITY SEWER LINES & EASEMENTS

RWRD	100	CASING FOR SEWER LINES
*RWRD	101	PILE-SUPPORTED SEWER LINES
RWRD	102	SEWER LINE REPAIR
RWRD	103	COUPLING FOR UNLIKE PIPE MATERIALS
RWRD	104	TYPICAL TRENCH FOR GRAVITY SEWER LINES
RWRD	105-106	(INTENTIONALLY OMITTED)
RWRD	107	DEFLECTION TESTING MANDREL
RWRD	108	SEWER/WATER CROSSING DETAILS
RWRD	109	TURNING RADII FOR SEWER EASEMENTS
RWRD	110	RIGHT ANGLE TURN AROUND FOR SEWER EASEMENTS
RWRD	111	TYPICAL SEWER EASEMENT
*RWRD	112	SEWER EASEMENTS IN ENVIRONMENTALLY SENSITIVE AREAS
*RWRD	113	SCOUR PROTECTION FOR SEWER LINES

MANHOLES

RWRD	200	PRECAST MANHOLE BASE
RWRD	201	CAST-IN-PLACE MANHOLE BASE
RWRD	202	MANHOLE FLOW CHANNELS
RWRD	203	BLOCK-OUTS
RWRD	204	(INTENTIONALLY OMITTED)
RWRD	205	4' DIAMETER MANHOLE CONFIGURATIONS
RWRD	206	5' DIAMETER MANHOLE CONFIGURATIONS
*RWRD	207	SHALLOW MANHOLES
RWRD	208	MANHOLE JOINTS
*RWRD	209	REINFORCED MANHOLE JOINTS
RWRD	210	MANHOLE STEPS CONFIGURATION
RWRD	211	CONCRETE COLLAR FOR PAVED AREAS
RWRD	212	CONCRETE COLLAR FOR UNPAVED AREAS
RWRD	213	24" FRAME AND COVER
RWRD	214	24" WATERTIGHT FRAME AND COVER
RWRD	215	24" BOLTED WATERTIGHT FRAME AND COVER
RWRD	216	30" FRAME AND COVER
RWRD	217	30" WATERTIGHT FRAME AND COVER
RWRD	218	30" BOLTED WATERTIGHT FRAME AND COVER
RWRD	219-222	(INTENTIONALLY OMITTED)
RWRD	223	MANHOLE VENT ASSEMBLY
RWRD	224	MODIFIED MANHOLE VENT ASSEMBLY
*RWRD	225	FLOW METERING STATION
*RWRD	226	CONCRETE WEIR FOR DIVERSION MANHOLES
RWRD	227	(INTENTIONALLY OMITTED)
*RWRD	228	REDWOOD ISOLATION GATE
*RWRD	229	LOW DROP MANHOLE CONNECTION
*RWRD	230	HIGH DROP MANHOLE CONNECTION

*SPECIAL STANDARD DETAILS MAY BE USED IF APPROVED IN THE PLANS OR IN WRITING BY THE FIELD ENGINEER

ISSUED:	STANDARD DETAIL		DETAIL NO.
1/94	SHEET INDEX		
REVISED:			
06/17			SHEET 1 OF 2

1. ANY CONSTRUCTION ACTIVITY HAVING THE POTENTIAL TO DAMAGE EXISTING PUBLIC SANITARY SEWERS OR ANY ACTIVITY THAT REQUIRES MATERIALS OR EQUIPMENT TO ENTER EXISTING PUBLIC SANITARY SEWERS SHALL REQUIRE A PIMA COUNTY RWRD SEWER CONSTRUCTION PERMIT PRIOR TO COMMENCING THAT ACTIVITY.
2. THE CONTRACTOR SHALL SUBMIT A FLOW MANAGEMENT PLAN (FMP) TO PCRWRD FIELD ENGINEERING FOR APPROVAL BEFORE PROCEEDING WITH ANY WORK THAT MAY AFFECT LIVE SEWERS. THE FMP SHALL IDENTIFY AND INCLUDE ALL FLOW MANAGEMENT COSTS IN THE CONSTRUCTION BID. THE FMP SHALL BE SUBMITTED THIRTY (30) CALENDAR DAYS PRIOR TO THE SEWER PRE-CONSTRUCTION MEETING. FIELD ENGINEERING WILL REVIEW THE FMP WITHIN TEN (10) BUSINESS DAYS TO ACCOMMODATE REVIEW AND REVISION CYCLES. REFER TO PCRWRD SSDC 2016, SECTION 2 FOR FMP REQUIREMENTS. PLEASE CONTACT PCRWRD FIELD ENGINEERING AT (520) 724-2651 FOR ANY QUESTIONS REGARDING FLOW MANAGEMENT.
3. THE CONTRACTOR SHALL FURNISH, OPERATE AND MAINTAIN ALL EQUIPMENT AND LABOR NECESSARY TO PROVIDE CONTINUOUS 24 HOURS PER DAY SANITARY SEWER SERVICE TO ALL PARTIES TRIBUTARY TO A LIVE SEWER TO WHICH A CONNECTION IS TO BE MADE.
4. THE INSPECTION OF THE CONTRACTOR'S WORK BY AN AGENCY AND/OR PCRWRD STAFF SHALL IN NO WAY RELIEVE THE CONTRACTOR OF THE RESPONSIBILITY FOR COMPLIANCE WITH THE REQUIREMENTS OF THE APPROVED CONTRACT DOCUMENTS. IF THE DESIGN ENGINEER OR PCRWRD STAFF FAIL TO POINT OUT A DEFECT, DEFICIENCY OR ERROR IN THE WORK FROM LACK OF DISCOVERY OR ANY OTHER REASON, IT SHALL NOT PREVENT LATER REJECTION OR RELIEVE THE CONTRACTOR OF PERFORMING CORRECTIONS TO THE UNSATISFACTORY WORK WHEN DISCOVERED. THE CONTRACTOR SHALL NOT FILE A CLAIM FOR LOSSES SUFFERED DUE TO ANY NECESSARY REMOVALS OR REPAIRS RESULTING FROM THE UNSATISFACTORY WORK.
5. ANY SEWER CONSTRUCTION WORK THAT IS NOT INCLUDED IN THE APPROVED SEWER PLANS WILL NOT BE ACCEPTED BY PCRWRD. SEE PCRWRD SSDC 2016, SECTION 1.4.5 REGARDING THE APPROVAL OF FIELD CHANGES.
6. CONCERNS REGARDING THE ACCURACY BETWEEN THE UNDERGROUND FACILITY MARKINGS AND THE PROJECT PLANS SHALL BE IMMEDIATELY REPORTED TO THE DESIGN ENGINEER.
7. CONTRACTOR SHALL MAINTAIN ACCESS TO ALL SANITARY SEWER MANHOLES AT ALL TIMES.
8. THE CONTRACTOR SHALL FIELD-VERIFY EXISTING SEWER LINE ELEVATIONS AND ALIGNMENTS PRIOR TO CONSTRUCTION. VERIFICATION MAY REQUIRE POT-HOLING.
9. ANY HOUSE CONNECTION SEWER (HCS) OR BUSINESS CONNECTION SEWER (BCS) LINES ENCOUNTERED DURING CONSTRUCTION SHALL BE PROTECTED, REPAIRED, OR REROUTED, AS THE SITUATION DICTATES, PER PCRWRD SSDC 2016 DETAIL NO. RWRD 400 AND AT NO EXPENSE TO THE PROPERTY OWNER OR PCRWRD. HCS AND BCS LINES ARE NOT OWNED OR MAINTAINED BY PCRWRD. PRIVATE CONNECTION SEWERS CONSTRUCTED PRIOR TO JANUARY 2006 ARE NOT REQUIRED TO BE LOCATED AND MARKED.
10. SURVEY LAYOUT AND SURVEY CONTROL SHALL BE PERFORMED BY, OR UNDER, THE DIRECT SUPERVISION OF AN ARIZONA RLS.
11. SURVEY CUT SHEETS SHALL BE PREPARED IN ACCORDANCE WITH PCRWRD SSDC 2016, SECTION 3.2.3(A)(I). CERTIFIED CUT SHEETS SHALL BE SUBMITTED TO THE PCRWRD FIELD ENGINEER PRIOR TO COMMENCEMENT OF SEWER CONSTRUCTION. CUT SHEETS ARE FOR PCRWRD REFERENCE ONLY AND SHALL NOT DELAY SEWER CONSTRUCTION DUE TO REVIEW OF THE DELIVERABLE. ANY ERRORS OR OMISSIONS RESULTING IN IMPROPER SEWER CONSTRUCTION SHALL NOT BE THE RESPONSIBILITY OF PCRWRD. REFER TO PCRWRD SSDC 2016, SECTION 3.2.3(A)(II) FOR CONSTRUCTION SURVEY STAKING REQUIREMENTS.

REVISION DETAIL

ISSUED:	STANDARD DETAIL		DETAIL NO.
06/17			RWRD 001
REVISED:	GENERAL NOTES		
			SHEET 1 OF 2

12. AS-BUILT PLANS SHALL CONFORM TO SSDC 2016, SECTION 1.4.7 AND ARE REQUIRED FOR FINAL ACCEPTANCE OF SEWER CONSTRUCTION BY PCRWRD.

13. NEW PUBLIC SANITARY SEWER FACILITIES MUST BE TESTED, INSPECTED AND AUTHORIZED FOR DISCHARGE BY PCRWRD AND ADEQ, OR IT'S DELEGATE, PRIOR TO DISCHARGING INTO THE EXISTING PUBLIC SANITARY SEWER SYSTEM.

14. PRIOR TO THE INSTALLATION OF SANITARY SEWERS, ALL ROUGH GRADING, INCLUDING FILL, SHALL BE COMPLETED TO A MINIMUM OF 4 FEET OVER THE TOP OF THE SEWER PIPE, BEDDING, SHADING, AND TRENCH BACKFILL COMPACTION SHALL BE PERFORMED IN ACCORDANCE WITH PCRWRD SSDC 2016, DETAIL NO. RWRD 104, OR AS SHOWN ON THE PLANS. SHOULD GROUND WATER OR UNANTICIPATED SOIL CONDITIONS BE ENCOUNTERED, THE BEDDING SHALL BE MODIFIED BY THE DESIGN ENGINEER AND APPROVED BY THE PCRWRD FIELD ENGINEER. WHEN THE NEW SEWER IS LOCATED WITHIN A PUBLIC SEWER EASEMENT, COMPACTION OF BACKFILL SHALL BE IN ACCORDANCE WITH THE CONSTRUCTION DOCUMENTS OR AS OTHERWISE DIRECTED BY PCRWRD. WHEN THE NEW SEWER IS LOCATED WITHIN RIGHT-OF-WAY AGENCY HAVING JURISDICTION.

15. SANITARY SEWER CONSTRUCTION SHALL START AT THE LOWEST DOWNSTREAM POINT AND PROCEED UPSTREAM, REGARDLESS OF THE STATIONING SHOWN ON THE PLANS. IF CONSTRUCTION CANNOT BE PERFORMED IN THIS MANNER, THE CONTRACTOR SHALL PROVIDE AN OUT-OF-SEQUENCE LETTER FOR APPROVAL BY THE PCRWRD FIELD ENGINEER PRIOR TO THE START OF SEWER CONSTRUCTION.

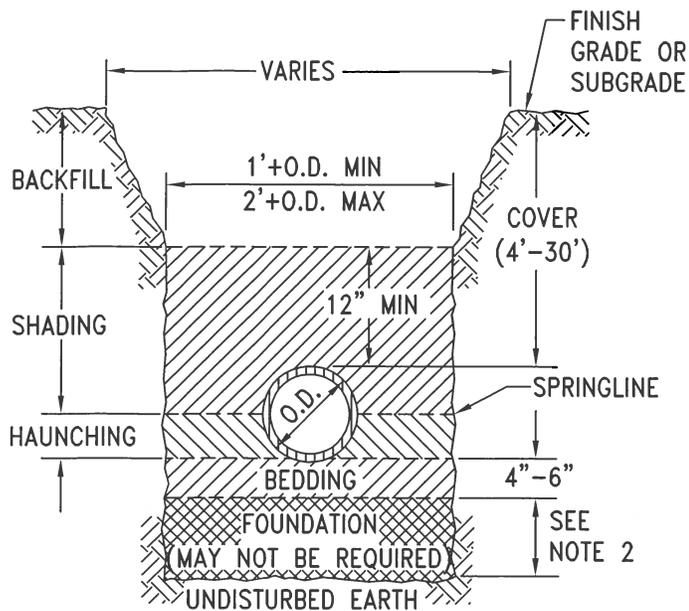
16. THE HORIZONTAL AND VERTICAL SEPARATION BETWEEN PUBLIC WATER MAINS AND PUBLIC SEWER LINES SHALL COMPLY WITH ARIZONA ADMINISTRATIVE CODE (A.A.C.) R18-5-502 AND PCRWRD SSDC 2016, DETAIL NO. RWRD 108.

17. PLANTING WITHIN PUBLIC SEWER EASEMENTS SHALL ONLY BE ALLOWED WITH SPECIAL APPROVAL. TREES WITH BRANCHES OR ROOTS HAVING THE POTENTIAL TO EXTEND INTO PUBLIC SEWER EASEMENTS SHALL BE REMOVED. IN SPECIAL CASES, WHERE THE PUBLIC SEWERS MUST BE LOCATED OUTSIDE PAVED OR STABILIZED AREAS, LANDSCAPING AND PLANTING SHALL ADHERE TO GUIDELINES IN PCRWRD SDS 2016, SECTION 7.7 AND PCRWRD SSDC 2016, DETAIL NO. RWRD 111.

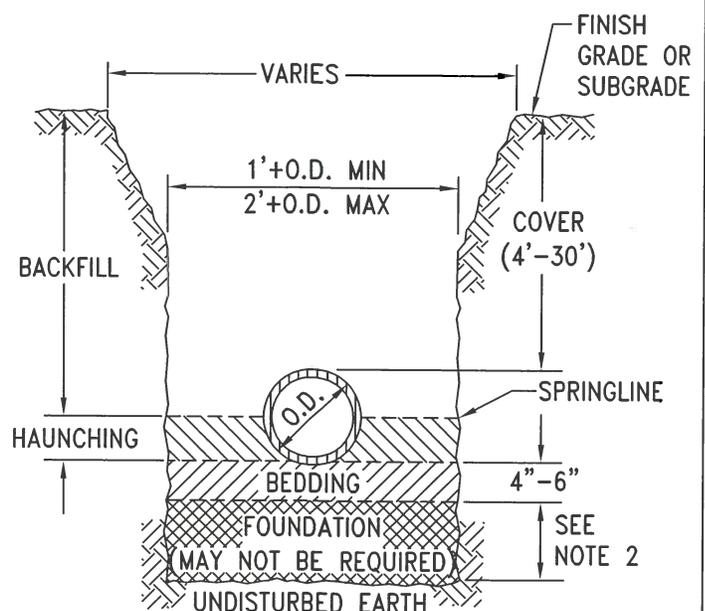
18. ALL PROJECT ACTIVITIES MUST BE KEPT WITHIN THE PROJECT AREAS, CONCERNING HUMAN BURIAL REMAINS. ARCHAEOLOGICAL CLEARANCE RECOMMENDATIONS DO NOT EXEMPT THE DEVELOPMENT FROM COMPLYING WITH STATE BURIAL PROTECTION LAWS. IN THE EVENT THAT HUMAN REMAINS, INCLUDING HUMAN SKELETAL REMAINS, CREMATIONS, CEREMONIAL OBJECTS OR FUNERARY OBJECTS ARE FOUND DURING EXCAVATION OR CONSTRUCTION, GROUND DISTURBING ACTIVITIES MUST CEASE IN THE IMMEDIATE VICINITY OF THE DISCOVERY. ARIZONA STATE LAWS ARS 41-844 AND 41-865 REQUIRE THAT THE ARIZONA STATE MUSEUM BE NOTIFIED OF THE DISCOVERY AT (520) 621-4795 SO THAT CULTURAL GROUPS WHO CLAIM CULTURAL OR RELIGIOUS AFFINITY TO THE REMAINS CAN MAKE APPROPRIATE ARRANGEMENTS FOR THE REPATRIATION AND REBURIAL OF THE REMAINS. THE HUMAN REMAINS WILL BE REMOVED FROM THE SITE BY A PROFESSIONAL ARCHAEOLOGIST PENDING CONSULTATION AND REVIEW BY THE ARIZONA STATE MUSEUM AND THE CONCERNED CULTURAL GROUPS.

NEW DETAIL

ISSUED:	STANDARD DETAIL		DETAIL NO.
06/17	GENERAL NOTES		RWRD 001
REVISED:		SHEET 2 OF 2	



FLEXIBLE PIPE TRENCH DETAIL
N.T.S.



RIGID PIPE TRENCH DETAIL
N.T.S.

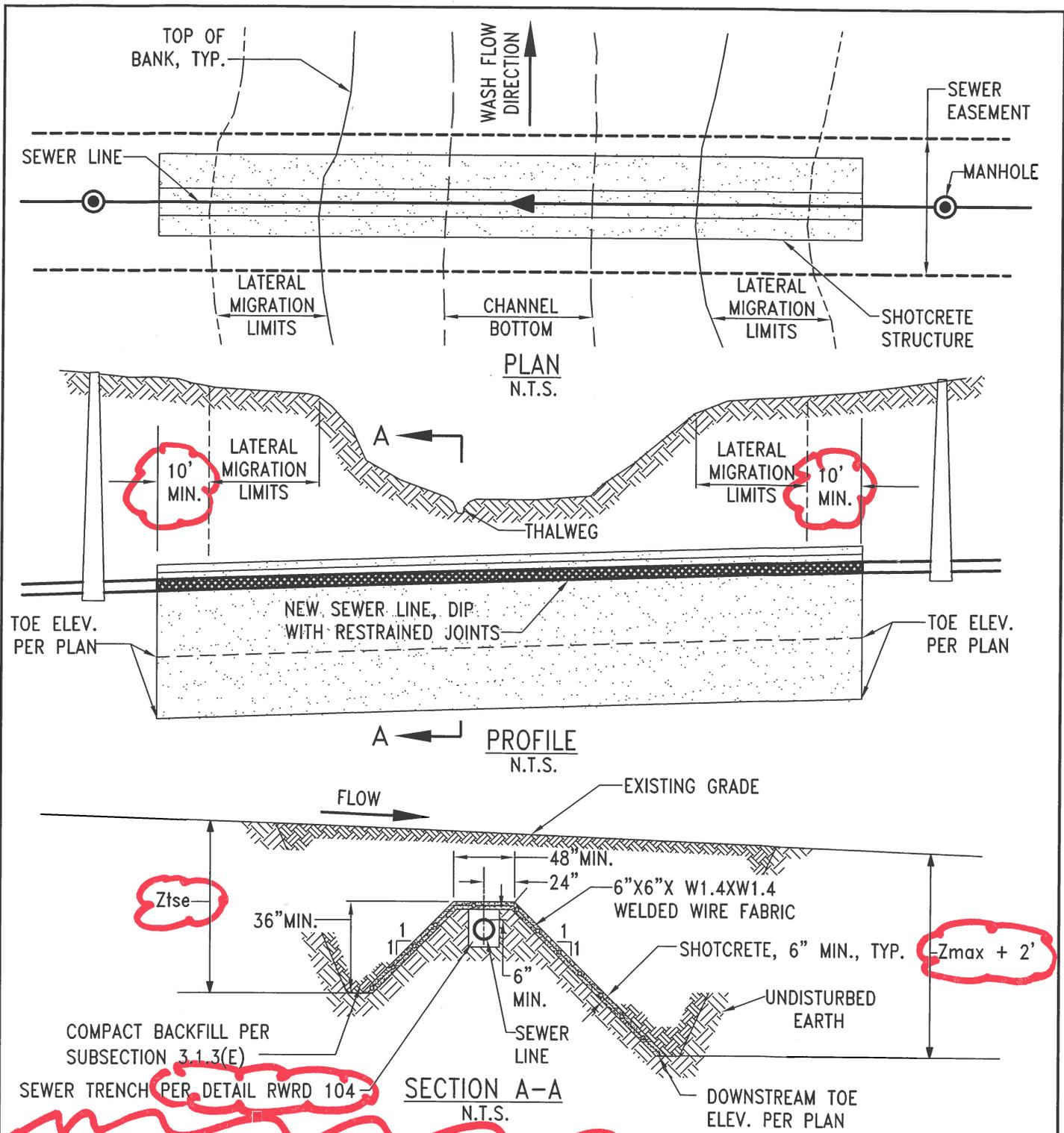
TABLE 1: APPROVED TRENCH MATERIALS AND GRADATION REQUIREMENTS

CRUSHED STONE (FOUNDATION, BEDDING, HAUNCHING & SHADING)		SAND (BEDDING, HAUNCHING & SHADING)		EXCAVATED NATIVE MATERIAL (BACKFILL)		SELECT IMPORT MATERIAL (BACKFILL & FOUNDATION)	
NOM. SIZE	% PASSING	NOM. SIZE	% PASSING	NOM. SIZE	% PASSING	NOM. SIZE	% PASSING
1"	100	1"	100	6"	100	3"	100
3/4"	90-100	#4	60-100	ALSO SEE SUBSECTION 3.1.2(C)		3/4"	60-100
3/8"	20-55	#200	0-10			#8	35-80
#4	0-10	MAX. P.I.=5				SUM OF #200 + P.I. ≤ 25	
#8	0-5	MAX. L.L.=30				ALSO SEE SUBSECTION 3.1.2(D)	
6.0 ≤ pH ≤ 12.0		6.0 ≤ pH ≤ 12.0					
MIN. RESISTIVITY =		MIN. RESISTIVITY =					
IN-PLACE MATERIAL		IN-PLACE MATERIAL					
OR 2,000 ohm-cm		OR 2,000 ohm-cm					
ALSO SEE SUBSECTION 3.1.2(A)		ALSO SEE SUBSECTION 3.1.2(B)					

NOTES:

- FOR SEWER LINES GREATER THAN 16 INCH DIAMETER OR COVER DEPTHS NOT CONFORMING TO THE STANDARD TRENCH DETAILS, SEE PLANS FOR MODIFIED TRENCH DETAILS.
- FOUNDATION IS REQUIRED FOR OVEREXCAVATION SUCH AS FOR ROCK OR UNSUITABLE MATERIALS. SEE SUBSECTION 3.1.3(B) FOR MORE INFORMATION.
- IN CASES WHERE GROUNDWATER IS ENCOUNTERED, INSTALLATION OF AN APPROVED GEOTEXTILE FABRIC ENCLOSING CRUSHED STONE SHALL BE REQUIRED FOR STABILIZATION.

ISSUED:	STANDARD DETAIL		DETAIL NO.
8/92			RWRD 104
REVISED:			
12/12			SHEET 1 OF 1
TYPICAL TRENCH FOR GRAVITY SEWER LINES			



NOTES:

1. THIS DETAIL MAY BE USED IF APPROVED IN THE PLANS OR IN WRITING BY THE FIELD ENGINEER.
2. THIS DETAIL IS INTENDED FOR CASES WHERE IT IS NOT POSSIBLE TO PLACE THE SEWER LINE BELOW THE MAXIMUM PREDICTED SCOUR DEPTH, Z_{max} , AS DEFINED IN APPENDIX A, EDS.
3. THE TOE ELEVATION OF THE DOWNSTREAM AND UPSTREAM GRADE CONTROL STRUCTURES SHALL BE CALCULATED USING APPROPRIATE HYDRAULIC FORMULAS.
4. A DESIGN REPORT SHALL BE INCLUDED WITH THE SEWER PLAN SUBMITTAL (SEC. 5.1.11.A, EDS.)

ISSUED:	SPECIAL STANDARD DETAIL	 PIMA COUNTY WASTEWATER RECLAMATION	DETAIL NO.
12/12	SCOUR PROTECTION FOR SEWER LINES		RWRD 113
REVISED:			SHEET 1 OF 1
06/17			