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**PART I - GENERAL CONDITIONS**  
**Section 3**

**MEASUREMENT AND BASIS OF PAYMENT**

**3.1 GENERAL**

All work completed under City contracts will be measured in place by the Engineer, according to United States Standards of measures, using methods generally recognized as conforming to good engineering practices and as specified herein.

Quantities of the units of work in place will be measured and payment computed, based on the following:

<u>Measurement</u>	<u>Payment Units</u>
Count	Lump sum, each
Linear (Horizontal or Vertical)	Inch, feet, yard, mile
Area (Horizontal or Vertical Plane)	Square: feet, yard or acre
Volume	Cubic: feet, yard
Weight (Avoirdupois)	Pounds, 2000 lb. ton
Liquid	U.S. Gallon
Haul	Ton mile, yard mile
Equipment	Hour

Payment made and accepted by the Contractor shall be full payment for furnishing all materials and performing all work under the contract in a complete and acceptable manner and for all risk, loss, damage, or expense of whatever character arising out of the nature of the work or the prosecution thereof.

Work or materials for which there are pay items and which are to be paid separately will be included in the approximate quantities listed in the Bid Schedule. Work or materials that are essential to the project but for which there are no pay items, will not be measured and paid for separately but shall be included in the project work.

**3.2 CLEARING AND GRUBBING**

Measurement: (Acres) (Lump Sum) The quantity of clearing and grubbing shall be measured in acres or fraction thereof or in lump sum for a specified area acceptably cleared and/or grubbed including scalping and shrub removal, within the project limits, to a depth of three (3) feet below the existing surface. No measurement will be made when the Bid Schedule calls for clearing and grubbing a specified area on a lump sum basis. Removal of vegetation with a trunk that measures smaller than twelve (12) inches in diameter when measured four (4) feet above the existing surface shall be paid for as clearing and grubbing.

Payment: The accepted areas will be paid for at the contract unit price or lump sum amount bid. When the Bid Schedule does not contain an item for clearing and grubbing, the work will not be paid for directly, but will be considered as a subsidiary obligation of the Contractor under other contract items.

Trees, plants, structures, etc. that are not to be removed shall be fully protected from injury by the Contractor at his expense.

### **3.3 TRANSPLANTING PLANTS, SHRUBS, TREES**

Measurement: (Each) - The quantity of transplanting to be measured will be the actual number of plants of the various types transplanted and accepted in their final location and in healthy condition at the end of a 90 day maintenance period.

Payment: The accepted quantities of the various plants transplanted, as specified in the Bid Schedule, will be paid for at the contract unit price bid. No separate measurement or payment will be made for digging, balling, spraying, debudding, pruning, transporting, fertilizing, watering and maintaining, but shall be included in the work.

### **3.4 DEMOLITION**

Measurement: (Each) - Demolition will be measured as the number of locations where structures have been razed or removed and area properly graded and accepted.

Payment: Accepted areas on which demolition has been performed will be paid for at the contract amount bid for the specified location. No separate measurement or payment will be made for: clearing and grubbing, removal of buildings, foundation, basement slabs, cesspool, privies, buried fuel and septic tanks, wells, well casing, slabs on grade; disconnect and protection of public utilities or improvements; hauling and disposal of rubble, furnishing, hauling, placing, compacting fill and grading the area to drain; protection of facilities designated to remain, but shall be included in the work.

### **3.5 REMOVAL OF STRUCTURES OR OBSTRUCTIONS TO SALVAGE OR WASTE**

Items: Buildings and foundations; bridges, culverts and other drainage structures; concrete curb, gutter, sidewalk, crosspans and pavement; manholes, fence, pipe, valves, meters, traffic devices, trees, etc.

Measurement: (Each) (Lump Sum) (Linear Feet) (Square Feet) (Square Yard) - Measurement will be made for removal for salvage or waste according to the unit specified in the Bid Schedule. Only count will be made of items removed on a lump sum basis. Tree stumps and roots must be removed to a minimum depth of three (3) feet below existing grade.

Payment: The accepted quantities will be paid for at the contract unit price bid for each of items removed for salvage or waste specified in the Bid Schedule. No separate measurement or payment will be made for sawing, removing, hauling and disposal, excavation and subsequent backfill to finish grade, but shall be included in the work.

The contract unit price bid shall also include the salvage of materials removed, their custody, preservation, storage and disposal as specified in the Contract Documents.

### **3.6 RESET, RELOCATE, RECONNECT, ADJUST**

Items: Barricade, fence, gate, mailbox, manhole barrel, cover, cone, flat top, ring or steps; pipe, pole, structures; sewer service; traffic devices; water meters, services and valves.

Measurement: (Each) (Lineal Feet) (Square Yards) - The quantity to be measured shall be the actual number, length or area of the various items removed, stored, reconnected, relocated, adjusted and reset to service, when specified on the Bid Schedule.

Payment: The accepted quantities of item reset to service will be paid for at the applicable contract unit price bid. No separate measurement or payment will be made for work related materials necessary to reset the item to service; such as posts, hardware, wire, mailbox, excavation, backfill, concrete, rewiring, bedding, joint material, collars, connecting bands; but shall be included in the work.

### **3.7 FLOW CONTROL, SPECIAL FITTINGS AND MEASURING DEVICES OR SYSTEMS**

Items: Meters, pumps, special fittings and valves; flumes, drain and head gates; recorders, totalizers, telemetry and electrical systems.

NOTE: Fire hydrants are excluded.

Measurement: (Each) - The actual number of the various devices or systems specified in the Bid Schedule installed and accepted.

Payment: The accepted number of flow control, special fittings and measuring devices or systems will be paid for at the contract unit price bid. No separate payment will be made for excavation, dewatering, bedding, in line fittings and connectors, supports, riser guides and extension, valve box with covers, backfill, grading, mounting brackets, electrical conduit, wire etc., but shall be included in the work.

### **3.8 FIRE HYDRANTS**

Measurement: (Each) - Actual number of five and one quarter inch (5¼") three-way fire hydrants installed to grade, including any fire hydrant extensions required.

Payment: The accepted number of fire hydrants will be paid for at the contract unit price bid. No separate measurement or payment will be made for excavation, dewatering, six (6) inch flanged gate valve with box and cover at main, hydrant extensions, bedding, six (6) inch PVC AWWA C900 CL 200 or AWWA C909 CL 150 lateral pipe, gravel underdrain, tie rods, shackle, tape wrapping, concrete anchor block, backfill, grading, etc., but shall be included in the work.

### **3.9 PIPING IN VAULTS**

Measurement: (Lump Sum) - No separate measurement will be made of Piping installed in vaults or within three (3) feet of the vault exterior surface.

NOTE: In line valves, meters, telemetry and electrical systems will be measured and paid for separately as called for in the Bid Schedule.

Payment: - Accepted in vault piping will be paid for at the contract unit price bid. No separate measurement or payment will be made for the various types, sizes or length of pipe and fittings required, tie-rods, corporation stop, gauges, pipe and device supports, structural steel, steel plates, hardware, gaskets, tubing, insulating and joint bonding material, tape wrapping, gasket and outlet sealants, vents, conduit, etc., but shall be included in the work.

### **3.10 CASING PIPE - JACKING OR BORING**

Measurement: (Lineal Feet) The quantity of casing pipe, according to the type and size called for in the Bid Schedule, will be measured along the pipe centerline between the limits designated on the plans or as directed.

Payment: Accepted quantity of casing pipe will be paid for at the contract unit price bid. No separate measurement or payment will be made for special insurance, excavation, pit sheeting and shoring, dewatering, pressure grouting, skids, chucks, stulls, stringing and anchoring carrier pipe, furnishing and installing sand in voids between the carrier and casing pipe if required, bulkheads, cathodic protection (32 lb. anode bags), backfill, disposal of surplus material, etc., but shall be included in the work.

NOTE: The length of carrier pipe will be paid for separately from the applicable contract unit price bid for pipe, installed through the casing.

### **3.11 PIPE LINES**

Items: Drainage, sanitary sewer and water lines; sanitary and water service lines; irrigation, siphon, underdrain and vent lines.

NOTE: Fire hydrant laterals and flared end treatments are excluded.

Measurement: (Lineal Feet) - Pipe of the various types, classes and sizes called for in the Bid Schedule will be measured by the lineal foot along the in place pipe centerline, between points of connection with existing facilities or extremities specified on the plans.

NOTE: Deduction in measured quantities will be made for piping in vaults and pipe at manholes and structures where the concrete inverts are cast in place and shaped. No deduction in measured length will be made for in line fittings and valves.

Payment: - Accepted quantities of pipe will be paid for at the contract unit price bid. No separate measurement or payment will be made for excavation, dewatering, trench stabilization material, bedding material, in line fittings and connectors, tape wrapping, gasket and joint materials, all thread ties, joint restraints, concrete anchor blocks, clay trench and inversion plugs, backfill, disposal of surplus materials, etc., but shall be included in the work.

### **3.12 CATHODIC PROTECTION DEVICES AND SYSTEMS**

Items: Anode Field, Conductors, Controller, Deepwell Anode System, Rectifier, Submerged Anode System, Test Station.

Measurement: (Each) (Lump Sum) - Cathodic protection will be measured by the actual number of the various devices and/or systems, specified on the Bid Schedule, installed.

Payment: Accepted quantities of the cathodic protection devices and systems will be paid for at the contract unit price bid. No separate measurement or payment will be made for excavation, drilling, dewatering, caldwell thermite bonding, insulating, ridged conduit, wire, reference electrodes, ground rod, junction box, backfill, energizing, testing, training owner's personnel in operating the system, retesting, etc., but shall be included in the work.

### **3.13 CONNECTS TO EXISTING FACILITY**

Items: Inlet, manhole, and pipe connections.

Measurement: (Each) - The quantity to be measured shall be the actual number of connections made between a new installation and an existing facility.

Payment: Accepted number of connections made to an existing facility will be paid for at the contract unit price bid. No separate measurement or payment will be made for connecting to water taps made by City crews, excavation, dewatering, tapping, cutting, chipping, drilling; furnish and installing; fittings, tie-rods, anchor blocks, tape wrapping, jointing material, gasket sealants, reshaping manhole inverts, backfill, etc., but shall be included in the work.

### **3.14 CHLORINATION AND PRESSURE TESTS**

Items: Drainage, sanitary sewer and water lines.

Measurement: (Each) - The quantity of chlorination and/or pressure tests shall be the number of pipe stretches tested between two (2) adjacent manholes on sanitary and storm sewer lines, or the number of stretches of water main tested between the line extremities as shown on the plans. No count will be made of lateral connections to immediate adjacent valves or service lines extending from the main.

Payment: Accepted chlorination and pressure tests will be paid for at the contract unit price bid. No separate measurement or payment will be made for chlorination and flushing of water lines, retesting when prior tests have failed, furnishing and connecting approved bulkheads, connectors, tubing, piping, compressor, pump, water, volumetric and pressure gauges, etc., to test water lines at 150 psig or sewer lines to 3.5 psig; but shall be included in the work.

### **3.15 PIPELINE INSPECTION AND/OR CLEANING**

Items: Root removal, scouring, television inspection.

Measurement: (Lineal Foot) - The actual number of lineal feet of pipe requiring root removal, inspected and/or scoured, measured along the pipe centerline between consecutive manholes, to the limits specified in the Contract Documents or as directed.

Payment: Accepted quantities of line inspected and/or scoured, as called for in the Bid Schedule, will be paid for at the contract unit price bid. No separate measurement or payment will be made for flow diversion or control; equipment set ups, film, traffic control, collecting data and reporting location of line failures; removal and offsite disposal of purged solids; repair of service lines damaged in performing the work etc., but shall be included in the work.

### **3.16 PIPE JOINT REHABILITATION**

Items: Joint testing, joint sealing, proof testing.

Measurement: (Each) - The actual number of pipe joints tested and/or sealed of the various pipe sizes called for in the Bid Schedule.

Payment: Accepted quantities of joints tested and/or sealed will be paid for at the contract unit price bid. No separate measurement or payment will be made for flow diversion or control, equipment set ups, retests of joints sealed, traffic control, etc., but shall be included in the work.

### **3.17 PIPE POINT REPAIR**

Measurement: (Each) - The actual number of point repairs made, in which thirteen and one-half (13 1/2) feet or less of new equivalent size pipe is installed.

Payment: Accepted quantities of point repairs made, of the various sizes of pipe specified in the Bid Schedule, will be paid for at the contract unit price bid. No separate measurement or payment will be made for mobilization, traffic control, excavation, trench shoring, dewatering, flow diversion or control, service line reconnects, watertight couplings or fittings, locating and protecting other utilities, bedding and backfill placement and compaction, disposal of waste and surplus materials, etc., but shall be included in the work.

### **3.18 PIPE SLIPLINER**

Items: Access pits, service reconnects, sliplining.

Measurement: (Lineal Feet) (Each) In place slipliner, of the various thickness and sizes called for in the Contract Documents, will be measured along the pipe centerline, between points of reconnects. Measurement of the access pits and service line reconnects will be the actual number of access pits for insertion and/or service connections made to the in place liner pipe.

Payment: The accepted number of lineal feet of slipliner pipe installed and/or the number of designated access pits or service reconnects made will be paid for at the respective contract unit price bid therefore. No separate measurement or payment will be made for mobilization, traffic control, excavation, manhole rehabilitation, flow diversion and/or control, shoring, power, thermal jointing, cement stabilized sand, circle seal clamps, sealing at manholes, saddles, gaskets, backfill, disposal of surplus material, restoration of property, etc., but shall be included in the work.

### **3.19 TRENCH RESURFACING**

Items Base course, asphalt, concrete

Measurement: (Square Yard) (Ton) The quantity of the trench resurfacing material specified in the Contract Documents will be measured as the number of surface square yards or tons placed over the pipe centerline within the following limits:

Minimum thickness shall be six (6) inches unless otherwise specified. Maximum width shall not exceed three (3) feet plus the outside diameter of the pipe "barrel" in feet, and then only where applicable or specified.

Payment: Accepted quantities of trench resurfacing will be paid for at the respective contract unit price bid. No separate measurement or payment will be made for wetting and compacting trench backfill, subgrade densification and shaping, vertical trueing of existing surface along each side of the trench, placing materials outside the established prism limits, tacking existing surface edges, traffic control, etc., but shall be included in the work.

### 3.20 **SELECT MATERIALS FOR BEDDING, BACKFILL, ETC.**

Items: Bed course, filter media, select and/or structural backfill, special backfill

Measurement: (Cubic Yard) - Measurement of select materials called for in the Bid Schedule shall be computed between horizontal and vertical neat lines and planes.

- A. Circular Conduits: Calculated volume between:
1. Vertical planes perpendicular to the conduit centerline between stations shown on the drawings or as directed; and between;
  2. Vertical planes each side and parallel with the conduit centerline. The spacing between the planes shall not exceed three (3) feet plus the outside diameter of the conduit in feet for trenches over five (5) feet deep and shall not exceed two (2) feet plus the outside diameter of the conduit in feet for trenches less than five (5) feet deep, and between;
  3. Two (2) horizontal planes, one (1) being one (1) foot above and parallel with the outside crown of the conduit and one at base course subgrade or at finish grade, whichever is the lower in elevation.
- B. Bedding Material: Calculated volume of material lying within the prism shown on the Standard Detail Drawings or construction plans. Except no measurement will be made for trench rock stabilization or conduit bedding material installed below a horizontal plane located one (1) foot above the conduit crown centerline.
- C. Bridges and Irregular Shaped Structures: Calculated volume to vertical neat lines one and one-half (1 1/2) feet outside and parallel to the outline of the foundation plan and between horizontal planes at elevation limits shown on the drawings or as directed.

Payment: Accepted quantities of select materials will be paid for at the contract unit price bid for the items as they appear in the Bid Schedule. No separate measurement or payment will be made for material royalties, haul, dewatering, compaction, etc., but shall be included in the work.

NOTE: Cost of trench dewatering, disposal of surplus material, trench stabilization, conduit bedding below and to the elevation specified in the Contract Documents shall be in the contract unit price bid for the conduit or pipe in place.

### 3.21 **CONCRETE-FLATWORK**

Items: Crosspans, curbs, gutters, pavement, sidewalk, driveway pans, slabs on grade, median.

Measurement: (Square Yard) (Lineal Feet) - Concrete flatwork will be measured as the actual number of square yards or lineal feet of exposed surface concrete placed to the thickness, shape and length specified in the Contract Documents.

Payment: Accepted quantities of concrete flatwork will be paid for at the contract unit price bid for the applicable type of concrete flatwork specified in the Bid Schedule. No separate measurement or payment will be made for base course material and/or subgrade preparation including compaction, fine grading, expansion joint, reinforcing steel, dowels, tie bar, joint filler, etc., but shall be included in the work.

### **3.22 CONCRETE-STRUCTURAL**

Items: Bridges, box culverts, catch basins, cut off walls, diversion structures, head and wing walls, inlets, vaults

Measurement: (Cubic Yard) (Each) - Bulk structural concrete will be measured by the cubic yard in accordance with the neat line dimensions called for in the Contract Documents. Deductions in the bulk measurement will be made for voids, wherein the volume of concrete displaced exceeds one (1) cubic foot. No deduction will be made for the volume of reinforcing steel contained therein.

Minor structures such as catch basins, diversion structures, cut off walls, etc., may be measured as the actual number installed, when so specified in the Bid Schedule.

Payment: The accepted quantity of structural concrete and or structures cast in place will be paid at the contract unit price bid. No separate measurement or payment will be made for structural excavation, dewatering, foundation stabilization, forming, embedded frames, grates, access covers, reinforcing or structural steel, colored concrete, etc. but shall be included in the work.

NOTE: Deck concrete within plan limits for curb, gutter, sidewalk and transitions shall be included in the contract unit price bid, when basins and inlets are to be paid for on the per each basis.

### **3.23 CONCRETE-MISCELLANEOUS**

Items: Anchor blocks, pipe encasement.

Measurement: (Lineal Feet) (Cubic Yard) - The quantity of anchor block concrete will be computed as the volume of concrete placed between end bulk heads. Set perpendicular to the pipe and between two (2) vertical planes; one (1) which clears the pipe springline by the lessor of one half the pipe outside diameter or twelve (12) inches, and one (1) passing through the pipe centerline, less the concrete volume displaced by one half the pipe end area. Pipe encasement will be measured along the pipe centerline, between bulkheads and neat lines specified in the Contract Documents, or as directed.

Payment: Accepted quantities of miscellaneous concrete will be paid for at the contract unit price bid, in accordance with the various items called for in the Bid Schedule. No separate measurement or payment will be made for excavation, dewatering, bulkheads, reinforcing steel, curing, frost protection, etc., but shall be included in the work.

### **3.24 CONCRETE - PRECAST**

Items: - Box culverts, catch basins, inlets, pre-stressed members, manholes, vaults, flared end sections

Measurement: (Each) - Actual number of precast structures of the various sizes and shapes specified in the Contract Documents.

Payment: Accepted quantities of precast structures will be paid for at the contract unit price bid. No separate measurement or payment will be made for excavation, dewatering, rock stabilization, shaped inverts or bases, eccentric cones, flat top covers, joint and outlet gasket or sealants, exterior drop pipe and fittings, concrete cast outs, steps, leveling rings, sump pit frame and grate; vent and sump piping; access frames and covers, backfill, etc., but shall be included in the work.

NOTE: Concrete curb, gutter, sidewalk and transitions cast in place shall be included in the contract unit price bid for catch basin and inlet.

### **3.25 REINFORCING STEEL - EPOXY COATED**

Measurement: (Pounds) Reinforcing steel will be measured by computing the unit weight of steel called for on the plans. Exceptions will be made for design revisions or proven error in excess of two (2) percent of the quantities specified in the Bid Schedule.

Payment: Accepted quantities of reinforcing steel will be paid for at the contract unit price bid. No allowance will be made for supports, clips, wire or other material used to anchor the reinforcement in place or epoxy coating, but shall be included in the work.

### **3.26 STRUCTURAL MEMBERS**

Items: Steel, timber.

Measurement: (Thousand feet board measure) (Pound) - Timber will be measured by the (TFBM); steel will be measured by computing the unit weight of material actually incorporated in the work.

Payment: Accepted quantities of structural timber or steel will be paid for at the contract unit price bid. No separate measurement or payment will be made for structural excavation, hardware, bolts, rivets, alloys, plates, galvanizing, epoxy coating, castings, welding, fabricating, bearing devices, connectors, rollers, drain pipe, waterproofing membrane, damproofing, water stops, painting, structural backfill, etc., but shall be included in the work.

### **3.27 RAILING**

Items: Hand rail, guardrail, end anchors.

Measurement: (Lineal Feet) (Each) - Railing of the various sizes and types called for in the Bid Schedule will be measured along the centerline of the railing between ends, including transitions. Guardrail end anchors will be measured as the actual number installed and accepted.

Payment: Accepted quantities of railing and end anchors will be paid for at the contract unit price bid for the type specified. No separate measurement or payment will be made for guardrail terminal sections, concrete, reinforcing steel, anchor bolts, hardware, cable, rod, nuts, washers, posts, etc., but shall be included in the work.

### **3.28 MISCELLANEOUS**

Items: - Access cover and frame, embedded items, flared end sections, grate and frame, tied joints, manhole steps, reshape manhole inverts, trash guards, meter pits, meters, etc.

Measurement: (Each) - The quantity of miscellaneous items to be measured will be the actual number, of the various types and sizes of miscellaneous items called for on the plans or specified in the Contract Documents, installed.

Payment: Accepted quantities of miscellaneous items will be paid for at the contract unit price bid for each of the various items that appear in the Bid Schedule. No separate measurement or payment will be made for subsidiary items essential to making the items functional as intended, but shall be included in the work.

### **3.29 DRILLED CAISSONS**

Measurement: (Linear Foot) - Drilled caissons will be measured by the linear foot from ground line or elevation shown on the plans to the bottom of the hole as drilled.

Payment: Accepted quantities of the various diameters of caisson specified in the Bid Schedule will be paid for at the respective contract unit price bid. No separate measurement or payment will be made for dewatering, furnishing and placing reinforcing steel, Class "A" concrete, splicing, etc., but shall be included in the work.

### **3.30 PILING**

Items: Sheet, steel, timber.

Measurement: (Square Feet) (Linear Feet) - Number of facial square feet of sheet piling or the lineal feet of steel and timber piling installed, to cut off elevation.

Payment: Accepted quantities of piling will be paid for at the contract unit price bid for each of the various types specified in the Bid Schedule. Payment made shall be full compensation for furnishing and driving piling including splicing, cut offs not used, drilling holes to facilitate driving, capping, pile shoes, jetting, blasting, painting exposed surfaces, etc., but shall be included in the work.

### **3.31 CRIB OR BIN WALL**

Items: Steel, concrete, timber.

Measurement: (Square feet) - Crib walls of the various types and design specified in the Bid Schedule will be measured by the number of square feet of facial area which parallels the centerline of the roadway or channel.

Payment: Accepted quantities of the various types specified in the Bid Schedule will be paid for at the contract unit price bid. No separate measurement or payment will be made for excavation; furnishing and installing Class "B" concrete, reinforcing steel; furnishing placing and compacting backfill, etc., but shall be included in the work.

### **3.32 FENCE AND GATES**

Measurement: (Lineal Feet) (Each) - Fence will be measured along the base of the fence between end post of each continuous run of fence but excluding gate openings. Gates will be measured by the actual number of the various sizes or types installed.

Payment: Accepted quantities of fence and gates will be paid for at the contract unit price bid for the various types and sizes called for in the Bid Schedule. No separate measurement or payment will be made for clearing and grubbing, grading along the alignment; line, end, corner and line brace posts; braces, guyes, concrete, painting and cut surface treatment of wood posts cut in the field, but shall be included in the work.

### **3.33 EXCAVATION, EMBANKMENT AND/OR BORROW**

Items: Borrow, embankment, excavation, muck, rock, unclassified.

Measurement: (Lump Sum) (Cubic Yard) - Measurement for excavation, embankment and/or borrow will be made according to the unit specified on the Bid Schedule. No measurement will be made when the item is specified as lump sum.

When payment is specified on a volume basis, all except excavation, stripping and borrow shall be measured in its original position by cross-sectioning the area excavated. Volume will then be computed from the cross-section measurements by the average end area method. Embankment material, when called for on a volume basis, will be measured in its final compacted position without allowances being made for stripping or subsidence due to compaction of the base of fills.

Payment: The accepted quantities of excavation, embankment, or borrow, called for on the Bid Schedule, will be paid for at the contract unit price bid. Payment made shall be full compensation for royalties on material, excavation, haul, rehandling from stockpile, wetting, compacting, shaping and disposal of surplus material.

### **3.34 SUBGRADE TREATMENT**

Items: Heating and scarifying bituminous surface, reconditioning subgrade, treatment at the base of cuts and fills.

Measurement: (Square Yard) - Subgrade treatment will be measured by the square yard of existing surface area treated and reconditioned.

Payment: The accepted quantities of the various type of treatment, called for in the Bid Schedule, will be paid for at the contract unit price bid. No separate measurement or payment will be made for removal, winrowing or tilling in place and recompaction, wetting, rolling, blading, shaping, finishing and maintenance of the finished surface prior to acceptance, but shall be included in the work.

### **3.35 SOIL STERILIZATION**

Measurement: (Lump Sum) (Square Yards) - The quantity of soil sterilization shall be the actual number of area surface square yards treated as specified in the Contract Documents. No measurement will be made when the item in the Bid Schedule is specified as lump sum.

Payment: Accepted quantities of soil sterilization will be paid for at the contract unit price bid. Water will not be measured and paid for separately but shall be included in the work.

### **3.36 FABRIC MATERIALS**

Items: Filter, geotextile, geogrid, impervious.

Measurement: (Square Yard) - Fabric will be measured as the number of surface square yards covered.

Payment: Accepted quantities of the various types of fabric specified in the Bid Schedule will be paid for at the contract unit price bid. No separate measurement or payment will be made for overlap, securing pins, vinyl bonding, bituminous tack coat, etc., but shall be included in the work.

**3.37****AGGREGATES AND ASPHALT MATERIALS**

Items: Base course, cover coats, foundation drains, gravel underdrains, patching, pit run, plant mix asphalts, seal coats, special backfill, treated base.

Measurement: (Ton) (Square Yards) - Measurement of aggregates and asphalt materials shall be the actual tons, evidenced by certified weight tickets, of the various types, grades or classes of materials, or placed in the work or the number of surface square yards when specified on the Bid Schedule.

Payment: The accepted quantities of materials will be paid for at the contract unit price bid. No separate measurement or payment will be made for barricading, traffic control, disposal of waste materials, subgrade preparation, hauling, placing, wetting, rolling, shaping, compacting, etc., but shall be included in the work.

**3.38****LIQUID AGENTS FOR ASPHALT SURFACE TREATMENT**

Items: Emulsions, prime coat, rejuvenating agents, tack coat.

Measurement: (Gallon) - Liquid agents for asphalt surface treatment will be measured as the actual number of gallons sprayed in place. The pay quantity for emulsified asphalt and/or rejuvenating agent shall be the number of gallons of concentrate before dilution and mixing with water.

Payment: The accepted quantities of the various liquid agents will be paid for at the contract unit price bid. No separate measurement or payment will be made for traffic control, blotter materials, or water used as diluent, but shall be included in the work.

**3.39****COLD MILLING**

Measurement: (Square Yards/Vertical Inch) - Cold milling will be measured as the actual number of square yards of surface area milled to an average depth of one inch, or fraction thereof.

EXAMPLE: A milled section twenty-seven (27) feet long, uniformly tapered from two and one quarter ( 2 1/4) inches below the gutter lip line and which daylights with the existing asphalt surface eight (8) feet and perpendicular therefrom will be measured as: (27 ft. x 8 ft./9 ft./sq. yd.) (2-1/4 in./2) = 27.0 square yards.

Payment: The accepted quantities will be paid for at the contract unit price per square yard per inch of depth bid. No separate measurement or payment will be made for traffic control, disposal of milled materials, maintenance of milled surface, prior to resurfacing etc., but shall be included in the work.

**3.40****SLOPE AND DITCH PAVING**

Items: Bituminous, concrete, dry or grouted rubble.

Measurement: (Cubic Yards) (Ton) - Bituminous slope and ditch paving will be measured by the number of tons in place and accepted. Measurement of the various other types will be by the cubic yard based on dimensions shown on the plans, as directed or measured by the average end area method.

Payment: Accepted quantities of the various types of slope paving specified in the Bid Schedule will be paid for at the contract unit price bid. No separate measurement or payment will be made for excavation, haul, mortar or concrete used for grout, top coat, etc., but shall be included in the work.

### **3.41 EROSION CONTROL MATERIALS**

Items: Rip rap, gabions, slope mattresses.

Measurement: (Cubic Yard) Number of cubic yards computed from dimensions shown on the plans, as directed or measured by the average end area method.

Payment: Accepted quantities of the various sizes and/or types of erosion control items specified in the Bid Schedule, will be paid for at the contract unit price bid. No separate measurement or payment will be made for excavation, toe or cut off walls, shaping subgrade, sand cement grout, filler rock, etc., but shall be included in the work.

### **3.42 HAULING**

Measurement: (Cubic Yard Mile) (Ton Mile) - Haul shall be the product obtained by multiplying the number of units of material removed; from its original center of volume or mass position; by the mean distance in miles or fraction thereof to its center of placement volume or mass.

Payment: The quantity of haul measured as provided above will be paid for at the contract unit price bid. Unless specifically specified in the Bid Schedule, no separate payment will be made for haul but shall be included in the various items of the work.

### **3.43 EQUIPMENT RENTAL**

Items: Backhoe, Dragline, Dozer, Front End Loader, Lo-Boy, Patrol Pump, Roller, Truck, etc.

Measurement: (Hour) - The quantity to be measured will be the number of hours or fraction thereof that the Bid Schedule specified piece of equipment is used, as directed.

Payment: The actual number of hours the specified piece of equipment is used will be paid for at the contract hourly rate bid. No measurement or payment will be made for labor, mobilization, time equipment is mechanically inoperative, attachments, piping, discharge lines, channelization, excavation, backfill, grading, etc., but shall be included in the work.

NOTE: Hourly rates shall not exceed the hourly rates recognized by the Colorado Department of Transportation plus 1.35 times the operator's hourly rate.

### **3.44 MUD JACKING**

Measurement: (Square Yard) - The quantity to be measured will be the number of superficial square yards or fraction thereof, of concrete mud jacked to grade between construction joints.

Payment: The accepted quantity of surface area will be paid for at the contract unit price bid. No separate measurement or payment will be made for drilling and plugging of holes, dewatering, soil cement materials, etc., but shall be included in the work.

### **3.45 PAINTING**

Items: Pavement marking with paint, thermoplastic or tape; steel, wood and concrete structures

Measurement: (Lineal Feet) (Square Feet) (Each) - The quantity to be measured shall be the actual exposed length or surface area of marking or painting installed. Painting of structures will be the actual number of the various types and sizes thereof, specified in the Bid Schedule, and no measurement of the surface area will be made.

Payment: Accepted quantities of pavement marking, and structure painting will be paid for at the contract unit price bid. No separate measurement or payment will be made for traffic control, dewatering, sand or grit blasting, protection of existing cathodic protection systems, protection of adjoining properties during blasting and/or painting, site restoration, disposal of surplus materials, etc., but shall be included in the work.

### **3.46 TRAFFIC CONTROL**

Measurement: (Lump Sum) - No separate measurement will be made for maintaining and channelizing traffic as required by the latest revision of the "Manual on Uniform Traffic Control Devices for Streets and Highways" and the Colorado Department of Transportation supplement thereto.

Payment: Payment of the contract amount bid will be paid as follows:

25% will be paid upon the first utilization of traffic control devices or flag persons.

75% balance will be prorated and paid according to the percent of the original contract amount approved for payment, but subject to retainage.

Payments made shall be full compensation for: furnishing, erecting, maintaining, moving, removing and disposing of temporary control devices; providing traffic control management, flagging and pilot car operation.

### **3.47 TRAFFIC CONTROL DEVICES**

Measurement: (Each) Traffic control devices will be measured by the actual number of the various types specified on the Bid Schedule, installed.

Payment: Accepted quantities of traffic control devices will be paid for at the contract unit price bid. No separate measurement or payment will be made for excavation, concrete footings, pedestals, posts, structural frame members, sign panels, mounting brackets, backing angles, hardware, lighting fixtures, electrical equipment, lamps, switch boxes, photo-electric controls, controllers, conduit, wiring, cable, cabinets, faces, loop detectors, magnetometer detectors, sensors, amplifiers, mast arms, cable, painting, messages, pavement cutting and sawing, backfill, asphalt replacement, electrical hookup between power source and switch, etc., but shall be included in the work.

**3.48 PROJECT FACILITIES**

Items: Field office, laboratory, sanitary.

Measurement: (Each) The number of facilities complete with utilities furnished, as called for in the Contract Documents.

Payment: Payment at the contract amount bid will be paid for project facilities furnished and maintained throughout the duration of the project, as follows: Fifty (50) percent upon first utilization, fifty (50) percent balance will be prorated and paid according to the percent of the original contract amount approved for payment, but subject to retainage. Restoration of the field facility areas will not be paid for separately, but shall be included in the cost of the item.

**3.49 MOBILIZATION**

Measurement: (Lump Sum) - No measurement for mobilization will be made.

Payment: Partial payments, subject to contract retainage, for mobilization will be made each month as the work progress as follows:

Original Contract Amount*	Mobilization Contract Amount Bid
-----	-----
Earned**	Payable
5%	25%
10%	50% (Less Prev. Payment)
25%	60% (Less Prev. Payment)
75%	100% (Less Prev. Payment)

\*Original contract amount less contract amount bid for mobilization

\*\*Payment for materials on hand will not be included as a percent of original contract earned until said materials on hand have been incorporated into the work and accepted for item payment.

**3.50 PARK FACILITIES**

Items: - Benches, buildings, comfort stations, drinking fountain, flagpole, lighting, playground equipment, picnic tables, trash receptacles, shelters, signs

Measurement: (Each) - The quantity of park facilities shall be the actual number of the various units, specified in the Bid Schedule, installed and accepted.

Payment: The accepted quantities will be paid for at the contract unit price bid. No separate measurement or payment will be made for excavation, backfill, permanent or temporary utilities, barricades, masonry, specialty items, doors, frames, windows, hardware, ceramic tile, roofing, flashing, insulation, carpentry, timber, glass, glazing, painting, special coating, plumbing, drainage, fixtures, heating, ventilating, electrical work, etc., but shall be included in the work.

**3.51 SPRINKLER AND IRRIGATION SYSTEMS**

Items: Irrigation pipe and fittings, power conduit and control wire, sprinkler heads, swivels and backflow prevention devices, pressure reducing and drain valves, manual and/or automatic control valves and controllers, meters, pits, quick couplers, strainers, in line valves and boxes.

Measurement: (Each) (Lineal Feet) - The quantities to be measured will be the actual number of the various units; and/or the lineal feet of electrical and sprinkler pipe, including fittings; installed and accepted.

Payment: The accepted quantities will be paid for at the contract amount or unit price bid, for the various items and types that appear in the Bid Schedule. No separate measurement or payment will be made for excavation, concrete, anchor or thrust blocks, sump aggregate, water, backfill, etc., but shall be included in the work.

**3.52 TOPSOIL**

Measurement: (Cubic Yards) On site stripped topsoil shall be measured in the stockpile, by the average end area method. Imported topsoil shall be measured by the average end area method in its original location or by a pre-determined and agreed to hauling unit bed volume count delivered to the site.

Payment: Accepted quantities of topsoil will be paid for at the contract unit price bid. No separate measurement or payment will be made for hauling, screening or removal of oversize rock and debris, subgrade preparation, placing, shaping, etc., but shall be included in the work.

**3.53 LAWN SOD AND SEEDING**

Measurement: (Square Yard) (Acre) (Lump Sum) - The quantity of lawn sod and/or seeding will be measured as the number of square yards or acres of surface area, providing acceptable growth. When lawn sod and seeding is measured as Lump Sum no separate measurement shall be made. Lump Sum quantity shall be as outlined on the construction drawings or in the Special Conditions.

Payment: Accepted quantities of lawn sod or seeding will be paid for at the contract unit price bid. No separate measurement or payment will be made for grading, tilling, seeding, drilling, fertilizing, mulching, placing sod, watering, maintaining, mowing, etc., but shall be included in the work.

**3.54 PLANTING TREES, SHRUBS**

Measurement: (Each) - The quantity of planting to be measured will be the number of plants, of the types and sizes specified in the Bid Schedule, planted and accepted.

Payment: The accepted quantities of plants will be paid for at the contract unit price bid. No separate measurement or payment will be made for handling, pruning, anchor stakes, soil conditioners, fertilizer, excavation, backfill, mulching, irrigating, seasonal spraying, maintenance and/or replacement until accepted, but shall be included in the work.

**3.55**

**REMOVAL AND DISPOSAL OF ASBESTOS-CEMENT (AC) PIPE**

Measurement: (Lineal Feet) Measurement shall be based on the proper removal and disposal of the actual number of lineal feet of AC pipe encountered on the project that is required to be removed in order to complete the work. Removal of AC pipe is considered to be a Class II Asbestos removal according to OSHA standards. Contractor shall be responsible for considering the regulations and procedures carefully and proceeding accordingly. Contractor may consider having a certified asbestos removal contractor perform this part of the work, or otherwise must follow all OSHA regulations in the removal process. Contractor shall also be responsible for following any of the Colorado Department of Public Health and Environment’s (CDPHE) Asbestos Regulations or Jefferson County Health Department standards that apply to AC pipe removal.

Payment: Shall be according to the actual number of lineal feet removed and shall include complete removal and disposal of the AC pipe in accordance with applicable OSHA standards, CDPHE standards and Jefferson County Health Department standards. Additional costs involved for removal and disposal of AC pipe shall be included in the work for AC pipe removal and disposal.

**3.56**

**FIBER OPTIC SPLICING AND TERMINATIONS**

Measurement: Fiber optic splice closure shall be measured by EACH and shall include all fusion splicing, splice trays, heat-shrink sleeves, labor, materials, tools, equipment and incidentals required to fusion splice the cable.

Fiber optic termination assembly shall be measured by EACH and shall include all labor, materials, tools, equipment and incidentals required to splice its integrated fiber optic cable pigtail to the backbone cable. It shall also include:

- All required optical attenuators, fiber optic jumper cables, CAT5e cables and serial cables (as applicable) within each traffic signal controller cabinet where a fiber optic termination assembly is installed and at corresponding fiber optic termination panels at City Hall.

Payment: Payments shall be made according to the pay items below:

Fiber Optic Splice Closure	Each
Fiber Optic Termination Assembly	Each

Testing fiber optic cable shall be measured and paid for separately in accordance with the City’s “Testing, Identification and Administration of Fiber Optic Infrastructure” standard specification.