

SECTION 1450

MEASUREMENT AND PAYMENT

1450.0100 GENERAL

1450.0101 Description. This Specification provides guidelines for measurement and payment for items installed in the Tucson Water Distribution and Production systems. Payment is for items installed in the Tucson Water Distribution and Production systems. Payment is for “Complete in Place” installations.

1450.0200 BLANK

1450.0300 DUCTILE IRON, POLYVINYLCHLORIDE, HIGH DENSITY POLYETHYLENE AND COPPER.

(A) **General.** Measurement shall be the actual linear feet of new pipeline installed, measured through the centerline of valves and fittings, except that on fire hydrant runs ductile iron or PVC pipe will be measured from the centerline of the main valve to the centerline of the hydrant. Also, service lines will be measured from the center of the corporation stop to the center of the curb stop, or, in the case of a split service, to the center of the yoke.

Payment will be made at the unit price bid for each size and type of pipe as stated in the Contract, and will be compensation in full for furnishing and installing the necessary materials and work as follows:

- Removal of obstructions, site clearing,
- All excavation, trench shoring and bracing,
- Pipe as called for on the Plans,
- Fittings, plugs and dead-end materials,
- Ductile iron pipe joint bonding and polyethylene encasement as required in the project design plans and specifications,
- Thrust resistant, as required by design plans or specifications
- Flexible connections, couplings, tie-ins and connections to existing lines or work including the lowering or raising of existing lines to the grade of the new line, if necessary for proper connection,
- Backfilling using material excavated from the trench, if suitable, or importing material, if necessary, that is acceptable, compaction in all areas per standards and specifications,
- Hydrostatic testing and disinfecting, flushing using dechlorinator,
- Existing asphalt or Portland cement concrete pavement saw cutting, milling, removal, and disposal including aggregate base course, as required,
- **Temporary cold mix patch, if required, or at the request of the Inspector and/or Engineer,**
- Shoulder cut replacement to finished grade,
- Removal and replacement of concrete, brick, stone, asphalt, or any other kind of sidewalks, and all driveways, curbs and other obstructions,
- Pipe hangers, and painting of pipe if required,
- Abandoning and plugging of existing mains as required or shown on the plans, and
- All work not specifically covered in other items,

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- All permits required for construction/installation and the costs associated with those permits are included in the unit bid costs for pipe installation,
- Project sign installation,
- Flange Insulating Kits (FIKs) as required in the plans and specifications,
- Any associated costs with providing parking for the Contractor's staff at the project site,
- All costs associated with required pre-construction video recording of the project site, including the costs of providing copies of DVDs as required by the Engineer,
- All soils and materials testing as requested by the specification, Inspector, and/or Engineer,
- Potholing to determine tie-in depth, materials, etc. as required by the plans and specifications shall be included in the unit bid cost of pipe installation. Additional potholing at the request of the Inspector and/or Engineer shall be paid for at separate unit bid costs,
- All costs associated with removing, transporting, and delivery of material salvaged for reuse by Tucson Water,
- All costs associated with the removal and disposal of non-salvaged materials including, but limited to: concrete asphalt, soil, rock, abandoned pipe (including cement asbestos pipe), vegetation, construction debris and trash shall be included in the unit bid cost of pipe installation,
- Bracing and support of existing utilities,
- All costs associated with the replacement of traffic loop detectors damaged during construction,
- All costs associated with plant protection prior to and during constructing, including re-establishing Native Plant Preservation tagging by professional expertise, and placing of fencing for plant protection,
- Revegetation and landscape restoration as called for on the plans including private driveways and rip-rap,
- Removal and replacement of fence as called for on the plans,
- Installation of tracer wire.

In the case of water service stub-outs to be installed at center of lot, or as indicated, payment for copper pipe is to include service clamp, corporation stop, copper pipe, curb stop, meter box and the tap.

Partial payment for this item will be made on the basis of the length of pipe that has been installed, backfilled, and tested.

(B) Extra Cast Iron Fittings. Extra cast iron fittings not called for on the plans. No payment will be made for cast iron fittings required but not called for on the plans.

(C) Valves, Tapping Sleeves and Valves. Measurement for these items shall be for each valve installed, for each tapping sleeve and valves installed. Payment will be at the unit price bid for each size and will be compensation in full for furnishing and installing all valves, all tapping sleeves

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and valves as specified, including excavation, valve, 6" riser pipe, valve box, valve box cover, valve extensions, making the tap, concrete support block, testing, disinfecting, backfilling, and concrete collar.

(D) Fire Hydrants. Measurement shall be for each fire hydrant installed. Payment will be made at the unit price bid and will be compensation in full for furnishing and installing the hydrants, complete as shown on the Plans and as specified, with the bury as needed, including excavation, crushed rock, thrust restraints, backfill, testing and disinfecting, and any other materials or work required to install the hydrant off of either an existing or new main, so that the center of the "steamer" or "pumper" nozzle will be at a height of not less than 16", and the breaking flange at a height of not more than 6", from the finished ground line.

Barrel extensions will only be allowed when approved by the Engineer.

Should fire hydrant barrel extensions be required, due to existing conditions not shown on the plans, they will be paid for at the following rate:

Barrel Extension	
6".....	\$320.00
12".....	\$350.00
18".....	\$380.00
24".....	\$410.00

Fire hydrant protection poles, not shown on the plans but required by the Engineer, will be paid at \$150 each.

(E) Pavement Replacement. Measurement shall be made by the square yard of pavement cut, replaced and accepted, measured as installed in place, and computed from the area of pavement replacement measurement limit shown on the PC/DOT Standard Detail No. 216. Payment will be made at the unit price bid for each type of pavement replacement, and will be compensation in full for furnishing and placing all materials for base and/or surface courses, including labor, equipment, tools, and incidentals necessary to complete the work in accordance with Pima County/City of Tucson Standard Specifications and Details for Public Works Construction.

(F) Boring. Measurement shall be the actual linear feet of casing installed. Payment will be made at the unit price bid for each size of casing, and will be compensation in full for furnishing and installing the casing as specified and shown on the Plans, including excavation, boring, casing, backfilling, all labor, material and equipment necessary to the work.

(G) Water Service Renewal. Measurement shall be for the actual number of linear feet of copper pipe installed, measured as installed in place. Payment will be made at the unit price bid, and will be compensation in full for furnishing and installing the service renewal material and work as follows: Removal of obstructions, all excavation, service saddle, corporation stop, tap, copper pipe, curb stop, meter spacer, copper gooseneck, adapters, appropriate meter box, backfilling, compaction, tie-in, testing and disinfecting.

(H) Air Release Valves. Measurement shall be for the actual number of air release valves installed. Payment will be made at the unit price bid for each size, and shall be compensation in full

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for furnishing all labor, materials, and incidentals necessary for a complete installation in accordance with Standard Detail SD 330 and 331 including excavation, backfill, service clamp, corporation stop, copper pipe, direct acting air release valve, appropriate meter box and lid, testing, disinfecting, connections, and all other work not specifically called for in other items.

(I) Pressure Regulator Valve and Enclosure. Measurement shall be for each pressure regulator installed and all necessary pipe and fittings.

(J) Additional Depth Not Called for on Plans. The purpose of this pay item is to provide compensation to the Contractor due to additional work involved when he installs pipe at a depth in excess of that shown on the Plans, or in the Standard Specifications, when he encounters obstructions in the field not shown to be existing on the Plans or for any other reason, but only after receiving approval from the Engineer.

This does not include excavation for services, fire hydrants, boring equipment, valves, tapping valves or equipment, or any other special excavation. Payment will be made at \$3.50 per cubic yard for normal excavation that can be made with trencher or back hoe, and at \$12.50 per cubic yard for hard rock excavation that requires blasting or jackhammer, and will be compensation in full for furnishing the necessary equipment, materials, and work as follows: All excavation, shoring and bracing, backfilling using material excavated from the trench, if suitable, or importing backfill material, if necessary, that is acceptable, compaction, repair and/or replacement of obstructions, and all matters pertaining to excavation and backfill.

(K) Drain Valve Assembly. Measurement shall be for each drain valve assembly installed, complete and in place. Payment will be made at the unit price bid, and will be compensation in full for furnishing and installing all labor and materials as called for in City Water Department Standard Detail SD400.

(L) Fencing. Measurement shall be for the actual linear feet of fence installed. Payment will be made at the unit price bid, and will be compensation in full for furnishing and installing all labor and material required in accordance with the Plans and Specifications.

(M) HCSs. HCSs encountered during pipeline installation will be considered incidental to the construction. There will be no compensation for going under or for repairs. All repairs will be at the contractor's sole expense.

(N) Water Services and Stub Outs. Water services and stub outs encountered during pipeline installation will be considered incidental to the construction. There will be no compensation for going under or for repairs. All repairs will be at the contractor's sole expense.

(O) Combination Air Release Valve Assemblies (CARV). Measure and payment shall be made per each CARV assembly as shown on the Design Plans or as directed by the Engineer to install complete, including all appurtenances and related work. Payment shall included all cost for furnishing, material and labor to install the CARV and appurtenances not otherwise paid for in other bid items, including, but not limited to clearing and grubbing, surface preparation, excavating, shoring and bracing, temporary erosion controls, pre-cast manhole structure and cover, CARV, piping, fitting, gate valve, drain grating, piping, and gravel, all fencing replacement/relocation, backfill and compaction,

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testing and disinfection, removal and replacement of concrete, brick, stone, or any other kind of sidewalks, curbs, and all work not specifically shown covered in other items.

(P) Combination Vacuum Relief and Air Release Valve Assemblies (CVR & ARV).

Measure and payment shall be made per each CVR&ARV assembly as shown on the Design Plans or as directed by the ENGINEER to install complete, including all appurtenances and related work. Payment shall include all cost for furnishing, material and labor to install the CVR&ARV and appurtenances not otherwise paid for in other bid items, including, but not limited to clearing and grubbing, surface preparation, excavating, shoring and bracing, temporary erosion controls, pre-cast manhole structure and cover, CVR&ARV, piping, fitting, gate valve, drain grating, piping, and gravel, all fencing replacement/relocation, backfill and compaction, testing and disinfection, removal and replacement of concrete, brick, stone or any other kind of sidewalks, curbs, and all work not specifically shown covered in other items.

(Q) Blowoff Assemblies.

Measure and payment shall be made per each blowoff assembly as shown on the Design Plans or as directed by the Engineer to install complete, including all appurtenances and related work. Payment shall include all costs for furnishing material and labor to install the blowoff and appurtenances not otherwise paid for in other bid items, including but not limited to clearing and grubbing, surface preparation, excavating, shoring and bracing, temporary erosion controls, pre-cast concrete vault and cover, piping, fittings, gate valve, ball valve, valve box and cover, CLSM (for Bid Alternate option), concrete, and gravel, all fencing replacement/relocation, backfill and compaction, testing and disinfection, removal and replacement of concrete, brick, stone, or any other kind of sidewalks, curbs, and all work not specifically shown covered in other items.

(R) Corrosion Test Stations.

Measurement shall be the actual number of corrosion test stations furnished, installed and accepted. Payment will be made at the unit price bid for each type of corrosion test station and will be compensation in full for furnishing and installing all labor, materials, and incidentals necessary for a complete installation, including testing of the stations and preparation of a final report by a NACE International-Certified Cathodic Protection Specialist summarizing the test results, and in accordance with these specifications and Tucson Water Standard Details SD-700 Series.

(S) Existing VCP Sewer Replacement.

Measurement and payment shall be made on a linear foot basis for each pipe diameter of ductile iron pipe (8" & 16") sewer replacement, measured along the horizontal centerline of the trench. Work includes all work removing, disposing and replacing the existing sewer, furnishing, and installing ductile iron pipe in accordance with the latest edition of Pima County Wastewater Management Department Standard Specifications and Details as specified herein. Payment shall include all work for removing and replacing existing sewers as described herein including, but not limited to coordination with Pima County Wastewater Management Department, all clearing and grubbing, surface preparation, excavating, shoring and bracing, temporary erosion controls, flow rerouting or bypass pumping, all special ductile iron pipe and fittings, pipe trench zone backfill and compaction, trench cut-offs, removal and disposal, testing and disinfection, removal and replacement of asphalt bike path, concrete, brick, stone, or any other kind of sidewalks, curbs, stone riprap, and all work not specifically shown covered in other items.

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(T) **Maintenance and Protection of Traffic.** This element of work shall be bid as lump sum and the price bid by the Contractor shall be considered payment in full for the work as follows:

- Maintenance of roadway and sidewalk areas, as well as detours in the project limits including sweeping and surface/pothole repairs.
- Storm water control adjacent to roadways, sidewalks, etc.
- Storm and emergency response to protect the Work including labor, equipment and materials.
- Relocation services for all traffic control devices including labor, equipment, vehicles, and supervision costs for installation, moving, damage repair, relocation and final removal.
- Monitoring of project site on nights, weekends, and holidays.
- Traffic control plan preparation and approval process.
- Notification of police, fire, ambulance, schools, public transit authorities, postal service, neighborhood groups, businesses, etc.
- Ingress and egress to driveways, bus stops, crosswalks, sidewalks, etc.
- Maintenance of existing traffic control and street signs.
- Other non-specific or incidental activities not included in other pay items of work associated with traffic control.

(U) **Construction Area Elements.** Measurement shall be from the time each element is put into active use on the project and until such time said element is no longer required. Measurement shall be only of those elements required by the approved traffic control plan or as directed by the Engineer or agency in whose jurisdiction the work will occur. Progress payment requests shall include invoices for the elements of which payment is being requested. Payment shall be made at the predetermined rates as follows:

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<u>Element of Work</u>	<u>Unit</u>	<u>Rate(\$)</u>
Install & Remove Temporary Concrete Barriers	Ea./Day	10.00
Relocate Temporary Concrete Barriers	Ea./Day	5.00
Temporary Concrete Barrier (In Use)	Ea./Day	0.05
Impact Attenuation Device		
(Sand Barrel) (In Use)	Ea./Day	0.05
(Energy Absorbing Terminal) (In Use)	Ea./Day	1.00
(Truck Mounted)	Hour	27.00
Flashing Arrow Panel	Hour	5.00
Pilot Truck	Hour	6.36
Flagger	Hour	12.50
Flagger (Uniformed Police Officer)	Hour	27.11
Official Police Vehicle	Hour	2.50
Vertical Panels	Ea./Day	0.50
Tubular Markers	Ea./Day	0.35
Barricade (Type II)	Ea./Day	0.50
Barricade (Type III)	Ea./Day	0.75
Flashing Warning Light (Type A)	Ea./Day	0.25
Flashing Warning Light (Type B)	Ea./Day	2.50
Steady-Burn Warning Light (Type C)	Ea./Day	0.80
High Intensity Reflective Sheeting		
Small Sign (Less than 10 sq.ft.)	Ea./Day	1.10
Medium Sign (10 to 16 sq.ft.)	Ea./Day	1.30
Large Sign (More than 16 sq.ft.)	Ea./Day	1.50
Std. Intensity Reflective Sheeting		
Small Sign (Less than 10 sq.ft.)	Ea./Day	0.50
Medium Sign (10 to 16 sq.ft.)	Ea./Day	0.65
Large Sign (More than 16 sq.ft.)	Ea./Day	1.00
Portable Sign Stand (Spring Type)	Ea./Day	2.10
Portable Sign Stand (10 sq.ft. or More)	Ea./Day	1.00
Portable Sign Stand (Under 10 sq.ft.)	Ea./Day	0.70
High Level Flag Tree	Ea./Day	0.80
Traffic Cones, 18-inch	Ea./Day	0.30
Traffic Cones, 28-inch	Ea./Day	0.40
Drum (18-inch by 36-inch)	Ea./Day	1.20
Orange Safety Fence (4 ft. min. by 50 ft.)	Ea./Day	2.50
Changeable Message Board (Preapproved)	Ea./Day	150.00

The amount shown in the Bid Schedule for this item of work is for bidding purposes only. Payment shall be made at the predetermined reimbursement rates as shown, and shall be considered payment in full.

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(V) **Revegetation and Landscape Restoration.** Measure and payment shall be made per each landscape unit bid and lump sum bid items that are shown on the Drawings or as directed by the Engineer, including any related work. Payment shall include all furnishing, materials and labor to transplant, revegetate, and mitigate complete in place and other work not otherwise paid for in other bid items, including, but not limited to clearing and grubbing, surface preparation, excavating, trenching, fertilizer, sand stakes, irrigation piping and controllers, fittings and drip emitters, valves, solar power units, backfill, clean-up, and all work not specifically shown covered in other items

(W) **Archaeological Standby Time.** Payment for standby time caused by archaeological monitoring shall be at the fixed hourly rate of one hundred fifty dollars (\$150.00) per hour for the actual total number of hours the monitoring work delays the CONTRACTOR. The Bid Schedule allows 10 hours for this purpose to provide consistency in the bids. It is not intended to be the actual number or hours required. Payment shall be considered compensation in full for the labor and equipment costs associated with the work delayed. The CONTRACTOR will not be considered delayed if he has other work, which can be done, and he is directed by the ENGINEER to move to a new location.

(X) **Archeological Closures.** Payment will be made at the lump sum price bid for each closure required and shall be compensation in full for the closure pieces of pipe, all labor and incidentals necessary for a complete closure, and any detrimental impacts to the contractor's construction sequencing resulting from the archeological closure. For the purposes of payment, each archaeological site will represent one closure, regardless of the number of type of connections required to make the closure. The payment will be for installing the closure and then removing the closure after the archaeological area has been cleared. The installation of pipe in the section left out will be paid at the unit price bid for that size and class of pipe.

(Y) **Survey Monuments.** Measurement shall be the actual number of survey monuments furnished, installed and accepted. Payment will be made at the unit price bid for survey monuments and will be compensation in full for furnishing and installing all labor, materials, and incidentals necessary to complete the work in accordance with Pima County/City of Tucson Standard Specifications and Details for Public Works Construction.

(Z) **Controlled Low Strength Material (CLSM) Pipe Zone Backfill.** Measurement and payment shall be made on a linear foot basis, as shown on the Plan & Profile and Detail Drawing and as defined per Standard and/or Special Specifications. CLSM pipe zone backfill is measured along the centerline of the trench, regardless of the depth. Payment shall include full payment for furnishing CLSM, processing of or removal of trench material, if required, proper CLSM flotation installation technique, trench maintenance, compressive strength testing of CLSM samples as required by the ENGINEER and disposal of surplus CLSM.