# APPENDIX F

# TECHINICAL SPECIFICATIONS

Measurement and Payment section of technical specifications apply only to projects contracted by the City.

## *TECHNICAL SPECIFICATIONS*

**Landscape and Irrigation**

| | |
|---|---|
| 02900 | Standard Landscaping Specifications |
| 02441 | Standard Irrigation Specifications |

**General**

| | |
|---|---|
| 10020 | Testing Laboratory Services |
| 10030 | Trenching and Backfilling |

**Paving**

| | |
|---|---|
| 20010 | Steel Reinforcement |
| 20020 | Lime Treated Subgrade |
| 20022 | Removal of Existing Pavement |
| 20030 | Reinforced Concrete Pavement, Curb and Gutters and Sidewalks |
| 20080 | Milling Pavement |
| 20081 | Asphalt Paving Overlay |
| 20082 | Cleaning and Sealing of Joints and Cracks |
| 20083 | Microsurfacing |

**Utilities**

| | |
|---|---|
| 30010 | Water Utilities |
| 30030 | Sanitary Sewer Utilities |
| 30050 | Pipe Bursting |
| 30051 | Adjustment of Utility Appurtenances |

**Traffic**

| | |
|---|---|
| 40010 | Pavement Striping, Markers, and Buttons |
| 40020 | Traffic Signals |
| 40030 | Traffic Signs and Posts |

# SECTION 02900

## LANDSCAPING

**NOTE: THESE SPECIFICATIONS ARE FOR USE ON CITY OF MESQUITE PROJECTS ONLY**

## PART 1 - GENERAL

### 1.01 GENERAL CONDITIONS

1. The requirements of the "General Provisions" shall apply to all work of this Section with the same force and effect as though repeated in full herein.

### 1.02 WORK INCLUDED

2. Furnish all labor, material, equipment and services necessary to provide all landscape planting, and related items complete in place, as shown on the Drawings and specified, herein. Work Specified in this Section: Fine grading, steel edging, soil preparation, gravel groundcover, planting, clean-up, and all other miscellaneous items related to landscaping as shown on the drawings.

### 1.03 QUALITY ASSURANCE

A. Standards:
   1. Standardized Plant Names, 1942 Edition, American Joint Committee on Horticulture Nomenclature.
   2. American Standards for Nursery Stock, Latest Edition, American Association of Nurserymen.

B. Source Quality Control:
   1. Submit documentation to Park Planner within ten (10) days after award of Contract that all plant material to be supplied by Contractor is available. Any and all substitutions due to unavailability must be requested in writing prior to confirmation of ordering. All materials shall be subject to inspection by Park Planner at any time after confirmation of ordering.
   2. Plants to be supplied by Contractor shall be subject to inspection and approval of Park Planner at place of growth or upon delivery for conformity to Specifications. Such approval shall not impair the right of inspection and rejection during progress of the work. Inspection and tagging of plant material by the Park Planner is for design intent only and does not constitute the Park Planner's approval of the plant materials in regards to their health and vigor. The health and vigor of the plant material is the sole responsibility of the Contractor. Submit written request for inspection of plant material at place of growth to Park Planner. Written request shall state the place of growth and quantity of plants to be inspected. Park Planner reserves the right to refuse inspection at this time if, in their judgment, a sufficient quantity of plants is not available for inspection.
   3. The Contractor shall submit specifications of any item being used on site upon the request of the Park Planner.

### 1.04 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Delivery:
   1. Deliver packaged materials to site in original unopened containers bearing manufacturer's guaranteed chemical analysis, name, trademark, and conformance to State Law.

2. Deliver all plants with legible identification labels.
    a. Label trees, evergreens, bundles of containers of like shrubs, or groundcover plants.
    b. State correct plant name and size indicated on plant list.
    c. Use durable waterproof labels with water-resistant ink which will remain legible for at least 60 days.
3. Protect plant material during and after delivery to prevent damage to root ball or desiccation of leaves.

B. Storage:
1. Store plant material in shade and protect from weather.
2. Storage at the site is allowed, however, Contractor accepts full responsibility for damage, theft, or vandalism.
3. Any plant material balled or burlapped, not installed within 24 hours of delivery shall be healed in until such time as it is installed.
4. Maintain and protect plant material not to be planted within four (4) hours in a healthy, vigorous condition.

C. Handling: The Contractor is cautioned to exercise care in handling, loading, unloading and storing of plant materials. Plant materials that have been damaged in any way will be discarded and if installed, shall be replaced with undamaged materials at the Contractor's expense.

## 1.05 JOB CONDITIONS

A. Perform actual planting only when weather and soil conditions are suitable in accordance with locally accepted practice.

B. Scheduling: Install trees, shrubs, and liner stock plant material before grassing is commenced.

C. Contractor shall note that rock and/or construction materials from previous site use may be encountered on some areas of the site. Rock or construction material excavation shall be included as part of bid.

## 1.06 QUALIFICATIONS OF WORKMEN

Provide at least one person who shall be present at all times during execution of this portion of the Work, who shall be thoroughly familiar with the type of materials being installed and the proper materials and methods for their installation, who speaks understandable English, and who shall direct all work performed under this Section.

## 1.07 SAMPLES AND TESTS

Park Planner reserves the right to take and analyze samples of materials for conformity to specifications at any time. Contractor shall furnish samples upon request by Park Planner. Rejected materials shall be immediately removed from the site at Contractor's expense. Cost of testing of materials not meeting Specifications shall be paid by Contractor.

## 1.08 PLANT GUARANTEE

A. All trees, shrubs, vines, and groundcovers will be guaranteed for a twelve (12) month period after Final Acceptance. The Contractor will replace all dead or defective materials upon notification (weather permitting) with plants of the same kind and size as those originally planted. Plants, including trees, which have partially died so that shape, size, or symmetry has been damaged, shall be considered subject to replacement, and the opinion of the Park Planner will be final. At the direction of the Park Planner, plants may

be replaced at the start of the next planting or digging season, but in such cases, Contractor will remove dead plants within two (2) working days.

B. All replacement work (including materials, labor and equipment) will be done at no cost to the Owner. Any damage, such as ruts in lawn or bed areas, that occurs when Contractor makes replacements, will be repaired immediately by the Contractor.

C. The guarantee will not apply where plants die after Final Acceptance because of injury by storms, drowning, drought, hail, freeze, insects, disease, mechanical injury by humans or machines, and theft.

# PART 2 - PRODUCTS

## 2.01 MATERIALS

A. All materials shall be of standard, approved and first-grade quality and shall be in prime condition when installed and accepted. Any commercially processed or packaged material shall be delivered to the site in the original unopened container bearing the manufacturer's guaranteed analysis. Contractor shall supply Park Planner with a sample of all supplied materials accompanied by analytical data from an approved laboratory source illustrating compliance or bearing the manufacturer's guaranteed analysis.

B. Product Manufacturer's name(s) and/or model numbers are used herein to set a standard of quality and are not intended to be a restraint of trade or prevent submittals of other manufacturer's products of equal quality.

C. Soil Amendment:
Compost Mix: "A Professional Bedding Soil" as produced by Living Earth Technologies, Inc., 1808 W. Northwest Highway, Dallas, Texas (phone: 214/869-4332) composed of 45% Compost, 45% Composted Pine Bark, and 10% Sandy Loam, or approved equal.

D. Tree Backfill Fertilizer:
13.13.13 analysis bulk fertilizer.

E. Tree Shrub, Groundcover, and Seasonal Color Fertilizer:
Provide commercial balanced slow release fertilizer (Osmocote), delivered to the site in bags labeled with the manufacturer's guaranteed analysis. If stored on the site, protect fertilizer from the elements at all times.

F. Tree, Shrub, and Groundcover Planting Tablets:
Shall be slow-released type with potential acidity of not more than 5% by weight containing the following percentages of nutrients by weight:
20% nitrogen
10% phosphoric acid
5% potash

G. Plant Material:

1. Plant names indicated, comply with "Standardized Plant Names" as adopted by the latest edition of the American Joint Committee of Horticultural Nomenclature. Names of varieties not listed conform generally with names accepted by the nursery trade. Provide stock true to botanical name and legibly tagged.
2. Plant material shall meet and/or exceed grades and standards set forth by the Texas Association of Nurserymen. All plants shall have a normal habit of growth and shall be sound, healthy, vigorous and free of insect infestations, plant diseases, sunscalds, fresh abrasions of the bark, excessive abrasions, or other objectionable disfigurements. Tree trunks shall be sturdy and have well "hardened" systems and vigorous and fibrous root systems that are not root or pot-bound. In the event of

disagreement as to condition of root system, the root condition of the plants furnished by the Contractor in containers will be determined by removal of earth from the roots of not less than two or more than two percent of the total number of plants of each species or variety. Where container-grown plants are from several sources, the roots of not less than two plants of each species or the variety from each source will be inspected. In case the sample plants inspected are found defective, the Park Planner reserves the right to reject the entire lot or lots of plants represented by the defective samples. Any plants rendered unsuitable for planting because of this inspection will be considered as samples and will be provided at the expense of the Contractor.

3. The size of the plants will correspond with that normally expected for species and variety of commercially available nursery stock or as specified on Drawings. The minimum acceptable size of all plants measured before pruning with the branches in normal position, shall conform to the measurements, if any, specified on the drawings in the list of plants to be furnished. Plants larger in size than specified may be used with the approval of the Park Planner, but the use of larger plants will make no change in Contract price. If the use of larger plants is approved, the ball of earth, container size, or spread of roots for each plant will be increased proportionately.
4. Provide "specimen" plants with a special height, shape, or character of growth. Tag specimen trees or shrubs at the source of supply. Plants may be inspected by the Park Planner and reviewed at the place of growth, for compliance with specification requirement for quality, size, and variety. Such approval shall not impair the right of inspection and rejection upon delivery at the site or during the progress of the work.
5. Field-selected or Nursery Grown Balled and Burlapped Tree Stock (B&B): Dig balled and burlapped plants with, natural balls of earth of sufficient diameter and depth to encompass the fibrous and feeding root system necessary for full recovery of the plant. Provide 10" of root ball per 1" caliper of trunk (measured 6" above grade level for trees 4" caliper and less and 12" above grade for larger trees). If a tree is of multi-trunk variety, the caliper of the tree is the average caliper of all its trunks. Cracked or mushroomed balls are not acceptable. Selectively remove 1/2 to 2/3 of twig growth.
6. Container-grown Stock (General): Grown in a container for sufficient length of time for the root system to have developed to hold the soil together, firm and whole.
   a. No plants shall be loose in the container.
   b. Container stock shall not be pot bound.
7. Container-grown Tree Stock: Grown in a container from seedling stage and complies with Paragraph 2.1 - G-6, Container-grown Stock requirements.
8. Containerized Tree Stock: Grown in a container for not less than one (1) year and complies with Paragraph 2.1 - G-6, Container-grown Stock requirements.
9. Plants planted in rows shall be matched in form, height and overall character.
10. Shrubs and small plants shall meet the requirements for spread and height indicated in the plant list.
    a. The measurements for height shall be taken from the ground level to the average height of the top of the plant and not the longest branch.
    b. Single stemmed or thin plants will not be accepted. Side branches shall be generous, well-twigged, and the plant as a whole well-bushed to the ground.
    c. Plants shall be in a moist, vigorous condition, free from dead wood, bruises, or other root or branch injuries.
11. Pruning: At no time shall trees or plant materials be pruned, trimmed or topped prior to delivery and any alteration of their shape shall be conducted only with the approval and when in the presence of the Park Planner.

12. All plants not conforming to the requirements herein specified, shall be considered defective and such plants, whether in place or not, shall be marked as rejected and immediately removed from the site of the work and replaced with new plants at the Contractor's expense. The plants shall be of the species, variety, size and conditions specified herein or as shown on the Drawings. Under no conditions will there be any substitutions of plants or sizes listed on the accompanying plans, except with the express consent of the Park Planner.

H. Tree Paint: Morrison Tree Seal, Cabort Tree Paint, or equal.

I. Water: Furnished by Owner; transport as required.

J. Mulch Topdressing: Shall be shredded, fine textured, hardwood mulch as approved by Park Planner. Minimum 2" layer spread uniformly.

K. Steel Edging and Stakes: 3/16" x 4" Ryerson 'Estate' edging, as manufactured by Joseph Ryerson Co., Inc., Houston, Texas (phone 713-675-6111), or approved equal.

L. Soil Saver/Jute Mesh (if required): Heavy weight (green) jute mesh as manufactured by Jim Walls Company, 12820 Hillcrest Road, Dallas, Texas 75230, or approved equal. Install on all groundcover or shrub bed slopes greater than 3:1 slope.

M. Anchoring Materials: In-ground type tree anchors approved by the Park Planner or the city's designated representative.

N. Gravel Mulch (if applicable): 3/4" to 1-1/2" native washed stone. Install 3" layer over layer of filter fabric (to be approved by Park Planner). Provide sample of gravel mulch for Park Planner approval.

O. Other Materials: All other materials, not specifically described but required for a complete and proper installation, shall be as selected by the Contractor subject to the approval of the Park Planner.

# PART 3 - EXECUTION

## 3.01 INSPECTION

A. Obtain Park Planner certification that final grades to ±0.10' have been established prior to commencing planting operations. Provide for inclusion of all amendments, settling, etc. Landscape Contractor shall be responsible for shaping all planting areas as indicated on Plans or as directed by Park Planner.

B. Inspect trees, shrubs and groundcover plant material for injury, insect infestation and trees and shrubs for improper pruning.

C. Do not begin planting of trees until deficiencies are corrected or plants replaced.

## 3.02 PLANTING PREPARATION

A. Soil Preparation for Groundcover, Shrub Beds:

1. Excavate existing soil, if necessary, and add to complete shrub, groundcover, and seasonal color beds the following:
   a. 4" layer of Compost Mix
   b. 14-14-14 slow release fertilizer (Osmocote) at a rate of 5 lbs./100 sq.ft.

2 Spread materials uniformly and cultivate thoroughly by means of a mechanical tiller. Till to a minimum depth of 8".

B. Final Grades:

1. Minor modifications to grade may be required to establish the final grade.
2. Finish grading shall ensure proper drainage of the site as determined on Drawings.

3. All areas shall be graded so that the final grades will be 1" below adjacent paved areas, curbs, valve boxes, edging, clean-outs, drains, manholes, etc., or as indicated on Plans.
4. At time of planting, the top 6" of all areas to be planted or seeded shall be free of stones, stumps, or other deleterious matter 1" in diameter or larger, and shall be free from all wire, plaster, or similar objects that would be a hindrance to planting or maintenance.

C. Disposal of Excess Soil: Disposal of any unacceptable or excess soil shall be the sole responsibility of the Contractor. Excess soil may be spoiled on-site per direction of Owner.

## 3.03 PLANTING INSTALLATION

A. General:
1. Actual planting shall be performed during those periods when weather and soil conditions are suitable and in accordance with locally accepted practice, as approved by the Park Planner.
2. Only as many plants as can be planted and watered on that same day shall be distributed in a planting area.
3. Containers shall be opened and plants shall be removed in such a manner that the ball of earth surrounding the roots is not broken and they shall be planted and watered as herein specified immediately after removal from the containers. Containers shall not be opened prior to placing the plants in the planting area.

B. Layout of Major Plantings: Locations for plants and outlines of areas to be planted shall be marked on the ground by the Contractor before any plant pits are dug. All such locations shall be approved by the Park Planner. If underground construction or utility line is encountered in the excavation of planting areas, other locations for planting may be selected by the Park Planner. Layout shall be accomplished by flagged grade stakes indicating plant names and specified container size on each stake. It shall be the Contractor's responsibility to confirm with the Park Planner superintendent and governing agencies the location and depth of all underground utilities, and obstructions.

C. Excavation:
1. Excavation for planting shall include the stripping and stacking of all acceptable topsoil encountered within the areas to be excavated for trenches, tree holes, plant pits and planting beds.
2. Excess soil generated from the planting holes and not used as backfill, or in establishing the final grades may be spoiled on-site per direction of Owner.
3. Protect all areas from excessive compaction when trucking plants or other material to the planting site.
4. Tree and shrub pits shall be excavated to allow the root ball to set on undisturbed soil and excavated to the following diameters:

| Plant Size | Pit Diameter |
|---|---|
| a. Up to 5 gallon container | 12" greater than root ball diameter |
| b. 5 gallon container and larger (including trees) | 24" greater than root ball diameter |

5. All excavated holes shall have vertical sides with roughened surfaces.
6. All holes for trees and large shrubs shall be tested for water retention prior to tree or shrub installation. After hole is excavated, it is to be filled with water to the top of the excavation. If, after 24 hours, the hole still holds water, the Contractor shall excavate an additional 6" from the bottom of hole. The Contractor shall then install

6" of native washed gravel covered on the top (and up a minimum of 12" on the sides of the hole) with filter fabric. The Contractor shall also install a capped 3" diameter PVC sump which will extend from near the bottom of the rock layer to 3" above the proposed finish grade so the hole can be evacuated through mechanical means.

D. Planting Trees:
   1. Container Removal:
      a. Cut cans (if applicable) with an acceptable can cutter. Remove tree from plastic container or box carefully so container can be re-used.
      b. Do not injure root ball.
   2. Center tree in pit.
   3. Face plants with fullest growth into prevailing wind, or away from building facade.
   4. Set plants plumb and hold rigidly in position until soil has been tamped firmly around ball.
   5. Tree Pit Backfill:
      Tree backfill should be composed of 5 parts existing soil excavated from the hole to one part Soil Amendment, thoroughly mixed with 5 lbs. per cubic yard tree backfill fertilizer. Tree backfill to be mechanically mixed prior to backfill operations.
   6. Set tree in upright position in the center of the hole and compact the backfill mixture around the ball or roots. Thoroughly water each plant after back filling. After planting trees not in beds, surround the pits with a 3" height berm.
   7. Plant Tablets:
      a. After the water has completely drained from the plant pit, planting tablets shall be placed in the top 3" of the plant pit, four tablets per every foot of rootball diameter per tree.
      b. Planting tablets shall be set with each plant on the top of the rootball while the plants are still in their containers so the required number of tablets to be used in each hole can be easily verified by the Park Planner.
   8. Pruning: Pruning shall be limited to the minimum necessary to remove injured twigs and branches or to limb-up trees as directed by the Park Planner. Pruning may not be done prior to delivery of plants. Cuts over 3/4" in diameter shall be painted with tree paint.
   9. Newly planted trees must be anchored the first year to help the tree become established. Some flexibility must be provided to allow the stem and root system to develop strength. For trees up to a 4" caliper diameter, use a minimum of two in-ground tree anchors; 4" - 8" use a minimum of three in-ground tree anchors. Information about in-ground tree anchoring products can be found at the website www.treestaple.com. This product and its web site are offered as an example of one type of tree anchoring system to establish a standard of quality. Similar products with equal specifications will be accepted.

E. Planting Shrubs:
   1. Container Removal:
      a. Cut cans on two sides with an acceptable can cutter. Do not cut cans with spade or ax.
      b. Do not injure root system.
   2. Center plant in pit or trench.
   3. Face plants with fullest growth into prevailing wind, or away from building facade.
   4. Set plants plumb and hold rigidly in position until soil has been tamped firmly around ball or roots.
   5. Fill holes with backfill composed of 50% soil taken from the hole and 50% Soil Amendment, thoroughly mixed.

6. Set plant in upright position in the center of the hole and compact the backfill mixture around the ball or roots. Thoroughly water each plant after back filling. After shrubs not in beds, surround the pits with a 3" height berm.
7. Plant Tablets:
   a. After the water has completely drained from plant pit, planting tablets shall be placed in the top 3" of the plant pit as indicated:
      One tablet per one-gallon container and two-gallon container
      Two tablets per five-gallon container
   b. Planting tablets shall be set with each tablet on the top of the rootball while the plants are still in their containers so the required number of tablets to be used in each hole can be easily verified by the Park Planner.
8. Pruning: Pruning shall be limited to the minimum necessary to remove injured twigs and branches. Pruning may not be done prior to delivery of plants.

F. Planting Groundcover:
1. Space the plants evenly as indicated on the Drawings, staggering.
2. After planting is completed, cover the bed uniformly with a minimum 2" layer of mulch topdressing.
3. Thoroughly water entire planting bed.

G. Grass Installation:
1. Sod Grass:
   a. All areas to receive sod must be roto-tilled to a depth of 2”(inches), cleaned of any rocks, bricks or other debris and fine graded before sod is planted.
   b. Sod must be fresh and free of any weeds. Sod may not sit on palettes for more than 48 hours without being planted. Any sod allowed to sit on palettes for more than 24 hours is subject to rejection by the Park Planner, and will be replaced at contractor’s expense.
   c. All sod is to be planted in a “running bond” pattern.
   d. All sod planted on the site must be watered and rolled with a grass roller the same day it is planted.
2. Grass seed:
   a. All areas to receive grass seed must be roto-tilled to a depth of 2”(inches), cleaned of any rocks, bricks or other debris, and fine graded before seed is spread.
   b. All seed must be distributed in a uniform fashion as per product manufacturer's or grower’s recommendations.
   c. All areas that have been seeded <u>must remain moist</u> for 7 to 10 days from the time of the first watering or until seed has germinated. Seed that is allowed to dry before germination will be subject to replacement at Contractor’s expense. It is the Contractor’s responsibility to coordinate site watering.

## 3.04 CLEAN-UP

A. After all planting operations have been completed, remove all trash, excess soil, empty plant containers and rubbish from the property. All scars, ruts or other marks in the ground caused by this work shall be repaired and the ground left in a neat and orderly condition throughout the site. Contractor shall pick up all trash resulting from this work on a daily basis. All trash shall be removed completely from the site.
B. The Contractor shall leave the site area broom-clean and shall wash down all paved areas within the Contract area, leaving the premises in a clean condition.

3.05 MAINTENANCE

A. Maintain the trees, shrubs, groundcovers, and sod grass until Final Completion and Acceptance of the entire project.
B. Maintenance shall include pruning, cultivating, weeding, watering, and application of appropriate insecticides and fungicides necessary to maintain plant free of insects and disease.
    1. Re-set settled plants to proper grade and position. Restore planting saucer and adjacent material and remove dead material.
    2. Correct defective work as soon as possible after deficiencies become apparent and weather and season permits.
    3. Deep-water trees, plants, and groundcover beds within the first 24 hours of initial planting, and not less than twice per week until final acceptance.

3.06 OBSERVATION SCHEDULE

A. When observations are conducted by someone other than the Park Planner, the Contractor shall show evidence in writing of when and by whom these observations were made.
B. No site visits shall commence without all items noted in previous Observation Reports either completed or remedied unless such compliance has been waived by the Owner and/or Park Planner.

# END OF SECTION 02900

# SECTION 02441
# IRRIGATION SYSTEM

**NOTE: THESE SPECIFICATIONS ARE FOR USE ON CITY OF MESQUITE PROJECTS ONLY**

## PART 1 GENERAL

1.01 DESCRIPTION

Provide an underground irrigation system as shown and specified. The work includes:

A. Automatic irrigation system, including piping, fittings, sprinkler heads, and accessories.
B. Valves, and fittings.
C. Meters provided and installed by the contractor
D. Controller, sensors, control wire, phone modem, flow meter, and phone line.
E. Testing.
F. Excavating and backfilling irrigation system work.

1.02 QUALITY ASSURANCE AND APPLICABLE STANDARDS

A. Installer's qualifications:
   1. Minimum of 5 years experience installing irrigation systems of comparable size.
   2. Contractor shall employ a licensed Texas Irrigator.
   3. Contractor shall also employ a licensed Texas Irrigation installer or licensed Texas Irrigator as a continuous on-site representative to the Contractor.
B. Materials, equipment, and methods of installation shall comply with the following codes and standards:
   1. The City of Mesquite Ordinances and Building Codes.
   2. National Electrical Code.
   3. American Society for Testing and Materials, (ASTM).
   4. National Sanitation Foundation, (NSF).
   5. Texas Commission on Environmental Quality rules and regulations.
C. Excavating, backfilling, and compacting operations:
D. Obtain Park Planner's acceptance of installed and tested irrigation system prior to installing backfill materials. Notification must precede requested inspection by 24 hours.

1.03 SUBMITTALS

A. Submit manufacturer's product data and installation instructions for each of the system components to be installed.
B. "As-Built" Drawings: Contractor shall submit a set of reproducible "As-Built" drawings on a Mylar base or a vector based electronic file (AutoCAD 2006 or compatible format) upon completion of the project. The Park Planner will provide a base sheet for temporary use by contractor. "As-Built" drawings shall give dimensions to objects from two permanent objects. Dimensions shall be 300' or less unless approved by the Park Planner. Permanent objects are considered non-perishable and not likely to be moved i.e., buildings, street curbs, fire hydrants, tennis/basketball court corners, concrete footings or slabs around facilities, street signs, etc. (plant material is perishable). If permanent objects are not close enough to take measurements from, consult with the Park Planner. Objects to be dimensioned include but are not limited to: electric valves, routing of wiring, mainline, double check valve assembly, any deviations from the plan (including any and all lateral lines). Prior to taking measurements, consult with the Park Planner as to what other objects, if any, are to be dimensioned. Identify field changes and Change Order changes by dimension and detail.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Deliver irrigation system components in manufacturer's original undamaged and unopened containers with labels intact and legible.
B. Deliver plastic piping in bundles, packaged to provide adequate protection of pipe ends, either threaded or plain.
C. Store and handle materials to prevent damage and deterioration. Do not store P.V.C. pipe in direct sunlight for more than 48 hours.

D. Remove uninstalled components and construction debris each day from site. No storage will be permitted.

1.05 PROJECT CONDITIONS

A. Known underground and surface utility lines are indicated on the drawings. Contractor shall request utility locating services provided by utility companies.
B. Water Service - The Contractor shall connect the proposed system into existing stub-out as indicated on the plans.
C. Protect existing trees, plants, lawns, and other features designated to remain as part of the final landscape work. Restore turf and planting area to original condition after trenching, backfilling, and cleaning.
D. Promptly repair damage to adjacent facilities caused by irrigation system work operations. Cost of repairs shall be contractor's expense.
E. Promptly notify the Park Planner of unexpected sub-surface conditions.
F. Irrigation system layout is diagrammatic. Exact locations of piping, sprinkler heads, valves, and other components shall be established by contractor in the field at time of installation. Obtain Park Planner's approval of head layout prior to installation.
G. Space sprinkler components as per manufacturer's recommendations.
H. Minor adjustments in system layout will be permitted to clear existing fixed obstructions. The Park Planner shall approve final system layout.
I. A pre-construction inspection will be conducted by Park Planner with the Contractor to observe original site conditions.
J. Electric power supply shall be furnished by the City to a location indicated on the plans. A ten-amp breaker box will be provided to irrigation contractor at park sign. Contractor shall be responsible for directly wiring the automatic controllers into 120 V power supply. NOTE: NO plug in devices will be accepted.

1.06 WARRANTY AND GUARANTEE

A. Materials and workmanship shall be fully guaranteed for one (1) year following Owner's final acceptance of project at 100% completion. Manufacturer's warranty shall extend beyond 1 year if applicable.
B. Backfilling of all excavation shall be guaranteed for the one (1) year guarantee period.
C. Provide a one (1) year warranty against material, installation and operation defects. Repairs, adjustments and replacement of defective irrigation system materials, including materials that have been installed on the work during the warranty period shall be at Contractor's expense.

## PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Parts List: Materials provided and installed by irrigation contractor

| DESCRIPTION | MANUFACTURER / MODEL NO. |
|---|---|
| Controller | Weathermatic Smartline: SL4800 (12 station base model)<br>12 Station Module: SLM12 (up to 3 needed depending on station quantity)<br>Aircard: SL-AIRCARD1 |
| Flow meter | Data Industrial #IR220p-? (Match size to mainline) w/ all necessary wiring and accessories for proper operation |
| Electric Valve | Weathermatic 11000 series (size as noted on drawings) |
| Wire Splice Kit | King One Step socket seal |
| Freeze Sensor | Weathermatic Wireless Weather Station: SLW15 (this one product is satisfies both sensors) |
| Rain Sensor | Weathermatic Wireless Weather Station: SLW15 (this one product satisfies both sensors) |
| Pop-up Spray Head (turf & bed areas) | Rainbird 1800 SAM/PRS w/ MPR nozzles (arc & radius as shown on the plans) |
| Small Rotary Head (turf areas) | Rainbird 5004 + PRS (stainless steel ) ¾" inlet |
| Large Rotary Head (turf areas) | Rainbird 7005, stainless steel, 1" inlet (50' – 70' radius) |

| | |
|---|---|
| Large Rotary Head (turf areas) | Rainbird 8005, stainless steel, 1” inlet (70’ – 80’ radius) |
| Rotary Head (clay infield) | Rainbird 6504 HS Falcon, stainless steel, ¾” inlet<br>(arc & radius as shown on the plans) |
| Low pressure rotor, 40 operating PSI | Rainbird 6504 Falcon, stainless steel, (20’ – 70’ radius) |
| Golf / large turf rotors 80’+ radius | Toro 690 Golf Course Rotor / Rainbird Eagle 700 & 900 |
| Tree / shrub bubbler | Rainbird RWS - M – BG02 Root Watering System |
| Quick Coupler Valve | Weathermatic V-100 |
| Ball Valve (at remote Valve, Q.C.V.) | Spears Schedule 80 PVC (size to match valve) |
| Valve Box, and lid, 12” x 17”<br>(for remote valve, and Q.C.V.) | DFW Plastics D-1200 |
| Valve Box Extension | DFW Plastics D-600 |
| Wire splice box | DFW Plastics 10” round |
| Concrete Valve Box | Brooks #65 concrete box with 2 piece cast iron cover |
| Reduced Pressure Zone Assembly (RPZ) | Febco Model 860 or Watts Regulator Series 009 (sized for optimum system performance) |
| RPZ device enclosure | HB-1 (1” RPZ) HB-2 (2” RPZ) |
| Main Line PVC | Class 200 PVC |
| Lateral PVC | Class 200 PVC |
| Swing Joint Assembly, 1” size | Lasco G-132-212 |
| Drip (4’ and narrower) | Netafim |
| Sleeves | Schedule 40 PVC 4” or 6” (size as noted on drawings) |

B. Manufacturers:

TORO
523 Camp Wisdom Rd.
Duncanville, TX 75116
972-709-3528

Weathermatic, Inc.
Telsco Industries
Bill Savelle 214.243.6697 cell
P. O. Box 180205
Dallas, TX 75218-0205
972-278-6131, office

Glen-Hilton Products, Inc.
P. O. Box 31614
Richmond, VA 23294
804-765-1101

Rainbird Corporation
Kirk Biddle
972-217-5961

2.02 MATERIALS

A. Provide only new materials, without flaws or defects and of the highest quality of their specified class and kind.
B. Comply with pipe sizes indicated. No substitution of smaller pipes will be permitted. Remove damaged and defective pipe.
C. Provide pipe continuously and permanently marked with manufacturer's name or trademark, size schedule and type of pipe, working pressure at 73 degrees F. and National Sanitation Foundation (NSF) approval.
D. Plastic pipe, fittings, and connections:
   1. Polyvinyl chloride pipe: ASTM D2241, rigid, unplasticized PVC, extruded from virgin parent material. Provide pipe homogeneous throughout and free from visible cracks, holes, foreign materials, blisters, wrinkles, and dents. SDR21, Class 200.
   2. PVC pipe fittings: ASTM D2241 schedule 40 PVC molded fittings suitable for solvent weld, slip joint ring tight seal, or screwed connections. Fittings made of other materials are not permitted. PVC Pipe Fittings - All PVC fittings shall be Type I, medium weight Schedule 40, as manufactured by LASCO Manufacturing Company, or approved equal. Provide 24" minimum dimensions between fittings (exception: threaded couplings).
E. Size slip fitting socket taper to permit a dry unsoftened pipe end to be inserted no more than halfway into the socket. Saddle and cross fittings are not permitted.

F. Schedule 80 PVC pipe may be threaded.
G. Use male adapters for plastic to metal connections. Tighten male adapters by hand plus one turn with a strap wrench.
H. Copper pipe, fittings, and connections of RPZ device: Refer to Water Utilities specifications. Contact Ron Self, City Backflow Inspector, for details at 972-216-6973.
   1. Water piping, fittings and connectors: ASTM B88 Type "L" hard tempered copper tubing. Fittings shall be 150 pound working water pressure standard, solder end type, constructed of wrought copper, bronze, or brass.
   2. Joints made with tin-lead solder, approximately 50/50 composition. Thoroughly polish joints and use proper flux to provide sound joints.
I. Associated equipment:
   1. Electric control: Type UF 12/2 gauge or 14/3 gauge insulation. UL listed approved for direct under ground burial when used in National Electrical Code Class II Circuit,
   2. Wire color code: Provide control or "hot" wires red in color. Provide common or "ground" wires white in color.
   3. Ground Rod and Wire for Controller
      a. Ground shall be 6 gauge uncoated copper bus wire.
      b. Ground rod shall be a copper coated steel rod or as per local code. Length and diameter shall be as per local code.
      c. Refer to manufacturer's requirements for wire sizing to valves, and sensors.
J. Valve box to enclose electric valves shall be a 12" rectangular valve box with a snap in lid. Valve box to be installed with 6" extension (as needed), and supported with bricks around the entire base of the box
K. Automatic sprinkler controllers shall be capable of operating the number of stations specified. Power source shall be standard 120V AC, 60 Hz., @1.0A for 5 valves. Output for operation of companion solenoid-operated valves shall be 24/28V AC, 2.5A (60/70VA). All conduits shall be ridged type for controller wire and electrical to breaker box. The controller shall be of solid-state construction. The operation of the controller shall be a fully automatic, incorporating the following features: pump start/master valve relay with flow sensing, telephone modem, internal surge protection for AC input and valve outputs, & program information memory during power outages. A computer chip bypass switch for the rain sensor shall be installed inside the controller housing.
L. Paco LC Model 15705 Simplex Booster System . Each system is pre-wired, skid mounted and assembled as a packaged system requiring only suction and discharge field connection and field wiring to panel. Each system consists of:
   1. Paco LC close-coupled bronze fitted pump with mechanical seal, bronze impeller, bronze case wear ring and bronze shaft sleeve. Full load capacity of pump to be 160 GPM at 147’ TDH. Motor to be a 10HP/3500 RPM/1PH/220 VAC/TEFC.
   2. Nema 3R enclosure control panel containing fusible disconnect switch with control power transformer, 220/110 volt. Starter with hand/off/auto switch, ambient compensated overload and run light. Also mounted on panel is external duplex receptacle for 110 volt service minimum 1KVA capacity and circuit breaker. Panel to have alarm system to indicate a non-flow condition and shut pump down. Pump on/off to be controlled by 24 volt signal provided by others. Controller and pump system to be wired and tested.
   3. Accessories and fittings to include ball valve and check valve on discharge piping, and ball valve flow switch on suction piping. Suction and discharge gauges to be furnished. Galvanized pipe to connect fittings. Only galvanized pipe should be connected to the pumps galvanized fittings. Thermostatically controlled tape furnished for freeze protection of piping, valve and pump case, etc., inside fiberglass enclosure. Drain valves to be included on suction and discharge side of pump.
   4. Unit to have fiberglass lockable enclosure with external gel coat color green. Commercial grade resin and reinforcing material furnished. Enclosed to have 2” flat flange lip plate. Bottom side with replaceable rubber gasket. Flange suitable to accept padlock device and with two (2) padlocks keyed alike. Two (2) lifting handles, six (6) 3” vents also furnished. Fiberglass enclosure designed 1/4” thick and for 300# line load. Enclosure includes electric fan ventilation system .
   5. Unit with heavy duty galvanized steel skid with four (4) anchor bolts holes. Holes inside enclosure. Suction and discharge openings provided through skid.

6. Start-up assistance and operation and maintenance instructions to be furnished by contractor to Park Supervisory personnel.

2.03 ACCESSORIES

A. Drainage fill: 1/2" washed pea gravel.
B. Fill: Clean soil free of stones larger than 1" diameter, foreign matter, organic material, and debris.
C. Suitable excavated materials removed to accommodate the irrigation system work may be used as fill material subject to the Park Planner's review and acceptance.
D. Concrete Thrust block: 3000 psi, 5 sack concrete mix.

## PART 3 EXECUTION

3.01 INSPECTION

A. Examine final grades and installation conditions. Do not start irrigation system work until unsatisfactory conditions are corrected.
B. The contractor shall verify existing and proposed locations of all site utilities (i.e. gas, water, electric, telephone, sanitary and storm sewers etc.) prior to any trenching and laying of pipe. In addition, this contractor shall request for inspection of reduced pressure zone assembly (RPZ) with the Water Utilities Division in connection to City provided meter and exhaust.

3.02 PREPARATION

Lay out and stake the location of each pipe run and all sprinkler heads and sprinkler valves. Obtain Park Planner's acceptance of layout prior to excavating.

3.03 INSTALLATION

A. Excavating and backfilling:
   1. Excavation shall include all materials encountered, except materials that cannot be excavated by normal mechanical means.
   2. Excavate trenches of sufficient depth to provide 18” maximum and 12” minimum cover over installed pipe.
   3. Fill to match adjacent grade elevations with approved earth fill material. Place and compact fill in layers not greater than 8" depth. Backfill all voids in soil. Material shall not be placed to cause shifting or compression of pipe and valve boxes.
   4. Provide clean original material fill free of rocks, concrete and debris for backfill.
   5. Provide drainage fill aggregate around each valve and double check assembly.
   6. Irrigation mainline: The mainline shall be installed in a 6" wide (minimum) trench with all electric wire to valves laid directly below mainline (upon inspection the wires should be hidden from sight). Trench shall allow a minimum of 12" of cover. All mains and laterals up to and including 4” shall have a maximum 18” of cover. Mainline shall be flushed before attaching valves. If splices are made in mainline, use gasket repair fittings. Compression fittings are not allowed. Mainline may be backfilled except at joints prior to inspection by the Owner. Mainline shall be tested for leaks under pressure for a 6 to 8 hour period. Joints may be backfilled after Park Planner verifies and approves that no leaks exist.
   7. Thrust block shall be required at all 3” or larger fittings.
   8. Lateral Piping - Shall be installed in a 4" wide (minimum) trench 12" deep. Excavate trenches and install piping and fill during the same working day. Do not leave open trenches or partially filled trenches open overnight. Fill at joints in pipe may remain open.
   9. Sleeves installed to accommodate irrigation piping shall be installed with 18” of cover, as measured from finished grade. Costs for providing and installing these sleeves shall be included in the irrigation system bid item.
B. Plastic pipe:
   1. Install plastic pipe in accordance with manufacturer's installation instructions. Provide for thermal expansion and contraction.
   2. Saw cut plastic pipe to ensure a square cut. Remove burrs and shavings at cut ends prior to installation.

3. Make plastic-to-plastic joints with solvent weld joints or slip seal joints. Use only solvent recommended by the pipe manufacturer. Install plastic pipefittings in accordance with pipe manufacturer's instructions. Solvent primer is required on all joints/fittings. Excess primer and/or solvent dripped on pipe or squeezed from fitting is not permitted and shall be grounds for removal and replacement of the joint.
4. Make plastic to metal joints with plastic male adapters.
5. Maintain a minimum of 24" between all glued joints.
6. Allow joints to set at least 24 hours before pressure is applied to the system.
7. Maintain pipe interiors free of dirt and debris. Close open ends of pipe by acceptable methods when pipe installation is not in progress.
8. Inspection of all fittings and coupling will be made by the Park Planner. Backfill of approved soil is not permitted until Park Planner has inspected all fittings, valves, and couplings.
9. Install in-ground control valves in valve box as indicated. Valve boxes shall be installed in accordance with the manufacturer's installation instructions and with an 8" layer of washed pea gravel under the valve. Each valve box shall be supported by bricks around the entire perimeter of the box. Install valve boxes on a suitable base to provide a level foundation. Set the top of the box 2” below surrounding grade and cover to protect from vandalism.
10. Seal threaded connections on both sides of the control valves with Teflon tape.
11. Install freeze and rain sensors as directed by the Park Planner.

C. Sprinklers, fittings, valves, and accessories:
1. Install fittings, valves, sprinkler heads, risers, and accessories in accordance with manufacturer's instructions, except as otherwise indicated. Maintain a minimum of 24" between all glued fittings. All fittings shall be installed in a horizontal manner. Fittings that join pipe vertically or at angles other than horizontal will be subject to removal. Use of fittings that appears excessive and inappropriate for normal installation and not in compliance with standard industry practice, shall be rejected.
2. Set sprinkler heads perpendicular to finished grades, except as otherwise indicated.
3. Set top of quick coupler, gate, and isolation valve boxes flush to finish grade.
4. Set top of electric valve box at 2" below finish grade.
5. Provide pop-up spray heads with 1/2" flex cut-off nipples joint assembly.
6. Install reduced pressure zone (RPZ) backflow device above grade in an insulated aluminum or stainless steel enclosure appropriately sized for the RPZ device. The enclosure shall be securely anchored and vandal resistant. The concrete pad for the enclosure shall be a 3000 PSI 4" concrete slab that extends 6" beyond the enclosure on all sides. Reinforce the concrete pad with #3 rebar @ 12” on-center, both ways.
7. Install the specified controller in the location shown on the drawings. Install per manufacturer's recommendations.
8. The contractor shall pull valve wires, program controller by labeling station position for zones and put controller in operation.

D. Control wiring:
1. Contractor shall run a single wire to each solenoid, for the control and a common neutral wire to all solenoids from the controller. Wire shall be sized and color-coded according to device requirements of manufacturer.
2. Install enough wire to allow raising the valve bonnet or splice to the surface without disconnecting the wires when repair is required.
3. Pull each remote control valve wire through rigid conduit in base, which shall then be connected to controller.
4. Make wire connections to remote control electric valves and splices of wire in 10" valve boxes. All wire splices must be properly insulated and waterproofed. Splices shall be made with a King One-Step in accordance with manufacturer's recommendations. Provide 2" of soil cover to protect from vandalism. Show location of any and all splices on the “As-Built” drawings

E. Sensors: Install rain, freeze and flow sensors as noted on the plans (or as directed by the Park Planner) with control wire enclosed in 1/2” rigid conduit (above grade).

F. RPZ device/enclosure shall be installed according the construction details shown on the plans and the heater shall be wired directly to the breaker box/disconnect. A licensed electrician shall perform all electrical connections.

G. Flushing, testing, and adjustment:

1. After sprinkler piping and main are installed and before sprinkler heads are installed, open control valves and flush out the system with full head of water until pipes are clear of debris.
2. Perform system testing upon completion of each section. Make necessary repairs and re-test repaired sections as required. Trench and pipe must be dry at inspection. System must be under operating pressure for 24 hours prior to observation of every joint and coupling, by the Park Planner. Backfill is permitted after inspection and approval by Park Planner.
3. Adjust sprinklers after installation for proper and adequate distribution of the water over the coverage pattern. Adjust for the proper arc of coverage.
4. Tighten nozzles on spray type sprinklers after installation. Adjust sprinkler-adjusting screw on lateral line or circuit as required for proper radius. Interchange nozzle patterns as directed by the Park Planner, to give best arc of coverage.
5. Adjust all electric remote control valve flow control stems for system balance.
6. Adjust all rain and temperature sensors as directed by the Park Planner. Test as required to obtain satisfactory operating conditions. Demonstrate correct operation of sensors to the Park Planner.
7. Test and demonstrate the controller by operating appropriate day, hour, and station selection features as required to automatically start and shut down irrigation cycles to accommodate plant requirements and weather conditions.

G. Spare Parts: Provide to the City of Mesquite additional parts as per noted on plan, including installation and operations manuals to all products.

H. Booster Pump: Install Paco LC model 15705 Simplex Booster System according to manufacturer recommendations.

3.04 DISPOSAL OF WASTE MATERIAL

A. Stockpile, haul from site, and legally dispose of waste materials, including unsuitable excavated materials, rock, trash, and debris. Debris must be removed at the end of work time each day.

B. Maintain pavement and curb clear, clean, and free of debris and soil. Pavement and curb shall remain clear, clean and free of debris.

3.05 SUBSTANTIAL COMPLETION:

An inspection of the irrigation system will be made by the Park Planner upon request for Application of Substantial Completion by the Contractor. The irrigation system must be sufficiently complete so that all plant material can be sustained by the system and all valve boxes are properly installed. All electric valves shall have 2" of fill over the top of the box. Contractor shall deliver complete "As-Built" drawings (section 1.03B) to Park Planner for review and comment prior to application of final payment.

3.06 CLEANING:

Perform daily cleaning during installation of the work and upon completion of the work. Remove from site all excess materials, soil, debris, and equipment. Repair damage resulting from irrigation system installation. Restore site to the original condition prior to damage caused by construction activities.

3.07 FINAL COMPLETION:

The Park Planner, upon written request, will make an inspection of the irrigation system for Final Completion by the Contractor. Provide notification of at least two (2) working days before requested inspection date. Contractor shall submit on forms approved by the Park Planner, a Waiver of Release of Lien, Affidavit of Payment of Debts and Claim, and a fully executed "Consent of Surety for Payment".

**END OF SECTION 02441**

# SECTION 10020

# TESTING LABORATORY SERVICES

## PART 1 – GENERAL

### 1.1 DESCRIPTION

A. The Contractor shall employ and pay for an independent testing laboratory, **APPROVED BY THE OWNER**, to perform testing of construction materials. Contractor shall submit the name of the testing laboratory prior to beginning of Work.

B. Contractor Shall coordinate all testing activities and shall assist in whatever manner necessary so that the testing laboratory may provide all testing services.

C. All re-testing costs for failed testing shall be at the expense of the Contractor.

D. The City's Representative may initiate any test.

E. The Contractor shall notify the assigned City Public Works Construction Inspector of all density testing 24 hours prior to the scheduled test. Copies of all test reports shall be sent to the Public Works Inspector for review and acceptance and inclusion in the City project file. Projects will not receive City acceptance until all test results are complete and satisfactory.

F. Materials and products incorporated in the Work, shall be inspected, tested and approved by the Contractor. Tests by the Contractor, Subcontractors or by Suppliers shall be performed by certified technicians using certified laboratories. Laboratory technicians shall hold current certification in accordance with ASTM E 329, Standard Practice for Use in Evaluation of Testing and Inspection Agencies as Used in Construction or have a nationally recognized certification acceptable to the Engineer. Work in which materials are used without prior test and approval may be ordered removed and replaced at the Contractor’s expense. The Contractor will be required to furnish such facilities and equipment as may be necessary to perform the tests and inspection and shall be responsible for calibration of all test equipment required. When requested, the Contractor shall furnish a complete written statement of the origin, composition, and/or manufacture of any or all materials that are to be used in the Work.

G. Contractor shall have testing laboratory include requested City personnel on email distribution list for all test reports. Testing reports must be submitted within five days after the test has been made. Construction shall not proceed where materials are to be placed upon materials previously placed and these previously placed materials have not been tested or the test results have not been made available to the Engineer.

H. The most current specifications for all specifications listed herein shall govern testing methods.

### 1.2 STANDARD TEST METHODS FOR COMPACTION AND MOISTURE CONTENT OF SOIL

A. Moisture and Compaction Testing Standards: Testing laboratory shall sample, test in laboratory, and test in field moisture content and compaction per the following ASTM designations:

1. D-698 - Moisture Density Relations of Soil and Soil Aggregate Mixtures.
2. D-6938 - Density, in Place, by Nuclear Methods Shallow Depth Test.
3. D-4318 - Liquid Limit Plastic Limit and Plasticity Index of Soils Test.
4. D-1140 - Material Greater than #200 Sieve.
5. D-2487 - Unified Soil Classification System

B. Test Report: Laboratory shall provide both field and final copies of test results to the Engineer, Owner and other parties as directed by the Contractor.

## 1.3 STANDARD TEST METHODS FOR CONCRETE AND CORING

A. Concrete

1. Samples shall be drawn from mid-load or from point of discharge if concrete is pumped. Sampling and making of cylinders shall conform to ASTM C-172 and ASTM C-31, respectively.
2. Field Test Methods: For concrete, laboratory shall perform field test(s) and provide the following information for each set of cylinders or beam:
   a. Contractor's name.
   b. Name of project.
   c. Exact location and description of area where concrete was placed.
   d. Date of sampling.
   e. Concrete supplier.
   f. Concrete batch design number.
   g. Minimum required strength.
   h. Ambient temperatures.
   i. Concrete temperature.
   j. Weather condition; e.g., raining, windy, cloudy, sunny, etc.
   k. Truck number.
   l. Ticket number.
   m. Any admixtures.
   n. Slump per ASTM C-143; visual inspection will not be accepted.
   o. Air content in percent per ASTM C-231.
3. Tests and Standards for Concrete:
   a. ASTM C-172 - Sampling of Freshly Mixed Concrete.
   b. ASTM C-31 - Making and Curing of Concrete Test Specimens in the Field.
   c. ASTM C-143 - Slump of Portland Cement Concrete.
   d. ASTM C-231 - Concrete Air Content by Pressure Method (for Fresh Concrete) Test.
   e. ASTM C-39 - Concrete, Cylindrical, Compressive Strength Test.
   f. ASTM C-793 - Standard Test Method for Flexural Strength of Concrete (Using Simple Beam with Center Point Loading.)
   g. ASTM A-1064 Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete

B. Coring

1. Tests and Standards for Concrete Coring:
   a. Samplings and tests of concrete cores shall conform to ASTM C-42 - Obtaining and Testing Drilled Cores Sawed Beams of Concrete.
   b. Should coring be required to demonstrate acceptable thickness, measuring of concrete cores shall conform to ASTM C-174 - Measuring Length of Drilled Concrete Cores.
   c. Testing for Comprehensive Strength shall be in accordance with ASTM C-39 Concrete Cylindrical Strength Test.

## 1.4 STANDARD TEST METHODS FOR WATER SYSTEMS

A. Bacterial Sampling

1. The City Public Works Construction Inspector shall supervise the taking of water samples from a suitable tap (not through a fire hydrant) for analysis by the North

Texas Municipal Water District laboratory. The sample(s) shall be transported by City staff to the laboratory at 9:00 AM on Tuesdays and Thursdays. Samples may not be taken earlier than 3:00 PM on the day prior to delivery. The City Public Works Construction Inspector shall notify the Contractor of the results.

2. Microbiological sampling shall be done prior to connecting the new conduit into the existing distribution system in accordance with AWWA C651 Disinfecting Water Mains. Samples shall be tested in accordance with ***Standard Methods for the Examination of Water and Wastewater***. Samples for bacteriological analysis shall be collected in sterile bottles treated with sodium thiosulfate. At least one sample shall be collected from every 1,000-linear-feet of new water conduit, plus one set from the end of the line and at least one set from each branch. If trench water has entered the new conduit during construction or, if in the opinion of the City inspector, excessive quantities of dirt or debris have entered the new conduit, samples shall be taken at intervals of approximately 200-linear-feet. Samples shall be taken of water that has been in the new conduit for at least 16-hours.
3. Unsatisfactory test results shall require a repeat of the disinfection process and resampling as required above until a satisfactory sample is obtained.
4. In the event there are two unsatisfactory test results from the same sampling point, the Contractor must "poly-pig" the new water main and samples taken again until a satisfactory sample is obtained.

B. Hydrostatic (Pressure) Test

1. All water mains, fittings and services shall be tested with a hydraulic test pressure of not less than 200 psi over a period of not less than 2 hours. The allowable leakage, in gallons, of all pipe tested shall be calculated per the following equation:

$$Allowable\ Leakage = \frac{28.28 * L * D}{148{,}000}$$

where $L$ is Length of Pipe, feet,

$D$ is Diameter of Pipe, inches

2. For a two hour pressure test at a pressure of 200 psi. If the tests indicate a leakage in excess of the acceptable rate, the Contractor shall be required to find and repair the leak. Even if the test requirements are met, all apparent leaks shall be repaired and stopped.
3. The hydrostatic pump shall be connected to a system where the amount of leakage can be determined by measurement or gauge. The 200-psi pressure shall be maintained at the highest point of the main being tested over the entire 2-hour test period. The leakage shall be determined by comparing the quantity of water in the measuring system at the beginning of the test and quantity of water at the end of the test. The difference in these quantities shall be the leakage. An alternate method is to add water to the measuring system during the test. At the end of the 2-hour test, the quantity of water added shall be the leakage.
4. Hydrostatic pressure test for HDPE pipe shall be per NCTCOG Standard Specifications.

C. Tapping Sleeve and Valve testing

## 1.5 STANDARD TEST METHODS FOR SANITARY SEWER SYSTEMS

A. Deflection Testing

1. Mains less than thirty-six (36) inches in diameter shall pass deflection mandrel test per NCTCOG Standard Specifications for Public Works Construction, Item

507.5.1.4 Flexible Pipe (Deflection) Testing and TCEQ regulations Chapter 217.57(b) Deflection Testing.

2. Alternate methods for measuring deflection for pipes larger than thirty six (36) inches in diameter subject to City approval. Testing of mains thirty six (36) inches and larger shall occur at least 30 days after installation and backfill.
3. Pipe with deflection exceeding the percentage allowed deflection per NCTCOG table 507.5.1.4.2(a) at the time of testing shall be uncovered and reinstalled. If deflection exceeds 7% at the time of testing, pipe shall be removed and replaced with new materials. All failed joints, pipes, sections or structures shall be retested upon completion of remedial actions. Failed sections shall be retested after the remedial construction has been in place for 30 days.

B. Air Testing

1. Mains less than thirty six (36) inches in diameter and laterals shall pass a Low Pressure Air Test per NCTCOG Standard Specifications for Public Works Construction, Item 507.5.1.3 Low Pressure Air Testing and TCEQ regulations 30 TAC Chapter 217.57(a)(1) Low Pressure Air Test.
2. Pipes 36-inches and larger may be tested per NCTCOG item 507.5.1.3.3 (individual joint air test method). Testing of mains thirty six (36) inches and larger shall occur at least 30 days after installation and backfill. All failed joints, pipes, sections or structures shall be retested upon completion of remedial actions. Failed sections shall be retested after the remedial construction has been in place for 30 days.

C. TV Camera Inspection

1. After the deflection mandrel and air pressure test, the contractor shall conduct a color television camera inspection of the interior of the installed sanitary sewer system. The main must be laced with enough water to fill any low points. A copy of the recording in digital format and storage device (DVD disk, flash drive, etc.) as specified by the City, with written log of the inspection, shall be provided to the Public Works Construction Inspector prior to final acceptance of the project.

D. Manhole Testing

1. All manholes shall be vacuum tested including grade rings and casting per NCTCOG Public Works Construction Standard 502.1.5.2 and meet TCEQ regulations 30 TAC 217 and ASTM C1244, "*Standard Test Method for Concrete Sewer Manholes by the Negative Air Pressure (Vacuum) Test Prior to Backfill*". The time for the vacuum to drop from 10 inches of mercury to 9 inches shall not be less than two (2) minutes.

### 1.6 FREQUENCY OF TESTS

A. Refer to City of Mesquite Standard Details and Project Specifications for the required frequency of tests.

## PART 2 – MATERIALS AND EQUIPMENT

Not used.

## PART 3 – EXECUTION

Not used.

## PART 4 – MEASUREMENT AND PAYMENT

### 4.1 MEASUREMENT

A. This section shall not be measured as a separate contract section.

**4.2 PAYMENT**

A. The work performed and materials furnished in accordance with this section will not be paid for directly but will be subsidiary to pertinent sections.

**END OF SECTION**

# SECTION 10030

# TRENCHING AND BACKFILLING

## PART 1 – GENERAL

### 1.1 DESCRIPTION

A. All excavation, backfilling, and compaction required for utility work.

### 1.2 SUBMITTAL

A. Backfill Material
B. Trench Safety Plan if trench depth greater than 5’
C. Affidavit of trained and certified “Competent Person” for Trench Safety Inspections

### 1.3 QUALITY CONTROL

A. General
   1. Locations for testing will be determined by the City Public Works Construction Inspector. Most current ASTM specifications shall govern testing methods.
B. Testing Requirements, reference Section 10020 Testing Laboratory Services
   1. Subgrade
      a. Proctor analysis
      b. Moisture content and compaction shall be tested every 300 linear feet along trench in each 12” loose lift
   2. Backfill Material brought from off-site
      a. Gradation sieve analysis shall be submitted prior to use of material
      b. City Public Works Construction Inspector may request additional gradation sieve analysis as project progresses

## PART 2 – MATERIALS AND EQUIPMENT

### 2.1 GENERAL

A. Rock and rubble shall not be used as backfill material.
B. Sand shall not be used as backfill or level up material.

### 2.2 BACKFILL MATERIALS UNDER PAVEMENT

A. Recycled Crushed Concrete Flexible Base per TXDOT Item No. 247, Grade 1, Type D
B. Trenches in area that is proposed to be pavement in the future shall be backfilled the same as areas under existing pavement

## PART 3 – EXECUTION

### 3.1 SAFETY

A. **TRENCH SAFETY**
   1. All excavation and trench operations shall be conducted in accordance with 29 Code of Federal regulations (CFR), Part 1926, Subpart P and all other applicable State and City regulations. Prior to commencing any excavation or trenching operation, the Contractor shall submit to the City Engineer a plan sealed by a Texas Licensed Professional Engineer indicating the intended procedures to be used by the Contractor to comply with OSHA requirements. Such plan shall further identify the “Competent Person” as required by paragraph 1926.651(k)(1) that will work with each crew. An affidavit from the Contractor indicating the competent person must be submitted with the trench safety plan to the City Engineer. A copy of the trench safety plan must be on the job at all times. The City reserves the right

to deny payment for any construction activities in excavations or trenches that are not in accordance with the submitted plan. The City does not approve or disapprove Trench Safety Plans, but will retain a file copy.

2. Trench Safety Plan
   a. Design Requirements. Design to be signed and sealed by a registered Texas professional geotechnical engineer or structural engineer. Engineer shall have sufficient professional engineering competence to designate necessary geotechnical investigation, interpret geotechnical information, and formulate structural design.
   b. Performance Requirements. Provide for safety of all personnel and the public present in or adjacent to any trench constructed under the scope of this contract.
   c. Trench safety design must not require excessive excavation, excessive slopes. Contractor is to protect existing trees and adjacent structures.
   d. Prepare and submit trench safety design to the Owner(s) and/or the City.
   e. Plan shall be project specific and shall list protection system to be used for plan locations requiring trench safety.
   f. Qualification. Design engineer to have completed a minimum of 20 trench safety designs in the last two (2) years and have had no trench safety design failures.
   g. Regulatory Requirement. Conform to any local, State, and Federal laws, rules, regulations, and ordinances covering design and trench safety designs.
3. Trench Safety Implementation
   a. Implementation of trench safety shall comply with submitted trench safety design plan.
   b. Submit designated competent person who will be on-site full time and is capable of identifying existing and predictable hazards in surrounding or work conditions which are unsanitary, hazardous, or dangerous to employees and who has the authorization to take prompt corrective measures to eliminate them.
   c. Install, operate, maintain, adjust, and remove trench safety equipment, and precautions in accordance with trench safety design.

B. **CONFINED SPACE ENTRY**
   1. All entry into confined spaces conducted in accordance with 29 Code of Federal regulations (CFR), Part 1910.147 P and all other applicable State and City regulations. Prior to commencing any confined space entry, the Contractor shall submit to the City Engineer a copy of the confined space entry plan with a completed permit.

**3.2 PREPARATION**

A. All areas where utilities and structures are to be placed shall be cleared of debris and timber. Disposal shall be off-site.

**3.3 INSTALLATION**

A. Excavation. Perform excavation to line, grade, and alignment as shown on plans.
B. Excavation in general, shall be made in open cut from the surface of the ground and shall be no greater in width and depth than is necessary to permit the proper construction of the work. When the trench depth exceeds five (5) feet, see Section 6.2 regarding “trench safety” requirements. The amount of trench excavation to grade shall not exceed one hundred (100) feet from the end of the pipe laying operations and no excavation shall be three hundred (300) feet in advance of the completed pipe operations (includes backfilling). At the end of the workday, all trench excavation shall be backfilled or trench shall be covered with steel plate and secured in place with

asphalt.

C. Timeliness. Trench backfill shall be of sufficient depth to ensure that the work constructed under this Contract and existing adjacent utilities and structures are stabilized for all conditions that may exist and/or arise. Contractor shall not lay more pipe on any single day than trench backfill can be placed and compacted, and density tested and/or such that stabilization of the work performed and surrounding existing utilities and structures cannot be achieved.
D. Backfill: For trenches under pavement (existing and proposed) or where indicated on plans, trench shall be backfilled with Recycled Crushed Concrete Flexible Base per TXDOT Item No. 247, Grade 1, Type D to bottom of proposed pavement. For trenches not under existing or proposed pavement, trench may be backfilled with native soil.
E. Compaction: Compact each 12" loose layer of backfill to within 95% to 100% of standard proctor density at a moisture range of 0% to 6% of optimum. The contractor shall take new proctors at each change in soil type. Water jetting will not be allowed for any trench.

**3.4 LINE AND GRADE**

A. All backfill to be graded to (+/-) 0.10 feet or as indicated on plans

## PART 4 – MEASUREMENT AND PAYMENT

**4.1 MEASUREMENT**

A. This section shall be measured by lump sum for development of trench safety plan.
B. This section shall be measured by linear foot for trench safety implemented.
C. Other work under this section shall not be measured as a separate bid item.

**4.2 PAYMENT**

A. Payment for trench safety plan shall be full compensation for development of plan signed and sealed by a professional engineer licensed in the state of Texas and for materials all manipulation, labor, tools, equipment and incidentals necessary to complete the work.
B. Payment for trench safety implementation shall be full compensation for implementation and maintenance of trench protection systems and for materials all manipulation, labor, tools, equipment and incidentals necessary to complete the work.
C. The work performed and materials furnished in accordance with this section including excavation, backfilling, drying, undercutting subgrade and reworking, hauling, disposal of material, compaction, testing and for all manipulation, labor, tools, equipment and incidentals necessary to complete the work, will not be paid for directly but will be subsidiary to installation of utilities.

**END OF SECTION**

# SECTION 20010

# STEEL REINFORCEMENT

## PART 1 – GENERAL

### 1.1 DESCRIPTION

A. The work as specified in this section includes all labor, equipment and materials necessary to furnish and install steel reinforcement for concrete.

### 1.2 SUBMITTALS

A. Submit certification that reinforcing steel meets or exceeds the applicable ASTM specification. Certification shall include origin of steel.

B. For structures, submit shop drawing showing bar number, size, length, configuration, spacing and location of all reinforcement bars. Shop drawings shall be prepared in accordance with ACI SP66, ACI Detailing Manual.

C. Submit dowel baskets, mechanical splicing devices and welded rebar mat layout where applicable.

### 1.3 QUALITY CONTROL

A. All reinforcement shall be inspected prior to placing any concrete.

## PART 2 – MATERIALS AND EQUIPMENT

### 2.1 MATERIAL

A. Reinforcing steel bars shall conform to ASTM A 615, Grade 60.

B. Welded wire reinforcement in roll form is prohibited from use on all projects.

C. Prefabricated welded wire reinforcement sheets are allowed. Mats shall be produced on automatic welding machines. Welding of rebar in the field in lieu of tie wires is not acceptable. Welded wire reinforcement shall conform to ASTM A 1064.

   1. Minimum weld shear strength: 35,000 psi times the area of the rebar wire
   2. Minimum yield strength: 70,000 psi

D. Stirrups and Ties shall conform to ASTM A 615, Grade 60.

E. Dowels: ASTM A 36, smooth, saw cut to lengths indicated on drawing and remove all burrs.

F. Mechanical Splicing Devices: Full mechanical connections for reinforcement splices shall be of the type indicated and shall develop at least 125 percent of the specified yield strength of the bar when tested in tension and compression.

G. Tie wire: Black annealed type, 16 gage or heavier.

H. Bar Supports

   1. Shall be plastic bar supports for concrete pavement placement.
   2. Class I Wire Bar Supports will be used for structures. Class I supports are plastic protected metal.
   3. All supports must be able to sufficiently support the weight of the steel.

### 2.2 FABRICATION

A. Cutting & Bending: Reinforcement shall be cut and bent to the shapes shown on the plans. Fabrication tolerances shall be in accordance with the requirements of ACI 318. All reinforcement shall be cold bent, unless otherwise permitted by the Engineer. Coated reinforcement shall not be field cut, unless permitted by the Engineer. Field cutting of coated reinforcement should be performed using hydraulic-powered or friction

cutting tools to minimize coating damage and field touch-up. Flame cutting of coated reinforcement will not be permitted. Field cut coated reinforcement shall be repaired immediately with compatible patching material and suitable for repairs in the field.

B. Hooks & Bend Dimensions: Hook dimensions and diameters of bends shall be as shown on the plans. When hook dimensions and diameters of bends are not shown, they shall be in accordance with the ACI 318.
C. Identification and Availability: Reinforcement shall be shipped in bundles, tagged and marked in accordance with the CRSI "Manual of Standard Practice".

## PART 3 – EXECUTION

### 3.1 DELIVERY, STORAGE AND HANDLING

A. Deliver reinforcement to project site bundled and tagged with metal tags indicating bar size, lengths, and other data corresponding to information shown on placement drawings.
B. Use care in loading, unloading, handling, and storage of reinforcement materials to prevent damage to bar marking labels.
C. Stack reinforcement materials on blocks in a neat and orderly manner in such a location as to limit the possibility of damage by construction equipment, prevent ground contact, and permit easy access

### 3.2 PREPARATION

A. Inspect subgrade and forms for proper location, grade and alignment before placing reinforcement.
B. Clean reinforcement, removing loose rust and mill scale, earth, mud, cement, oil, paint, ice, and other materials which reduce or destroy bond with concrete.

### 3.3 INSTALLATION

A. Reinforcing steel shall not be damaged, bent, or misshapen prior to, during, or after installation. Re-bending or straightening shall not be allowed, except where field bends are specifically indicated on drawings. Do not use reinforcement having kinks or bends that are not required. Heating of reinforcement shall not be allowed.
B. Tack welding and welding of reinforcement on site is prohibited. Only factory welded rebar mats are permitted.
C. Bar supports shall be provided for all reinforcement no matter the depth of the concrete member.
D. Install reinforcing steel bar in the exact position shown on the plans. Reinforcing splices shall conform to ACI 318 12.15. Reinforcing bar laps shall be 30 bar diameters or per ACI 318, section 12.15, whichever is greater. All reinforcing steel bar intersections shall be secured with tie wire.
E. Accurately position reinforcements on bar supports, spacers, hangers or other approved supports. Supporting reinforcement directly on concrete, masonry units, brick or rocks in lieu of approved wire chairs is prohibited. Wire sizing and spacing of the chairs shall be sufficient to properly support the steel and shall be in accordance with applicable CRSI standards.
F. Secure reinforcement in place with ties or clips. Set wire ties so that ends are directed into concrete and not toward exposed concrete surfaces. Remove all wire clippings and debris from bottom of formwork before placement of concrete. Tack welding of reinforcing is not permitted.

G. Vertical stirrups shall pass around the main tension members and be securely tied to the members. The reinforcing shall be wired together at a sufficient number of intersections to produce a sound or sturdy mat or cage of reinforcement that will maintain the reinforcement in the intended positions when the concrete is poured.
H. Splices not shown on the plans may be made provided such splices meet the requirements of ACI 318. Install mechanical splicing devices in accord with manufacturer's literature. The Owner shall inspect all splices prior to concrete operations.
I. Where changes in cross section of a column occur, offset longitudinal bars in a region where lateral support is afforded. Where offset is 3 inches or less, slope of inclined portion with axis of column shall not exceed 1 in 6. Where a column face is offset greater than 3 inches, longitudinal bars shall not be offset bent. Separate dowels, lap spliced with the longitudinal bars adjacent to the offset column faces, shall be provided. Use templates to insure proper placement of column dowels.
J. Place reinforcement in position such that the concrete cover between the outside of any bar and the concrete form conforms to the following schedule unless shown otherwise in the drawings and details.
    1. For concrete cast against and permanently exposed to earth: 3”
    2. For concrete exposed to weather or earth: 2”

**3.4 TOLERANCES**

A. Concrete cover to formed surface - plus or minus 1/4".
B. Minimum spacing between bars - two times the bar diameter.
C. Bars spacing - plus or minus 1/4" in 12".
D. Conform to ACI 318.

## PART 4 – MEASUREMENT AND PAYMENT

A. This section shall not be measured as a separate bid item. The work performed and materials furnished in accordance with this section will not be paid for directly but will be subsidiary to pertinent sections.

**END OF SECTION**

# SECTION 20020

# LIME TREATED SUBGRADE

## PART 1 – GENERAL

### 1.1 DESCRIPTION

A. The work as specified in this section includes all labor, materials and equipment necessary for the placement and compaction of Lime Treated Base to the lines and grades indicated on the plans.

### 1.2 SUBMITTAL

### 1.3 QUALITY CONTROL

A. General
   1. Locations for testing will be determined by the City Public Works Construction Inspector. Most current ASTM specifications shall govern testing methods.

B. Testing Requirements, reference Section 10020 Testing Laboratory Services
   1. Lime Treated Subgrade
      a. Proctor analysis
      b. Moisture content and compaction shall be tested every 300 linear feet per lane
      c. Provide sieve analysis for material at 500-foot intervals per lane

## PART 2 – MATERIALS AND EQUIPMENT

### 2.1 LIME

A. Lime for lime treated subgrade application shall be provided in accordance with NCTSSPWC Item 301.2, Lime Treatment.

B. Lime shall be Type A, Hydrated Lime, as specified by NCTSSPWC Item 301.2.1.1.

## PART 3 – EXECUTION

### 3.1 PREPARATION

A. Prepare roadbed in accordance with NCTSSPWC Item 301.2.3.

B. Depth of preparation per plans.

### 3.2 INSTALLATION

A. Installation of Lime Products in accordance with NCTSSPWC Item 301.2.3.

B. Depth of installation per plans.

C. Compaction shall be 95% to 100% per ASTM D698 or ASTM D 2922.

## PART 4 – MEASUREMENT AND PAYMENT

A. This section shall be measured by the square yard of lime treated subgrade installed at the depth and concentration specified and shall be full compensation for lime, hauling, mixing, scarifying, testing, compaction, grading; and for all manipulation, labor, tools, equipment and incidentals necessary to complete the work, all in accordance with the plans and these specifications.

**END OF SECTION**

# SECTION 20022

# REMOVAL OF EXISTING PAVEMENT

## PART 1 – GENERAL

### 1.1 DESCRIPTION

A. The work as specified in this section includes all labor, equipment and materials necessary to remove and dispose of existing pavement of all types (i.e. driveways, sidewalks, street, etc.) and materials (i.e. asphalt, concrete, etc.) in conformity with the plans and these specifications

### 1.2 SUBMITTAL

### 1.3 QUALITY CONTROL

## PART 2 – MATERIALS AND EQUIPMENT

### 2.1 MATERIALS

### 2.2 EQUIPMENT

## PART 3 – EXECUTION

### 3.1 GENERAL

A. When removing portions of concrete pavement from existing pavement that will remain in place, Contractor shall delineate the line of removal neatly and accurately with a full-depth saw-cut to facilitate removal without damaging the remaining pavement. Saw-cut shall be considered incidental. Contractor shall ensure the removal methods do not chip or damage surrounding pavement or curb. If any existing concrete beyond the removal limits is damaged or destroyed, it shall be replaced at the Contractor's entire expense. Removed concrete pavement shall be disposed of off-site by the Contractor.

## PART 4 – MEASUREMENT AND PAYMENT

### 4.1 MEASUREMENT

A. This section shall be measured by each plan view square yard of pavement removed. Payment shall be full compensation for materials and installation including sawcutting, removal, excavation, haul off and lawful disposal of spoils, and all manipulation, labor, tools, equipment and incidentals necessary to complete the work, all in accordance with the plans and these specifications.

**END OF SECTION**

# SECTION 20030

# REINFORCED CONCRETE PAVEMENT, CURB AND GUTTERS AND SIDEWALKS

## PART 1 – GENERAL

### 1.1 DESCRIPTION

A. The work as specified in this section includes all labor, equipment and materials necessary to construct the reinforced concrete pavement of the thickness shown on the plans and in conformity with the plans and these specifications.

### 1.2 SUBMITTAL

A. The Contractor shall submit the proposed concrete mix design for approval and record.
B. Paving equipment
C. Pattern and color for stamped, colored concrete as applicable.
D. Submittals as required by Section 20010 Steel Reinforcement

### 1.3 QUALITY CONTROL

A. General
    1. Locations for testing will be determined by the City Public Works Construction Inspector.
B. Testing Requirements, reference Section 10020 Testing Laboratory Services
    1. Subgrade / Sub-base
        a. Moisture content and compaction shall be tested every 300 ft. per lane
    2. Concrete During Placement
        a. At least one test shall be made on fresh concrete each day for each class of concrete. On large placements, at least one test shall be made on each 150 cubic yards of concrete placed, per class of concrete. Each set of tests shall consist of one (1) slump test, one (1) air entrainment test, one (1) temperature test and three (3) compression test cylinders.
            1. One cylinder shall be broken at 7 days and the other two at 28 days or as instructed by the Public Works Construction Inspector.
            2. The Contractor may have additional cylinders taken if desired to determine the strength of the concrete in addition to a 7-day break and 28-day break.
        b. Temperature shall be tested throughout the day on each load of concrete
    3. Concrete Cores (4” diameter)
        a. Tested for both thickness and 28-day strength
        b. Cores shall be taken at a rate of one per every 300 ft. per lane
    4. Reinforcement
        a. Inspected by City Representative for layout prior to placing any concrete

### 1.4 INSPECTION

A. Reinforcing steel must be inspected and approved prior to placement of concrete
B. Any subgrade and/or base material testing required must be completed and shown to have passed requirements of project specifications prior to placement of concrete.

## PART 2 – MATERIALS AND EQUIPMENT

### 2.1 GENERAL

A. All materials and requirements for concrete shall conform to the requirements of NCTSSPWC Item 303 “Portland Cement Concrete Pavement” with the exception of

items specified herein.

B. Slip Form Paving Machine(s) equipped with external vibrators shall be used for all street pavements. Vibrating screeds will only be allowed for hand finished placement or if authorized by the engineer.

**2.2 CONCRETE**

A. Concrete shall have a 28-day minimum compressive strength of 4,000 psi, containing 6 sacks of cement per cubic yard minimum, with 1" to 3" slump for machine placement and 3" to 5" slump for hand placement.

B. Fly ash may be substituted for up to 20% of the cement content requirement at 1 to 1.25 cement to fly ash substitution rate.

**2.3 REINFORCEMENT**

A. Reinforcing shall conform to ASTM A 615 and be a minimum grade of 60 ksi per ASTM A 370. Reinforcement may be rejected for failure to meet the following: reinforcement exceeding the allowable variations; reinforcement with a coating of dirt, loose scale, paint, oil, or other foreign substance which would prevent the bonding of the concrete and reinforcement; reinforcement not bent in accordance with the standard details; or twisted bars. Reinforcement shall be stored above the ground surface upon skids, platforms, or other supports, and shall be protected from mechanical injury and surface deterioration caused by exposure to the conditions producing rust.

B. Reinforcement shall conform to Section 20010 Steel Reinforcement.

**2.4 JOINTS**

A. Joints shall be filled with hot-poured rubber joint sealing compound that conforms to ASTM D 3406 and meets the requirements of NCTSSPWC 303.2.14.1.1.(a) Hot Poured Polymer Sealant Requirements

B. Expansion joint materials shall consist of:

1. Pre-molded asphalt board tested in accordance with ASTM D 545 Test Methods for Preformed Expansion Joint Fillers for Concrete Construction (Non-extruding and Resilient Types).
2. Redwood shall be prohibited on sidewalks and used on streets only when necessary for constructability

**2.5 CURING MATERIALS**

A. White Curing compound is to be applied, per manufacturer's recommendations, to all exposed concrete surfaces (including back-of-curbs) immediately after completion of finishing operations. Clear curing compound shall be used on stained concrete surfaces only. Curing compounds shall be ASTM C-309, Type 2 and shall be per NCTSSPWC Section 303.2.13.1.1. The compound shall be delivered to the jobsite in the manufacturer's original containers only, which shall be clearly labeled.

**2.6 STAMPED CONCRETE**

A. Pattern and color per plans. City shall be provided mold upon completion of project.

B. Prepare for approval a 9-sq. ft., 3-in. thick specimen for each color, pattern, and texture required before beginning work

## PART 3 – EXECUTION

**3.1 GENERAL**

A. All requirements for concrete shall conform to the requirements of the current NCTSSPWC Item 303 "Portland Cement Concrete Pavement" with the exception of items specified herein.

**3.2 JOINTS**

A. Joints shall be used where shown on the plans or where directed by the Engineer. The plane of all joints shall make a right angle with the surface of the pavement. No joint shall have an error in alignment of more than one half (1/2) inch at any point. The

concrete along the face of all joints, except dummy joints, shall be thoroughly consolidated by vibration to insure a surface which is free from honeycombing. All joints shall be constructed in accordance with Standard City of Mesquite Joint Details.

**3.3 INTEGRAL CURB**

A. Integral curb shall be constructed along the edge of the pavement as an integral part of the slab and of the same concrete as the slab. The concrete for the curb shall be deposited not more than thirty (30) minutes after the concrete in the slab.

B. If curb is formed by hand finishing a curb finish mule must be used to ensure a uniform cross-section.

A. Provide finished work with a well-compacted mass and a surface free from voids and honeycomb, in the required shape, line, and grade. Round exposed edges with an edging tool of the radius shown on the plans. Construct joints at locations shown on the plans. Cure for at least 72 hr.

B. Set and maintain a guideline that conforms to alignment data shown on the plans, with an outline that conforms to the details shown on the plans. Ensure that changes in curb grade and alignment do not exceed 1/4 in. between any 2 contacts on a 10-ft. straightedge.

C. Conventionally Formed Concrete.
   1. Shape and compact subgrade, foundation, or pavement surface to the line, grade, and cross-section shown on the plans. Lightly sprinkle subgrade or foundation material immediately before concrete placement.
   2. Pour concrete into forms, and strike off with a template 1/4 to 3/8 in. less than the dimensions of the finished curb unless otherwise approved. After initial set, plaster surface with mortar consisting of 1 part hydraulic cement and 2 parts fine aggregate. Brush exposed surfaces to a uniform texture.
   3. Place curbs, gutters, and combined curb and gutters in 50-ft. maximum sections unless otherwise approved.

D. Extruded or Slipformed Concrete.
   1. Hand-tamp and sprinkle subgrade or foundation material before concrete placement. Provide clean surfaces for concrete placement. Coat cleaned surfaces, if required, with approved adhesive or coating at the rate of application shown on the plans or as directed. Place concrete with approved self-propelled equipment.
   2. The forming tube of the extrusion machine or the form of the slipform machine must be easily adjustable vertically during the forward motion of the machine to provide variable heights necessary to conform to the established gradeline.
   3. Attach a pointer or gauge to the machine so that a continual comparison can be made between the extruded or slipform work and the grade guideline. Other methods may be used when approved.
   4. Finish surfaces immediately after extrusion or slipforming.

**3.4 REINFORCEMENT**

A. Reinforcement shall be placed at locations and spacing shown on the plans, or as directed by the Engineer, and shall be supported above the sub-grade on chairs approved by the Engineer.

B. Placement and work methods shall conform to Section 20010 Steel Reinforcement

C. Contractor shall drill dowel holes using approved equipment that will ensure proper depth and alignment. Dowel holes shall be mechanically drilled at mid-depth of the slab. The holes shall be on alignment, level with the top surface of the slab, with minimal wandering. In some instances, dowel locations may have to be adjusted due to field conditions such as cracks, heavy mesh reinforcement, or other obstructions at the plan location for a dowel hole. After drilling holes, Contractor shall clean out the dowel holes with compressed air at a minimum 125 psi and then brush the holes out. Contractor shall insert the air nozzle to the back of the hole to force out all dust and debris, which might

prevent the epoxy from bonding to the concrete. Contractor shall occasionally check the air for oil and moisture contamination from the compressor. To place the anchoring material, Contractor shall use a long nozzle that feeds the material to the back of the hole, assuring that the anchoring material will flow forward along the entire dowel embedment length during insertion. Contractor shall not use any method that attempts to pour or push the anchoring material into the hole. The injection wand on the installation unit shall contain an auger-type mixing spindle that mixes the two-part epoxy. Contractor shall insert dowels by twisting the dowel about one full revolution to evenly distribute the material around the dowel's circumference. Contractor shall verify that the dowels are installed to the proper insertion depth and to the correct orientation (perpendicular to the vertical face of pavement). A plastic grout-retention disk shall be used to prevent the escape of epoxy. Some anchoring material shall be visible from the sides of the disk after installation to ensure proper amount of epoxy was placed in the hole. Dipping dowels into epoxy and inserting the dowel into the drilled hole is not acceptable.

D. Standard pavement reinforcing steel bar laps are to be 30 bar diameters or 15" per ACI 318, section 12.15, whichever is greater. All bars shall be wired at their intersections and at all laps or splices. All reinforcement necessary for a section of concrete shall be placed and approved by the Owner before any concrete is placed in the section. The pavement reinforcing steel shall be supported on chairs and care shall be exercised to keep all steel in its proper locations. After the reinforcing steel is securely installed above the subgrade, there shall be no loading imposed upon (or walking upon) the bar mats or individual bars before or during the placing or finishing of the concrete. When placed in the work, the reinforcement shall be free from dirt, loose rust, scale, painting, oil, or other foreign material.

## 3.5 CONCRETE PLACEMENT

A. The Contractor shall do all necessary filling, leveling, and fine grading required to bring the subgrade to the exact grades needed for repair.

B. Fill and Level Up: Approved fill and level-up material is crushed concrete Flexible Base per TXDOT Item No. 247, Grade 1, Type D. **Sand may not be used as fill or level-up material under any pavement**.

C. The subgrade shall be compacted using City approved vibratory sheep's foot rollers, or other mechanical compaction equipment approved by the City. The subgrade and all level-up material must be compacted to 95% standard proctor density with a moisture content of 0% to plus 6% of optimum moisture. Moisture level must be maintained by wetting, until placing of concrete. All fill shall have densities taken at the interval and locations determined by the City Public Works Construction Inspector.

D. Subgrade shall be prepared per plans and pass required testing prior to setting forms.

E. Placement of Concrete

1. Forms shall be straight, free of warp and kinks, and of a depth equal to the thickness of the finished work. Forms shall be a minimum of 10' in length for each individual form or of a section satisfactory to the Owner, securely staked to the line and grade, and maintained in a true position during the depositing of concrete. Forms shall be of ample strength and shall be provided with adequate devices for secure setting so that when in place they shall withstand the impact and vibration of equipment imposed thereupon without appreciable springing or settlement. Forms shall be thoroughly cleaned and oiled before each use. Forms shall remain in place until the concrete has taken its final set. Removal of forms shall be followed immediately by banking earth against the sides of the slab and wetting it. Care shall be taken in removing forms to prevent spalling or other damage of the concrete. All forms showing a deviation of 1/8" in 10' from a straight line shall be

rejected.

F. Thickness of concrete shall be per plans.

G. Hot-Weather Concreting
   1. The temperature of concrete as delivered shall not exceed 95 degrees F. Take immediate corrective action or cease concrete production when the concrete temperature exceeds 95 degrees F.
   2. If concrete is to be placed before sunrise or after there is sufficient natural light the contractor must provide their own supplemental artificial lighting enough to do work safely and properly and in accordance with the City of Mesquite specifications.

H. Cold-Weather Concreting
   1. No concrete shall be placed on a frozen subgrade
   2. If the ambient air temperature is less than 40 degrees F and dropping concrete shall not be placed.
   3. If concrete is placed and there is an anticipated low temperature of less than 40 degrees F within 5 days after placement the concrete must be covered and kept at a temperature of no less than 50 degrees F.
   4. In all cases, concrete should not be kept at a temperature of less than 50 degrees F for a period of 5 days' minimum.

**3.6 FINISHING**

A. Immediately after finishing all concrete surfaces, the surfaces shall be finished to a true, even surface and the required line, grade, and section with all surface voids filled. Finish all concrete street paving wider than 37' with a tine finish (1"), perpendicular to traffic flow. Broom curb and gutter parallel to traffic 12" from curb. The edges of slabs and all joints requiring edging shall be carefully tooled with a suitable tool at the time the concrete begins to take its "initial set" and becomes non-workable. Before street pavement will be accepted and reopened, all foreign debris shall be removed and pavement cleaned.

B. Stamped Concrete: Contractor shall apply concrete stamping as shown on the plans. Upon completion, contractor shall provide concrete stamping mats used for construction to City.

**3.7 Sidewalks**

A. Shape and compact subgrade, foundation, or pavement surface to the line, grade, and cross-section shown on the plans. Lightly sprinkle subgrade or foundation material immediately before concrete placement. Hand-tamp and sprinkle foundation when placement is directly on subgrade or foundation materials. Remove and dispose of existing concrete. Provide a clean surface for concrete placement directly on the surface material or pavement.

B. Mix and place concrete in accordance with the pertinent Sections. Hand-finishing is allowed for any method of construction. Finish exposed surfaces to a uniform transverse broom finish surface. Curb ramps must include a detectable warning surface and conform to details shown on the plans. Install joints as shown on the plans. Ensure that abrupt changes in sidewalk elevation do not exceed 1/4 in., sidewalk cross slope does not exceed 2%, curb ramp grade does not exceed 8.3%, and flares adjacent to the ramp do not exceed 10% slope. Ensure that the sidewalk depth and reinforcement are not less than the driveway cross-sectional details shown on the plans where a sidewalk crosses a concrete driveway.

C. Provide finished work with a well-compacted mass, a surface free from voids and honeycomb, and the required true-to-line shape and grade.

**3.8 PROTECTION OF PAVEMENT AND OPENING TO TRAFFIC**

A. No vehicle traffic shall be permitted on newly paved areas for a minimum of seven days

after placement or until 3000 psi has been achieved.

B. Contractor shall protect concrete during curing period. Any damage done to pavement shall be remedied at contractor's expense.

## 3.9 PAVEMENT TOLERANCES

A. No concrete pavement with ponded or standing water over 1/8" deep will be accepted.

B. Contractor shall measure the transverse and lateral profile of the finished riding surface using a 10-ft straightedge to measure and evaluate the ride quality of the pavement surfaces. The texture and ride quality of the new pavement should closely match of that of the existing pavement to which it connects. Contractor shall use an approved grinding or other acceptable method to correct localized roughness and surface areas that have more than 1/8-in variation between any 2 contacts on a 10-ft straight edge. This shall be considered incidental to this bid item.

C. Comply with tolerances of ACI 117 and as follows:
   1. Elevation: 1/4 inch.
   2. Thickness: Plus 3/8 inch, minus 1/4 inch.
   3. Surface: Gap below 10-foot- long, unleveled straightedge not to exceed 1/4 inch.
   4. Joint Spacing: 3 inches.

## 3.10 CLEANUP

A. After the construction work has been completed, the Contractor shall remove all debris, trash, excess materials, forms, stakes, etc. from the premises. The site shall be left with a neat appearance. All excavation shall be backfilled, and all excess excavated materials shall be disposed of.

## 3.11 PENALTY FOR DEFICIENT PAVEMENT THICKNESS AND STRENGTH

A. Where the pavement is deficient in strength from that called for by the plans or specifications, as determined by the proper compressive strength testing, the Contractor is responsible for addition testing to determine the actual strength deficiency.

B. Where the pavement thickness is deficient from that called for by the plans or specifications, as determined by core test set up in the contract, the Contractor is responsible for additional core tests to determine actual limits of deficient pavement thickness. The length of the area of such deficient thickness shall be determined by additional cores at intervals of 10 feet along the length of the pavement in each direction until cores are obtained which are at least plan thickness. The width of such area shall be the entire placement width.

C. Contract payment will be made at an adjusted rate based on the following tables**.** If area of pavement is deficient in both measurements, then the more stringent payment

deduction will be in effect:

| Percent Deficient from Required Strength | Percent of Contract Price Allowed |
|---|---|
| Greater than 0%- Not more than 5% | 95% |
| Greater than 5%- Not more than 10% | 90% |
| Greater than 10%- Not more than 15% | 80% |

| Deficiency in Thickness Determined By Cores | Percent of Contract Price Allowed |
|---|---|
| 0.00 – 0.20 | 100% |
| 0.21 – 0.30 | 80% |
| 0.31 – 0.40 | 70% |
| 0.41 - .050 | 60% |

D. Any area of pavement found deficient in strength by more than 15% or deficient in thickness by more than 0.50 inches shall be removed and replaced by the Contractor at his entire expense for the width of the street or alley and as directed by the Engineer.

**3.12 REMOVAL OF DEFICIENT CONCRETE**

A. If the above tests indicate that a particular batch of previously placed concrete has less than the design strength, the Engineer may direct that the defective concrete be removed and replaced.
   1. The removal of the defective concrete shall also include the removal of concrete that has obtained the required strength if the Engineer deems this necessary to obtain structural or visible continuity when the concrete is replaced.
   2. The removal, and replacement of any defective concrete, shall be made at no additional cost to the Owner. This shall include any formwork required and any reinforcing steel required. The Owner will not accept any additional costs for extra work required because of the failure of placed concrete to meet the minimum requirements.

## PART 4 – MEASUREMENT AND PAYMENT

A. Concrete street pavement and sidewalks shall be measured by square yard of reinforced concrete street pavement and sidewalks in place and accepted for the depth specified in the plans. The area of concrete pavement includes the portion of the pavement slab extending beneath the curb. Payment shall be full compensation for concrete paving including reinforcement, joints, joint sealing, forms, base for level up, curing compound, testing, clean-up and for all manipulation, labor, tools, equipment and incidentals necessary to complete the work, all in accordance with the plans and these specifications.

B. Curb or curb and gutter shall be measured by linear foot of curb or curb and gutter in place and accepted. Payment shall be full compensation for concrete paving including reinforcement, joints, joint sealing, forms, base for level up, curing compound, testing, clean-up and for all manipulation, labor, tools, equipment and incidentals necessary to complete the work, all in accordance with the plans and these specifications

**END OF SECTION**

# SECTION 20080

# MILLING PAVEMENT

## PART 1 – GENERAL

### 1.1 DESCRIPTION

A. This item shall govern for removing existing asphalt or concrete pavement surface to the required depth, profile and cross-slope and proper utilization or disposal of the milled material.

B. The work as specified in this section includes all labor, equipment and materials necessary to plane existing concrete pavement in conformance with the current Texas Department of Transportation's Standard Specifications for Construction of Highways, Streets and Bridges, Item 354 "Planing and Texturing Pavement" with exceptions of items specified herein.

C. Cold milling is divided into the following classifications:

1. **Scarification.** Scarification shall be used to provide a roughened texture to an existing pavement surface at removal depths ranging from 1/4 to 1/2". Scarification shall be used to prepare an existing pavement for a functional overlay where the existing pavement has excessive crack sealing, has a polished surface, or requires minor profile corrections.
2. **Milling.** Milling shall be used to remove material from an existing pavement surface to a specified average depth by milling the surface and creating a uniform profile.
3. **Wedge Milling.** Removing existing asphalt or concrete pavement surface material along concrete curb and gutter or abutting concrete street pavement that is scheduled to remain in place, including proper utilization or disposal of all removed material. This wedge milling of existing pavement shall be to a depth of 1.5" and to a width of 4' beyond the edge of pavement that is to remain in place, unless otherwise directed. The intent of wedge milling is to prevent excessive build-up of new pavement overlay adjacent to and/or directly over existing gutter or street pavement. This helps to ensure a new pavement overlay does not exceed the height of the gutter line and that the existing drainage capacity and flow characteristics of the curb and gutter are maintained or improved.

## PART 2 – MATERIALS AND EQUIPMENT

### 2.1 MATERIALS

### 2.2 EQUIPMENT

Equipment, tools and machines used in the performance of the work shall be maintained in a satisfactory working condition. Equipment shall be in accordance with the following:

A. **Cold Milling Machine.** The cold milling machine shall be a commercially manufactured machine that shall be self-propelled with sufficient power, traction, and stability to maintain an accurate depth of cut to perform the work to the Owner's satisfaction. The cold milling machine shall be equipped with automatic controls for establishing profile grades at all edges of the machine. The machine shall be equipped to remove the milled material away from the roadway surface. The machine shall be equipped with an effective means of controlling dust produced during the milling operation. The machine shall not cause damage to any part of the pavement structure that is not to be removed. Contractor shall replace broken, missing, or worn teeth as required in order to maintain

the surface texture requirements.
Contractor shall provide a smaller machine if required to trim areas inaccessible to larger machine at manholes, utility valves, drainage appurtenances, curb returns, and intersections.

B. **Wedge Milling Machine.** The wedge milling machine shall be a commercially manufactured machine that shall be self-propelled with sufficient power, traction, and stability to maintain an accurate depth of cut to perform the work to the Owner's satisfaction. The wedge milling machine shall be equipped with automatic controls for establishing profile grades at all edges of the machine. The machine shall be equipped to remove the milled material away from the roadway surface. The machine shall be equipped with an effective means of controlling dust produced during the milling operation. The machine shall not cause damage to any part of the pavement structure that is not to be removed. Contractor shall replace broken, missing, or worn teeth as required in order to maintain the surface texture requirements.

C. **Street Sweeper.** Sweeping operations shall require a street sweeper to pick up loose material and for dust control.

D. **Straightedge.** A 10' straightedge comprised of a rigid beam mounted on two solid wheels on axles 10' apart shall be required to ensure tolerances are met as outlined in this item specification. The straightedge shall have a mounted push bar to facilitate propelling the device along or across the pavement. Tolerance points shall be located at the 1/4, 1/2, and 3/4 points and may include threaded bolts capable of being adjusted to the tolerance specified. The Contractor shall be allowed to provide an alternate device capable of ensuring the required tolerances are met with prior approval from the Owner.

## PART 3 – EXECUTION

### 3.1 GENERAL

A. Prior to milling operations, the Contractor shall mark the existing pavement for removal by squaring off the areas to be removed. Contractor shall sawcut to milling depth along perimeter of milling area to prevent spalling and flaking of the existing pavement and to provide a vertical edge.

B. All of the milled material shall be pulverized to pass a 2" sieve. The Contractor shall ensure underlying materials are not included in the millings.

C. Work will require detailed milling operations to mill surfaces around structures (manholes, aprons, etc.) and in driveways where large milling machines will not maneuver. Surface material that cannot be removed by cold milling operations due to physical or geometric constraints shall be removed by other methods approved by the Owner.

D. The Contractor shall be allowed to remove and plane the roadway surface around and over manholes, utility valves, and drainage appurtenances within the limits of the work as directed by the Owner. Any damage to these items caused by the removal and planning operations shall be replaced at the Contractor's expense. The Contractor shall place a temporary wedge consisting of bituminous or other approved material around manholes, utility valves, and drainage appurtenances after removal of the existing material around them. The temporary wedge shall have a slope that will allow safe transition over the appurtenance by through traffic and be designed so that the material remains intact while under traffic loading. The temporary wedges shall be removed prior to resurfacing operations.

E. The Contractor shall perform milling operations in a manner and take other necessary measures to ensure proper drainage, both during and after construction operations, is provided and maintained. Traffic lane surface drainage restrictions will not be allowed. This can be achieved by proper sequencing of milling operations, construction of temporary drainage channels in shoulders, milling multiple lanes and/or lanes and shoulder on the same day, or any other method approved by the Owner.
F. When pavement markings have been removed by milling operations, the Contractor must place temporary pavement markings prior to opening the roadway to traffic.
G. At transverse joints in areas where cold milling is done and is to be opened to traffic, overlay with a temporary bituminous wedge having a slope that will allow safe transition by through traffic. The temporary wedge shall be designed so that the material remains intact while under traffic loading and shall be removed prior to resurfacing operations. This pavement transition at transverse joints may be omitted when the vertical offset between the milled surface and the adjacent riding asphalt surface is less than 3/8”.
H. When the milled surface is open to traffic, no vertical cuts greater than 2” shall be allowed along a gutter line or shoulder line unless protected by temporary barricades and warning signs. If milling operations result in a vertical longitudinal cut greater than 1” in depth between adjacent lanes, milling shall be performed on the adjacent lane the same day. At the conclusion of each day, less than 500’ of construction area shall have a vertical difference of over 1” between adjacent lanes. No vertical drop off will be allowed between traffic lanes over weekends, holidays, or other extended periods when work is not being performed.
I. Any milled surface that is to be opened to traffic for 30 days or more shall have a texture produced by the cold milling operation that is uniform and provides a satisfactory riding surface and skid resistance.
J. Prior to allowing traffic on the milled surface, the Contractor shall thoroughly sweep the surface to remove loose material not picked up by the milling machine and for dust control.

## PART 4 – MEASUREMENT AND PAYMENT

A. Wedge Milling shall be measured by linear foot at the width specified and shall be full compensation for pavement preparation, installment and for removal of asphalt and/or concrete; hauling, transporting, and/or disposing of the millings; detailed milling; sweeping; and for all manipulation, labor, tools, equipment and incidentals necessary to complete the work, all in accordance with the plans and these specifications.
B. Scarification and Milling shall be measured by the square yard of the milled area, and shall be full compensation for removal of pavement material; hauling, transporting, and/or disposing of the millings; detailed milling; sweeping; and for all manipulation, labor, tools, equipment and incidentals necessary to complete the work, all in accordance with the plans and these specifications.
C. Construction, removal, and patching of any temporary drainage facilities or measures constructed will not be paid for directly but will be subsidiary to pertinent bid items. Furnishing and installing temporary pavement markings shall be considered incidental to this item. Repairs made to existing pavement outside the removal limits as well as to manholes, utility valves, and drainage appurtenances shall be at the Contractor’s expense. No separate payment shall be made for saw-cut, which shall be considered subsidiary to

pertinent bid items. Furnishing, installing, and removing temporary bituminous wedge transitions shall be considered subsidiary to pertinent bid items.

**END OF SECTION**

# SECTION 20081

# ASPHALT PAVING OVERLAY

## PART 1 – GENERAL

### 1.1 DESCRIPTION

A. This item shall govern for application of a hot-mix asphalt concrete pavement overlay as a surface course as shown in the plans. The course shall be composed of a compacted mixture of mineral aggregate and asphaltic material mixed in a mixing plant. The overlay shall be constructed on the previously completed and approved base course in accordance with the required lines, grades, and typical sections shown in the plans or established in the field by the Owner.

### 1.2 SUBMITTALS

A. Asphalt Mix Design
B. Tack Coat Material

### 1.3 QUALITY CONTROL

A. General
   1. Locations for testing will be determined by the City Public Works Construction Inspector.
   2. Materials must conform to City of Mesquite Approved Water Materials List.
B. Testing Requirements, reference Section 10020 Testing Laboratory Services and the City of Mesquite General Design Standards for Testing Procedures
   1. Subgrade – Not Applicable for Overlays
      a. Proctor Analysis
      b. Moisture content and compaction shall be tested every 300 linear feet per lane
   2. Asphalt
      a. Compaction
      b. Temperature of asphalt
   3. Pavement cores – taken every 300 linear feet per lane
      a. Tested for thickness

## PART 2 – MATERIALS AND EQUIPMENT

### 2.1 MATERIALS

A. **Aggregates.** Mineral aggregates shall be comprised of fine aggregate, coarse aggregate, and when required, a mineral filler.
B. **Paving Mixture.** Asphaltic materials for the paving mixture shall be determined by the Contractor and approved by the Owner after design tests have been made, using the mineral aggregates proposed to be used in the mixture.
C. **Tack Coat.** Furnish CSS-1H per TxDOT Item 300
D. **Paving Mixture.** Type D, Fine Surface per TxDOT Item 340

### 2.2 EQUIPMENT

Contractor shall provide machinery, tools, and equipment necessary for proper execution of the work. Owner shall approve such equipment as to type and condition prior to the Contractor beginning construction operations on which the equipment is to be used. All machinery, tools, and equipment shall be maintained in a satisfactory and workmanlike manner.

## PART 3 – EXECUTION

**3.1 Milling**. When specified on plans, contractor shall mill existing pavement in accordance with 20080 Milling Pavement.

**3.2 Application of Base Course.** When specified on plans, contractor shall apply a base course prior to application of surface course.

**3.3 Tack Coat.** Apply tack coat to the newly laid base course or existing pavement prior to applying the surface course. The surface shall be dry and clean. Apply tack coat at a rate of 0.10 gallons per square yard unless otherwise directed by the Owner. The vertical surfaces of existing pavements, gutter, and all structures in actual contact with asphalt mixtures shall be coated with a thin, complete tack coating. Tack coat shall not be applied more than 2,000 feet ahead of paver. Contractor shall provide signs and flaggers, as necessary, to ensure traffic does not drive on the tack coat. No application of tack coat shall be allowed when the air temperature is below 50°F and falling. Placement shall be allowed when the air temperature is above 40°F and rising. Temperature shall be taken in the shade away from artificial heat sources.

**3.4 Placing.** No application of asphalt leveling course shall be allowed when the air temperature is below 50°F and falling. Placement shall be allowed when the air temperature is above 40°F and rising. Temperature shall be taken in the shade away from artificial heat sources.

A. The minimum laydown temperature of the material shall be 275°F. Asphalt surface course shall be applied by an approved paving machine wherever practical. The material shall be spread as soon as possible after arriving at the site and before the mixture cools to an unworkable consistency. Hand methods may be used in inaccessible areas. When placed by hand, loads shall not be dumped any faster than can be properly distributed. During placing and spreading of the hot-mix asphalt material, Contractor shall take care to prevent the spilling of material onto adjacent, pavement, gutters, or structures.

**3.5 Compaction**. Rolling with a 3-wheel and tandem roller shall start longitudinally at the sides and proceed toward the center of the surface course, overlapping on successive trips by at least half the width of the rear wheels, with the alternate trips being of varying lengths. Rolling shall continue until no further compression can be obtained and all roller marks are eliminated. The motion of the rollers shall be slow enough at all times to avoid displacement of the asphaltic material. If displacement should occur, it shall be corrected at once by the use of rakes and fresh asphaltic mixtures where required. The roller shall not be allowed to stand on the surface when it has not been fully compacted and allowed to cool. To prevent adhesion to the roller, the wheels shall be kept thoroughly moistened with water, but an excess of water shall not be permitted.

A. The compacted surface course shall be the thickness specified on plans and in bid item. The relative density of the course shall not be less than 92%.
B. With Owner approval, a vibratory steel wheel roller may be substituted for the 3-wheel roller and tandem roller.
C. The finished surface shall be smooth and meet the line, grade, and cross section requirements. When tested with a 16-ft straightedge placed parallel to the centerline of the roadway, the finished surface shall not deviate in excess of 1/16” per foot from the nearest point of contact. The maximum ordinate measured form the face of straightedge shall not exceed 1/4” at any point.

## PART 4 – MEASUREMENT AND PAYMENT

A. Asphalt Paving shall be measured by square yard at the depth specified and shall be full compensation for pavement preparation, asphalt material, tack coat, heating, mixing, hauling, placing, rolling and finishing; and for all manipulation, labor, tools, equipment and incidentals necessary to complete the work, all in accordance with the plans and these specifications.

**END OF SECTION**

# SECTION 20082

# CLEANING AND SEALING OF JOINTS AND CRACKS

## PART 1 – GENERAL

### 1.1 DESCRIPTION

A. This item shall govern for application of sealing cracks and joints in concrete and asphalt pavement.

B. Work shall be done in accordance with the current Texas Department of Transportation's Standard Specifications for Construction of Highways, Streets and Bridges, Item 712 "Cleaning and Sealing Joints and Cracks (Asphalt Pavement)", Item 713 "Cleaning and Sealing Joints and Cracks (Concrete Pavement)" with the exception of items specified herein.

### 1.2 SUBMITTALS

A. Crack Sealing Compound

B. Application Method and Equipment

## PART 2 – MATERIALS AND EQUIPMENT

### 2.1 MATERIALS

A. **Crack Sealing Compound.**

1. For asphalt pavement contractor shall use asphalt-rubber hot-applied sealant, Type 3 per TxDOT DMS 6310 "Joint Sealants and Fillers"
2. For concrete pavement
   a. Type 3, Type 5, or Type 7 per TxDOT DMS 6310 "Joint Sealants and Fillers"

## PART 3 – EXECUTION

## PART 4 – MEASUREMENT AND PAYMENT

A. Unless listed as separate bid item, joint sealing shall be subsidiary pavement construction bid items.

B. Crack sealing shall be measured by gallon of material used, linear feet of crack sealed or by the lane mile of pavement crack sealed, whichever is specified on the plans and shall be full compensation for pavement preparation, routing, cleaning, and sealing of joints and cracks, crack sealing material; and for all manipulation, labor, tools, equipment and incidentals necessary to complete the work, all in accordance with the plans and these specifications.

**END OF SECTION**

# SECTION 20083

# MICROSURFACING

## PART 1 – GENERAL

### 1.1 DESCRIPTION

A. The work as specified in this section includes all labor, equipment and materials necessary to furnish and place a microsurfacing system in conformance with the current Texas Department of Transportation's Standard Specifications for Construction of Highways, Streets and Bridges, Item 350 "Microsurfacing" with exceptions of items specified herein.

B. Item is for scratch course and surface course. Contractor shall place a scratch course where necessary and as approved by City Inspector. Each course will be measured and paid as described below.

## PART 2 – MATERIALS AND EQUIPMENT

### 2.1 MATERIALS

A. Microsurfacing shall be the TxDOT Grade 2 gradation and the mix shall be applied at a minimum of 24 lbs/sy. Contractor shall utilize a screening plant to remove oversized particles from the aggregate at the stockpile site.

### 2.2 EQUIPMENT

## PART 3 – EXECUTION

### 3.1 GENERAL

A. Contractor shall prepare existing pavement for microsurfacing application including removal of pavement marking and buttons.

B. Prior to applying microsurfacing, pavement shall be free of debris and approved by the City Inspector.

C. Microsurfacing shall be applied with a continuous run paving machine with a hydraulically adjustable spreader box to adjust to width of the street to avoid seams in the surface material.

D. Protect all manholes lids and valves lids from microsurfacing material and lids shall be uncovered and cleaned after application.

## PART 4 – MEASUREMENT AND PAYMENT

A. Microsurfacing shall be measured by the square yard completed and accepted and shall be full compensation for pavement preparation, installment and for pavement marking removal, microsurfacing application, traffic control; stockpiling or disposing of material; sweeping; and equipment, labor, tools, and incidentals necessary to complete the work, all in accordance with the plans and these specifications.

B. Construction, removal, and patching of any temporary drainage facilities or measures constructed will not be paid for directly but will be subsidiary to pertinent bid items. Furnishing and installing temporary pavement markings shall be considered incidental to this item

**END OF SECTION**

# SECTION 30010

# WATER UTILITIES

## PART 1 – GENERAL

### 1.1 DESCRIPTION

A. All material, labor, equipment, tools, and superintendence necessary to furnish and install public water systems, water services from public waterline to meter and private fire sprinkler systems.

### 1.2 SUBMITTAL

A. Pipe material, fittings, valves, fire hydrants and appurtenances
B. Polyethylene tube wrap
C. Backfill material
D. Detector Tape
E. Flushing plan as required by City Engineer

### 1.3 QUALITY CONTROL

A. General
   1. Locations for testing will be determined by the City Public Works Construction Inspector.
   2. Materials must conform to City of Mesquite Approved Water Materials List.
B. Testing Requirements, reference Section 10020 Testing Laboratory Services and the City of Mesquite General Design Standards for Testing Procedures
   1. Waterlines – Prior to connecting water lines to active distribution system, water lines shall be tested for:
      a. Hydrostatic Pressure at the highest point in main
      b. Bacterial Sampling – one sample per 1,000 linear feet plus one sample from the end of the line and one from each branch
   2. Tapping sleeves and valves – Each tapping sleeve and valves shall be air tested prior to installation
   3. Backfill
      a. Moisture content and compaction shall be tested every lift, every 300 linear feet of trench

## PART 2 – MATERIALS AND EQUIPMENT

### 2.1 MATERIALS

A. Where applicable, all of the following shall conform to the City of Mesquite General Design Standards for materials. Materials shall be from the City of Mesquite Approved Water Materials List.
B. Public Water Line Pipe:
   1. PVC Water Pipe (Including Fusible PVC Pipe): 4”-18” Diameter
      a. AWWA C-900, Class 305 (DR 14)
      b. Blue in color
      c. Ductile iron pipe nominal dimensions (DIPS), integral bell and locked-in factory installed rubber gasket or thermal butt fused joint, as specified.
   2. Ductile Iron Pipe: Larger than 12” Diameter

a. AWWA Standard C151, thickness Class 52 for all sizes, designed for a minimum working pressure of 200 psi and HS-20 loading.
b. Gauged pipe with consistent outside diameter
c. Polyethylene Tube Wrap in accordance with AWWA C105 and blue in color. Installed in accordance with AWWA C105, Method A.
d. Pipe Coatings in accordance with AWWA C104, standard interior cement mortar lining and exterior asphaltic coating.
e. Joints:
    1. All joints and glands shall be ductile iron in accordance with AWWA C111 with a minimum pressure rating of 250 psi. Bolts and Nuts for all joints and glands shall be ASTM A 325 Type 3 Enhanced Corrosion Resistant steel, or stainless steel grade 304 or 316.
        i. Push on Joint: AWWA C111
        ii. Flanged Joint: AWWA C115
        iii. Mechanical Joints: AWWA C111
    2. Internal bead shall be removed from fused pipe joints

3. Concrete Pressure Pipe: 16” or Larger Diameter
    a. Pipe: Concrete Pressure Pipe may be supplied for water systems for pipe diameters 16” and larger and shall conform to AWWA C303 and AWWA C304, designed for a minimum working pressure if 200 psi minimum field test pressure of 200 psi and an HS-20 live load.
    b. Fittings: All fitting and glands shall be designed and fabricated in accordance with AWWA C303 and AWWA C304 and shall be designed for a minimum working pressure of 200 psi minimum field test pressure of 200 psi and an HS-20 live load. All fittings and valves shall be mechanically restrained using full circle welds or equal as approved by the City Engineer. Bolts and Nuts for all fitting shall be ASTM A325 Type 3 Enhanced Corrosion Resistant Steel, or stainless steel Grade 304 or 316.
4. Fittings:
    a. All mechanical joint fittings, glands and restraints for Ductile Iron pipe or PVC pipe shall be Ductile Iron in accordance with AWWA C153 (compact fittings) & AWWA C111 with a minimum pressure rating of 350 psi Flange fittings shall be ductile iron in accordance with ANSI/AWWA C110/A21.10 and 125# ANSI B16.1 faced and drilled. Fitting interior shall be cement lined and seal coated. The outside coating shall be bituminous coating. Bolts and Nuts for all fittings shall be stainless steel Grade 304 or 316 or ASTM A325 Type 3 Enhanced Corrosion Resistant steel. Stainless steel all-thread may be used in some applications with the approval of the City Engineer.
    b. Joint Restraint: All fittings, including valves, shall be mechanically restrained using restrained fittings and meet requirements of ASTM F1674 (PVC) or U.L. Standard 194 (Ductile Iron). Restraint gland and body and wedge components shall be ductile iron material. For pipe diameters 12” or greater, waterline profile plan shall show length of joints to be restrained on each side of fittings. For pipe diameters less than 12”, all joints within 15-feet of fitting shall be restrained.

C. Fire Hydrant:
    1. All fire hydrants supplied shall comply with AWWA C-502, with a minimum working pressure of 200 p.s.i.

2. All fire hydrants shall include 1 – 4” steamer nozzle and 2 – 2-1/2” hose nozzles and a 1-1/2” pentagon operating nut which turns counter clockwise to open.
3. Fire hydrants shall be installed without chains.
4. Valves - All valves shall be resilient seat gate valves (restrained) AWWA C509 or C515.

D. Air Release Valves and Combination Valves:
   1. All air release valves and combination valve components shall be insulated.

E. Gate Valves:
   1. All valves 4-inch to 36-inch diameter shall be resilient seated gate valves that comply with AWWA C509 or C515 with a minimum working pressure of 200 psi. The valve shall be full opening, ductile iron body, non-rising stem, resilient seated wedge type designed to have complete zero leakage with flow in either direction at pressures up to two hundred psi. The valves shall be designed for throttling if required.
   2. All valves over 24-inch in diameter shall be designated for horizontal installation unless otherwise shown on plans. Valves shall be placed in vault.
   3. Coating – Valves shall have all internal and external ferrous metal surfaces coated with an approved epoxy coating to provide a corrosion resistant barrier. The epoxy coating shall be holiday free with a minimum thickness of not less than ten mils.
   4. Operating Stems - Valves shall have two (2) “O” ring stem seals. Valves shall have the thrust collar and bearing surfaces isolated from the waterway and be provided with continuous lubrication, or they shall be provided with non-corrosive thrust bearings above and below the thrust collar. All valves shall open by turning to the left (counter clockwise) and shall have a two (2) inch-operating nut. Hand-wheel operated valves shall only be installed if specifically shown on the plans or related general details.
   5. Valve Ends - In general, all in-line valves supplied shall have mechanical joint ends unless otherwise specified.

F. Butterfly Valves:
   1. General - With the approval of the City Engineer, valves larger than 24-inch diameter may be butterfly valves. Butterfly valves must comply with AWWA C504 pressure class 250B or approved equal. **Seats must be in the valve body**.
   2. Gear Boxes – Butterfly valves shall be supplied with worm gear operators manufactured of hardened steel with open/closed indicators. Gearboxes shall be supplied with an operating nut unless otherwise specified.
   3. Bolts, Bolt-studs and “T” Head Bolts - Bolts and “T” head bolts shall be long enough so that the ends project ¼ to ½ inch beyond outside surface of nuts. The ends of all bolts shall be chamfered or rounded. The threads on all bolts, bolt-studs and “T” head bolts shall have ANSI B1.1 coarse thread series, class 2A Fit. Bolt-studs may be threaded full length. Studs for tapped holes shall be threaded to match threading in holes. All bolts, bolt-studs and “T” head bolts (AWWA C111) shall be either A242 high strength low alloy steel with enhanced atmospheric corrosion resistance (ASTM A325 Type III) or Stainless Steel A151 304 or 316 high strength bolts. All nuts are to be A563 carbon alloy steel with a C3 grade and finish. **Exception:** All-thread rod and nuts used in for joint restraint or thrust restraint shall be A151 304 or 316 stainless.
   4. Valve Vaults and Manholes - All butterfly valves must be enclosed in manholes or vaults. The size of the manhole or vault and lid should be adequate to access and

remove or service the valve, gear box and sleeve from the enclosure. The valve must be installed with a sleeve to allow removal of the valve and must be mechanically thrust anchored with stainless all-thread or other approved system. Direct bury of butterfly valves may be allowed with the approval of the City Engineer.

G. Tapping Sleeves and Valves:
   1. Tapping Sleeve – Tapping sleeves shall be full body, and be completely constructed of type A151 304 stainless steel. The sleeve shall have a flange flat-faced outlet recessed for the tapping valve conforming to AWWA C207 Class D-ANSI 150 pound drilling and a ¾" inch N.P.T. test opening with plug for pressure test prior to tapping. All welds shall be fully passivated to restore the corrosion resistance of the stainless steel.
   2. Tapping Valve – Tapping valves shall be a flange by MJ resilient seat gate valve unless otherwise specified. The gaskets shall be neoprene or other synthetic rubber, conforming to ASTM D2000 BA508.
   3. Bolts and Nuts – All bolts shall be Grade 18-8, Type A151 304 Stainless steel with heavy hex nuts. Bolts will be fluorocarbon coated to prevent galling.
   4. Gasket – Gasket shall be Buna-N rubber, conforming to ASTM D2000, BA508, with resistance to water, oil and hydrocarbon fluids. The gasket shall be of hydraulically loaded design to provide a positive seal against the pipe surface.

H. Standard Water Service: All water service lines 2-inch or smaller shall be Type K copper in accordance with AWWA C800.
   1. Service Saddles - Service saddles shall meet requirements of AWWA C800 and be equipped with AWWA taper threads outlet. For ductile iron, cast iron and PVC water mains shall have a brass or bronze body with two bronze or 304L stainless steel straps. Epoxy coated ductile iron service saddles will not be allowed. Service saddles for AC water mains shall be a full body tapped stainless steel repair clamp. Service connections to the main for services larger than 2-inches shall use factory tee fittings.
   2. Corporation Valves - All corporations shall meet requirements of AWWA C800 and be equipped with ball valve, AWWA taper threads inlet and a stainless steel grip ring compression outlet and be rated for 200 psi service pressure. For ductile iron pipe, use threaded corporation with Teflon tape wrap. Factory tees shall be installed for all services larger than 2-inches.
   3. Angle Meter Valve (Angle Curb Stop)- All angle meter valves shall meet requirements of AWWA C800 and be equipped with a ball valve with lock wing, rated for 200 psi service pressure. Angle meter valves of ¾-inch and 1-inch size shall be equipped with a stainless steel grip ring compression inlet connection x meter saddle-swivel nut outlet connection. Angle meter valves of 1-1/2-inch and 2-inch size shall be equipped with a stainless steel grip ring compression inlet connection and meter flange outlet connection.
   4. Meter Box or Vault - A water meter box with locking lid shall be furnished and installed the Contractor after paving and fine grading is complete. When installing a water main, new meter boxes shall be furnished, installed and connected to the main. Meters larger than 2-inches in size shall be furnished and installed by the Contractor in concrete vaults in accordance with City details.

I. Concrete thrust block: 2,000 psi and 4-sack minimum cement content

## PART 3 – EXECUTION

### 3.1 GENERAL

A. **Contractor shall not operate any valves in the existing water system nor operate any new valves that would allow connection the City water system.**

B. The Contractor shall coordinate and notify the City Public Works Construction Inspector 72-hours in advance to schedule a shut-down of the existing water system by City personnel. The City may require a night or weekend shut-down in order to maintain customer service. Notices to all affected customers shall be delivered by the contractor a minimum of 48-hours in advance of scheduled water shut-down.

### 3.2 REMOVAL/ABANDONMENT OF EXISTING WATERLINES AND APPURTENANCES

A. Any existing water main being replaced shall be cut and plugged or removed as directed by the City Engineer.

B. Abandoned Mains – The ends of the pipe to be abandoned shall be plugged with anchor plug

C. Valve stacks for abandoned mains shall be removed and/or filled with concrete as shown in the City of Mesquite General Design Standards.

### 3.3 DELIVERY, STORAGE AND HANDLING

A. Transport, handle, and store pipe and fittings as recommended by manufacturer.

B. If new pipe and fittings become damaged before or during installation, it shall be repaired as recommended by the manufacturer or replaced as required by the Engineer at the Contractor's expense, before proceeding further.

C. Deliver, store and handle other materials as required to prevent damage.

D. Pipe Delivery, Handling and Storage

1. Off-loading devices such as chains, wire rope, chokers, or other pipe handling implements that may scratch, nick, cut, or gouge the pipe are strictly prohibited.
2. During removal and handling, be sure that the pipe does not strike anything. Significant impact could cause damage, particularly during cold weather.
3. If appropriate unloading equipment is not available, pipe may be unloaded by removing individual pieces. Care should be taken to insure that pipe is not dropped or damaged. Pipe should be carefully lowered, not dropped, from trucks.
4. Any length of pipe showing a crack or which has received a blow that may have caused an incident fracture, even though no such fracture can be seen, shall be marked as rejected and removed at once from the work. Damaged areas, or possible areas of damage may be removed by cutting out and removing the suspected incident fracture area. Limits of the acceptable length of pipe shall be determined by the owner or engineer.
5. Any scratch or gouge greater than 10% of the wall thickness will be considered significant and can be rejected unless determined acceptable by the owner or engineer.
6. Pipe lengths should be stored and placed on level ground. Pipe should be stored at the job site in the unit packaging provided by the manufacturer. Caution should be exercised to avoid compression, damage, or deformation to the ends of the pipe. The interior of the pipe, as well as all end surfaces, should be kept free from dirt and foreign matter.
7. Pipe shall be handled and supported with the use of woven fiber pipe slings or approved equal. Care shall be exercised when handling the pipe to not cut, gouge, scratch or otherwise abrade the piping in any way.
8. If pipe is to be stored for periods of 1 year or longer, the pipe should be shaded or otherwise shielded from direct sunlight. Covering of the pipe which allows for

temperature build-up is strictly prohibited. Pipe should be covered with an opaque material while permitting adequate air circulation above and around the pipe as required to prevent excess heat accumulation.

9. Pipe shall be stored and stacked per the pipe supplier's guidelines.

## 3.4 INSTALLATION

A. General
   1. All water pipe, valves, fire hydrants, and fittings shall be installed by the use of lifting straps. The use of chains is prohibited.
   2. Where applicable, all of the following will conform to the City of Mesquite General Design Standards for installation.

B. Waterline Pipe:
   1. Open cut installation per NCTSSPWC Items 506.3-506.4 and 506.6 except as amended by this specification
      a. Water mains with a nominal diameter less than 14-inches shall have a minimum cover of 42"
      b. Water mains with a nominal diameter 14" or greater shall have a minimum cover of 60-inches
      c. Warning tape shall be installed 24" above the top of pipe or as otherwise directed by the City Engineer. The tape shall be a plastic, high stretch, 4" width tape, blue in color and have the words "Caution – Water Main Buried Below" imprinted on the tape.
   2. Pipe Bursting – Install in accordance with Section 30050 Pipe Bursting

C. Excavating, backfilling and compacting shall be done in accordance with Section 10030 Trenching and Backfilling.

D. Concrete Thrust Blocking:
   1. All fittings, valves, hydrants, etc. shall be blocked with 2,000 psi concrete, 4-sack minimum cement content. All blocking shall be poured to avoid nuts and bolts to allow easy access for maintenance. Excessive blocking shall not be allowed and shall be removed at the contractor's expense. Sizing and construction of blocking shall be as shown in standard drawings 4010A to 4040 of the NCTSSPWC.

E. Valves:
   1. Valves shall be anchored to adjacent fittings at Tee and Cross fittings and on fire hydrant leads.
   2. Valves located within a right-of-way shall be indicated on the face of the curb, or where curbs do not exist, on a conspicuous location adjacent to the valve location. Markings are to be the cutting of a four (4) inch high and 1/8" deep letter **"V"** with the point of the **"V"** pointing towards the valve location. The **"V"** shall be cut into the curb or paving using an approved motor driven concrete saw. The completed cut and valve riser lids shall receive a coating of blue paint if a main line valve or red if a fire hydrant valve. Contractor shall coat the interior, and exterior of the cut to a width of one (1) inch.

F. Tapping waterline
   1. Wet connections to existing water mains (6-inch through 12-inch in size), shall be made with a tapping sleeve and valve. **EXCEPTION:** In some cases, as judged by the City Engineer, the use of a cut-in sleeve and tee will be required.
   2. Wet tapping is to be accomplished with no interruption of service. Facilities shall be provided for proper dewatering and for disposal of water removed from the water mains and excavations without damage to adjacent property. Special care

shall be taken to prevent contamination of the existing potable water line when dewatering, cutting, and making connections with existing pipe. No trench water, mud, or other contaminating substances shall be permitted to enter the existing lines. The interior of all tapping sleeves, tapping machine cutter assemblies, and tapping gate valves installed in such connections, and the surface of the existing pipe at these connections, shall be thoroughly cleaned and then swabbed with a solution having a chlorine content of 200 milligrams per liter.

G. Fire Hydrants

1. Fire hydrants shall be located to minimize interference with driveways and shall be located with sufficient clearance from drive and street radii to prevent the fire hydrant from being struck if a vehicle jumps the curb and/or takes a wide turn. Hydrants shall not be placed in intersection radii or other locations with a high probability of being damaged by traffic. A 3-foot clear space shall be maintained around the circumference of fire hydrants except as otherwise required or approved.
2. Mid-block fire hydrants shall be located on property lines (extended) to minimize interference with drives and on-street parking.
3. Hydrants shall be placed 2-feet to 10-feet from the back of curb and shall not interfere with sidewalks, driveways, etc. Hydrants shall be placed so the bury mark is at ground or paving level. Mounding of the ground or paving shall not be allowed to achieve this requirement. No more than one extension of 18 inches maximum will be allowed for grade adjustment. Hydrants shall have a barrel length of 4-feet to 6-feet unless approved by the City Engineer. All hydrants shall be surrounded by a concrete splash pad between the hydrant and the curb for flushing operations per City of Mesquite General Design Standards.
4. Bollards shall only be used to protect fire hydrants in low speed areas where speed limit is 10 mph or lower, such as around loading docks and in parking lots. Bollards are not a substitute for proper traffic flow layout and should only be used after options for relocation of the fire hydrant have proved infeasible. Bollards shall not be used in City street or alley right-of-way. Bollards that are installed shall meet the requirements of the appropriate General Design Standards.
5. Installation shall be of a type as detailed in these standards. All fire hydrant leads shall be from an MJ to Flanged tee and all valves and fittings from the tee to hydrant shall be flanged.
6. If a fire hydrant is out of service, for any reason, the contractor shall bag the fire hydrant with a black trash bag secured with duct tape and report hydrant to the Utility Dispatch office with the reason why it is out of service. This includes, but is not limited to, hydrants that are out of service for the following reasons:
   a. Water main valved-off and being abandoned but connected hydrant is not yet removed.
   b. New hydrant recently installed but not yet ready for service
   c. Hydrant temporarily out of service due to main shut down
7. The contractor shall place a Stimsonite Model 88-SSA blue fire hydrant marker in the street adjacent to the hydrant. The marker shall be located perpendicular to the curb, at the center of the driving lane closest to the fire hydrant. The marker shall be installed with a two-part epoxy adhesive per manufacturer's instructions.
8. All fire hydrants are to be painted with a base coat consisting of two (2) coats of aluminum paint as specified below. Refer to City of Mesquite Approved Water

Materials List for approved paint. When a color code other than aluminum is required, the top bonnet (from operating nut to underneath the uppermost flange) shall be painted two coats of the appropriate color in accordance with the following color code. Nozzle caps are not to be color-coded.

a. Base undercoat: Two (2) coats of aluminum paint are required as a base coat on all hydrants.
b. Overcoats: Two (2) additional coats of paint are required over the base coat. The colors shall conform as follows:

| **Main Size** | **Color** |
|---|---|
| 6” | Aluminum – Top & Bottom |
| 8” | Blue Top – Aluminum Bottom |
| 10” or larger | Yellow Top – Aluminum Bottom |

9.

## 3.5 WATER SERVICES

A. Contractor will be totally responsible for protecting service lines. If Contractor damages or removes a service line, Contractor must replace it, installing new copper tubing, and making new connections to the existing (or new) main and the meter. This includes new service saddles, corporation stops, and miscellaneous fittings. If Contractor damages a service line outside the scope of work, in the opinion of the Engineer, then the Contractor will be responsible for all repair at no additional pay
B. Contractor must not interrupt water service to customers for more than four (4) hours. Temporary services are required if the work involved will be longer than four (4) hours.
C. Service Taps - Domestic water service taps shall be off a looped main. Domestic water service taps shall not be shared, split or bullheaded with an irrigation tap and shall not tap to a fire hydrant lead. Irrigation meters may tap a fire hydrant lead. Utility contractor shall make the tap and install the service.
D. Location - Meters and services must be located within R.O.W. or easements in accordance with City approved plans and details. In residential developments, residential water meters and services are generally placed at the center of the lot in the grassed parkway. Water meters shall not be located in proposed driveways, sidewalks, parking lots or other paved areas. For narrow lots or front entry lots, the designer must design the location of the meters to make sure they are placed in an unpaved area. Meters in conflict with this requirement will be relocated by the developer/builder at their expense. In non-residential developments, water meters shall be located in unpaved islands. Meters should be set so that the meter face is 6-inches to 10-inches below finished grade.
E. Service Lines - All water services shall be continuous from the corporation valve at the water main to the angle meter valve in the meter box (No Couplings). Service line shall be “goose necked”. Crimping or excessive bending of the service line shall not be allowed. Service lines shall be continuous and shall have no fittings under any paving, unless approved by the City Engineer. Long copper service lines that exceed the length of standard rolls of copper may be spliced in unpaved areas with a silver solder coupling. When installing a water main, the Contractor shall furnish and install new meter boxes. Service lines shall be poly-wrapped for the first 5-feet of copper service from the main.

Water service mains shall have a minimum depth under paving of 36-inches (measured from surface of paving).

F. Marking - Each individual service location shall be marked on the face of the curb with a 4-inch high and 1/8 -inch deep scribe mark “I” cut in the curb using an approved motor driven concrete saw. The scribe mark “I” shall receive a coating of blue paint, which shall coat the interior and exterior of the cut to a width of 1-inch.

G. Blow-Off Valves - For 2-inch blow-off valves, use fittings for a standard 2-inch service configuration.

## 3.6 CONNECTION TO EXISTING WATER SYSTEM

A. Water required to fill the new main for hydrostatic pressure testing, disinfection, and flushing shall be supplied through a temporary connection between the distribution system and the new main. The temporary connection shall include an appropriate cross-connection control device and shall be disconnected during the hydrostatic pressure test. As an alternate, a connection to the existing distribution system is permitted provided a new valve is placed at the connection point. Do not test against an existing valve in the existing system

B. General Procedures and Precautions Taken During Construction:

1. Inspect materials prior to installation to ensure their cleanliness and integrity.
2. Keep interior of pipe dry and clean during storage and installation. Prevent contaminates from entering the water main during storage and construction.
3. If dirt enters the pipe during storage or installation, it shall be removed and the interior surface swabbed with a 1 to 5 percent hypochlorite disinfecting solution.
4. During construction openings in the pipe shall be closed with a watertight plug when pipe laying is stopped at the close of each day’s work or for other reasons such as rest breaks and meals to prevent contaminants and animals from entering pipe
5. Remove, by flushing or other means, those materials that may have entered the water main.
6. Chlorinating any residual contamination that may remain, and flushing the chlorinated water from the main.
7. Protecting the existing distribution system from backflow caused by hydrostatic test and disinfection procedure.
8. Documenting that an adequate level of chlorine contacted each pipe to provide disinfection.
9. Once the contractor has been notified by the City Public Works Construction Inspector of a successfully (negative result) laboratory bacteriological testing result, the contractor can make connection of the approved new water main to the active distribution system.

## 3.7 DISINFECTION

A. The inside of all pipe and fittings shall be kept clean during installation. The City Engineer may require swabbing or pigging of all new pipe if the pipe is installed in an unsanitary manor.

B. Flushing

1. Before the main is chlorinated, it shall be filled to eliminate air pockets and flushed to remove particulates. The flushing velocity in the main shall not be less than 3.0 ft/sec. Below is the required flow and openings needed to flush pipelines with a pressure of 40 psi

| Pipe Inch | Flow gpm | 1” Tap | 1-1/2” Tap | 2” Tap | 2-1/2” Hydrant Outlets |
|---|---|---|---|---|---|
| 4 | 120 | 1 | | | 1 |
| 6 | 260 | | 1 | | 1 |
| 8 | 470 | | 2 | | 1 |
| 10 | 730 | | 3 | 2 | 1 |
| 12 | 1060 | | | 3 | 2 |
| 16 | 1880 | | | 5 | 2 |

C. Pigging

1. Pigging is accomplished by passing an appropriate sized pig through the pipe. A pig is a bullet-shaped, flexible sponge available in different sizes, densities, and degrees of roughness. All mains 12-inch and larger must be pigged prior to flushing and disinfection with chlorine.
2. The pig shall be inserted in the new conduit at the location where the new conduit is connected to the active distribution system.
3. Where expulsion of the pig is required through a dead-ended conduit, the Contractor shall make every effort to prevent back flow of the purged water into the conduit after passage of the pig. Backwater re-entry into the pipe can be prevented by the temporary installation of mechanical joint bends and pipe joints to provide a riser out of the trench.
4. After passage of the pig, flushing of all backwater from the pipe, and satisfactory test results, the Contractor shall secure the test location openings and then proceed with disinfection.
5. If thermal butt fused joints are specified (i.e. internal bead), Contractor shall confirm pigging procedure and sizing is in accordance with pipe manufacturers recommendations.

D. Disinfection

1. The Continuous-feed method must be used unless it is stated otherwise in the Contract Specifications.
2. The Contractor shall install and remove all pump-in, blow-off and sampling points.
3. Water from the existing system or other approved source shall be made to flow at a constant rate in the new main.
4. At a point no more than 10-ft downstream of the beginning of the new conduit, water entering the new conduit shall receive a dose of chlorine such that the water shall have not less than 100-mg/L (ppm) free chlorine. Chlorine application shall not cease until the entire conduit is filled with heavily chlorinated water. 125 lbs of Calcium Hypochlorite (65% available chlorine) is required in 100,000 gal of water to produce 100 mg/L (ppm) Chlorine concentration.
5. The chlorinated water shall be retained in the conduit for at least 24 hours, during which time all valves and hydrants in the section treated shall be operated in order to disinfect the appurtenances. Every effort shall be made to prevent the flow of

chlorinated water into conduits in active service. At the end of the 24-hour period, the treated water in all portions of the conduit shall have a residual of at least 10-mg/L (ppm) free chlorine.

E. Chlorine for Disinfection:
   1. Calcium Hypochlorite in granular form conforming to ANSI/AWWA B300 must be used and must contain approximately 65 percent available chlorine by weight. The material should be stored in a cool, dry, and dark environment to minimize deterioration.
   2. The heavily chlorinated water shall then be flushed from the conduit and disposed in a manner meeting the requirements set out below.
   3. The chlorine residual shall be tested prior to flushing operations.

F. Disposal of Hyper-Chlorinated Water:
   1. If the chlorine residual exceeds 4-mg/L (ppm) the water shall remain in the new water conduit until the chlorine residual is less than 4-mg/L (ppm). As an alternate, the Contractor may choose to evacuate the water into water trucks, or an approved storage facility (such as a detention pond until the chlorine residual is 4-mg/L (ppm) or less), or treat the water with Sodium Bisulfite or another dechlorination chemical (Sulfur Dioxide, Sodium Sulfite, Sodium Thiosulfate, or Ascorbic Acid) or method appropriate for potable water and approved by the Owner until the chlorine residual is reduced to 4-mg/L (ppm) or less. The heavily chlorinated water shall not be disposed of into the storm sewer system. After the specified chlorine residual is obtained, less than 4-mg/L (ppm), the water may then be discharged into the storm sewer system or utilized by the Contractor.
   2. The requirement for discharge of heavily chlorinated water is found in the TPDES General Permit to Authorize the Discharge of Storm Water and Certain Non-Storm Water Discharges from Regulated Construction Activities Within the State of Texas.
   3. The Contractor shall prepare the conduit for disinfection activities and secure same after chlorination is complete.
   4. This shall consist of furnishing all equipment, material and labor to satisfactorily prepare the conduit for disinfection. The Contractor shall also be required to provide adequate provisions for sampling.
   5. The Contractor shall make all necessary taps into the pipe to accomplish chlorination of a new line.
   6. After satisfactory completion of the disinfection operation, the Contractor shall remove surplus pipe at the chlorination and sampling points, plug the remaining pipe, backfill, and complete all appurtenant work necessary to secure the conduit.

**3.8** CORROSION PROTECTION

A. Contractor shall coat all bolts with anti-seize compound.
B. All cast and ductile iron pipe, fittings and valves shall be wrapped with polyethylene tube wrap in accordance with AWWA C105. The polyethylene wrap of pipe must be blue in color. The wrap shall be installed in accordance with AWWA C105, Method A.

## PART 4 – MEASUREMENT AND PAYMENT

A. This section shall be measured by linear feet of waterline installed and accepted. Linear footage will be measured horizontally from center of fitting to center of fitting or end of pipe without any deduction for the length of the intermediate fittings or valves. Payment

shall be full compensation for materials, installation, testing and all manipulation, labor, tools, equipment and incidentals necessary to complete the work, all in accordance with the plans and these specifications.

B. This section shall be measured by each fire hydrant assembly installed and accepted. Payment shall be full compensation for materials, installation, testing of fire hydrant assembly including fire hydrant, valves, 6” piping, fittings, thrust restraint and all manipulation, labor, tools, equipment and incidentals necessary to complete the work, all in accordance with the plans and these specifications.
C. This section shall be measured by each air release valve installed and accepted. Payment shall be full compensation for materials, installation, testing and all manipulation, labor, tools, equipment and incidentals necessary to complete the work, all in accordance with the plans and these specifications.
D. This section shall be measured by each valve installed and accepted. Payment shall be full compensation for materials, installation, testing and all manipulation, labor, tools, equipment and incidentals necessary to complete the work, all in accordance with the plans and these specifications.
E. This section shall be measured by each service connection installed and accepted. Payment shall be full compensation for materials, installation, testing, including corporation stop, saddle, copper, angle stop, meter can, meter adjustment and all manipulation, labor, tools, equipment and incidentals necessary to complete the work, all in accordance with the plans and these specifications. A bid item for ‘short side’ shall mean a service connection where 10 or less linear feet of service line is laid. A bid item for ‘long side’ shall mean a service connection where more than 10 linear feet but less than 50 linear feet of service line is laid. A ‘long side’ service shall be by bore.
F. This section shall be measured by each plug installed. Payment shall be full compensation for materials, installation including cutting existing line, providing and installing plug, removal of waterline necessary to install plug and all manipulation, labor, tools, equipment and incidentals necessary to complete the work, all in accordance with the plans and these specifications.
G. This section shall be measured by each valve abandoned. Payment shall be full compensation for removal of valve stack including removal and disposal of valve cover and stack, concrete fill, backfill and all manipulation, labor, tools, equipment and incidentals necessary to complete the work, all in accordance with the plans and these specifications.
H. Thrust blocks, fittings, bends, tees, joint restraints, appurtenances and any excavation, backfill, grading, compaction, testing will not be paid for directly but will be subsidiary to pertinent bid items.
I. Unless listed as separate bid item, temporary water service will be subsidiary to installation of waterlines.

**END OF SECTION**

# SECTION 30030

# SANITARY SEWER UTILITIES

## PART 1 – GENERAL

### 1.1 DESCRIPTION

A. All material, labor, equipment, tools, and superintendence necessary to furnish and install public sanitary sewer systems and sanitary sewer services to property line.

### 1.2 SUBMITTAL

A. Pipe material, fittings, and appurtenances
B. Manhole shop drawings
C. Backfill material
D. Detector Tape
E. By-pass pumping plan

### 1.3 QUALITY CONTROL

A. General
   1. Locations for testing will be determined by the City Public Works Construction Inspector.
   2. Materials must conform to City of Mesquite Approved Sanitary Sewer Materials List.
B. Testing Requirements, reference Section 10020 Testing Laboratory Services and the City of Mesquite General Design Standards for Testing Procedures
   1. Sanitary Sewer Lines – Each new line shall have the following tests performed on the entire length:
      a. Deflection Testing
      b. Air testing
      c. Camera Inspection
   2. Manholes- Vacuum test each manhole
   3. Backfill
      a. Moisture content and compaction shall be tested every lift, every 300 linear feet of trench

## PART 2 – MATERIALS AND EQUIPMENT

### 2.1 MATERIALS

A. Where applicable, all of the following shall conform to the City of Mesquite General Design Standards. Materials shall be from the City of Mesquite Approved Sanitary Sewer Materials List.
B. Public Sanitary Sewer Line
   1. Polyvinyl Chloride (PVC) Pipe (Including Fusible PVC Pipe): 4” – 27” Diameter
      a. Gravity mains from four (4) inches through fifteen (15) inches in diameter shall conform to current ASTM D 3034, SDR 26. All bells shall be formed integrally with the pipe and shall contain a factory installed elastomeric gasket of the “Rieber” style that is mechanically restrained using a steel band or ring. No solvent cement joints shall be permitted unless specifically authorized in writing by the City Engineer. If Fusible PVC Pipe is specified, internal bead shall be removed prior to installation.

b. Gravity mains from eighteen (18) inches through twenty-seven (27) inches in diameter with burial depths less than fifteen (15) feet shall conform to current ASTM F 679, SDR 26, PS 115, manufactured with a 12364A resin (material PVC 1120) and must have a solid wall. Pipe with corrugated interior or exterior walls or voids in the wall will not be accepted.
c. All PVC sanitary sewer pipes shall be green in color.

2. Fiberglass Pipe: 30” or Larger Diameter
   a. Shall be used for mains 30-inches and larger or as approved by the City Engineer. Fiberglass wastewater pipe shall conform to AWWA M45 and ASTM D3262-06. See the City of Mesquite Approved Sewer Materials List for approved manufacturers. Pipe shall have a minimum stiffness of 46 psi. The pipe manufacturer shall provide detailed design calculations sealed by a licensed professional engineer registered in the state of Texas in accordance with AWWA M45 and Appendix B Technical Memorandum for Pipe Loading showing the suitability of the pipe stiffness to the installation conditions specified and that the maximum specified pipe deflection is not exceeded. Direct buried pipe joints shall be either of the following: Integral Bell and spigot with rubber ring gasket or fiberglass coupling joints with two rubber seals. Joints shall be in accordance with AWWA M45 and ASTM D4161-01
3. Ductile Iron Pipe: Aerial Crossings
   a. Only for use at aerial crossings and crossings where loading may be a concern.
   b. AWWA C151, Thickness Class 54 with a Protecto 401 by Induron Protective Coatings ceramic epoxy lined interior. The dry coating thickness shall be a minimum of 40 mils. The interior coating shall be holiday tested and certified by a third party testing lab and any defects repaired. The exterior of the pipe shall have an asphaltic coating in accordance with AWWA C151 and AWWA C104.
4. Sanitary Service – SDR 26 PVC, green in color

C. Manholes
1. General - All portions of manholes including castings, lids, and flat top lids shall be designed to withstand an AASHTO HS-20 load.
2. **Pre- Cast -** Pre-cast manholes shall be used on all new construction unless an alternate is approved by the City Engineer. Pre-cast concrete shall conform to current ASTM designation C 478 (C 478M). Lifting eyes shall be installed on manholes. Lifting holes are not allowed in pre-cast manholes. Shop drawing shall be submitted to the City Engineer for all pre-cast manholes.
3. **Cast In Place -** Cast-in-place concrete manholes shall only be allowed with special permission of the City Engineer. Generally the City Engineer will only grant permission for cast-in-place manholes for connections to existing mains carrying live sewer. When cast-in-place manholes are approved by the City Engineer, construction must conform to City of Mesquite General Design Standards.
4. Manholes must have a concentric top cone section. Eccentric cone manholes may be used in situations where conflicts with other facilities warrant it.
5. Brick or fiberglass manholes or any other type of manhole material other than concrete will not be allowed.
6. Ring and Cover –
   a. New construction manhole ring and covers shall have a 30-inch clear opening and shall be constructed of Ductile Iron and hinged with elastomeric T-gasket

in the lid and infiltration plugs at the hinges. The manhole shall be scribed with the words Sanitary Sewer, with the City of Mesquite Logo and with the warning "Confined Space – Entrance by Permit Only". The lid shall be equipped with a MPIC Pick Slot. All rings shall be bolted to the manhole cone section with a layer of mastic applied between the ring and cone section.

b. Retrofit construction manhole ring and covers may have a 24-inch clear opening with other features the same as above. All manhole ring and covers on manholes with a connecting sanitary sewer main size of 15-inches or larger shall be coated with a City approved structural / high sulfide resistant coating

7. Grade Rings - Manhole rings and covers shall be adjusted by the use of approved grade rings with butyl sealant between grade rings, cover ring and manhole. Maximum adjustment is eight (8) inches. Grade rings may be HDPE or Rubber in accordance with NCTCOG Public Works Construction Standard 502.1.2.2 or 502.1.2.4. Concrete grade rings, bricks, steel, iron or broken concrete are not acceptable for adjustment.
8. Inverts - All manholes shall have full depth inverts to the depth of the largest entering main.
9. Ring Sealing to Manhole Cone/Flat Top - All manholes rings shall be sealed and contain an internal manhole chimney seal or approved external seal or wrap.
10. Coating - All manholes with a connecting pipe of fifteen (15) inches in diameter or larger shall be coated. Manholes shall be coated with a City approved structural/high sulfide resistant coating (see **City of Mesquite Approved Sewer Materials List).**. Coating application procedures shall conform to the recommendations of the coating manufacturer, including material handling, mixing, and environmental controls during application, safety, and equipment.
11. Cementitious patching – Quick-setting fiber reinforced calcium aluminate cementitious material shall be used as a patching material and is to be mixed and applied according to manufacturer's recommendations

## PART 3 – EXECUTION

### 3.1 GENERAL

A. Without excluding other safety considerations, Contractor is advised that the sanitary sewer system, existing and proposed, may contain dangerous or deadly concentrations of gases.

B. Confined Space Entry; All entry into confined spaces conducted in accordance with 29 Code of Federal regulations (CFR), Part 1910.147 P and all other applicable State and City regulations. Prior to commencing any confined space entry, the Contractor shall submit to the City Engineer a copy of the confined space entry plan with a completed permit.

### 3.2 DELIVERY, STORAGE AND HANDLING

A. Transport, handle, and store pipe and fittings as recommended by manufacturer.

B. If new pipe and fittings become damaged before or during installation, it shall be repaired as recommended by the manufacturer or replaced as required by the Engineer at the Contractor's expense, before proceeding further.

C. Deliver, store and handle other materials as required to prevent damage.

D. Pipe Delivery, Handling and Storage

1. Off-loading devices such as chains, wire rope, chokers, or other pipe handling

implements that may scratch, nick, cut, or gouge the pipe are strictly prohibited.

2. During removal and handling, be sure that the pipe does not strike anything. Significant impact could cause damage, particularly during cold weather.
3. If appropriate unloading equipment is not available, pipe may be unloaded by removing individual pieces. Care should be taken to insure that pipe is not dropped or damaged. Pipe should be carefully lowered, not dropped, from trucks.
4. Any length of pipe showing a crack or which has received a blow that may have caused an incident fracture, even though no such fracture can be seen, shall be marked as rejected and removed at once from the work. Damaged areas, or possible areas of damage may be removed by cutting out and removing the suspected incident fracture area. Limits of the acceptable length of pipe shall be determined by the owner or engineer.
5. Any scratch or gouge greater than 10% of the wall thickness will be considered significant and can be rejected unless determined acceptable by the owner or engineer.
6. Pipe lengths should be stored and placed on level ground. Pipe should be stored at the job site in the unit packaging provided by the manufacturer. Caution should be exercised to avoid compression, damage, or deformation to the ends of the pipe. The interior of the pipe, as well as all end surfaces, should be kept free from dirt and foreign matter.
7. Pipe shall be handled and supported with the use of woven fiber pipe slings or approved equal. Care shall be exercised when handling the pipe to not cut, gouge, scratch or otherwise abrade the piping in any way.
8. If pipe is to be stored for periods of 1 year or longer, the pipe should be shaded or otherwise shielded from direct sunlight. Covering of the pipe which allows for temperature build-up is strictly prohibited. Pipe should be covered with an opaque material while permitting adequate air circulation above and around the pipe as required to prevent excess heat accumulation.
9. Pipe shall be stored and stacked per the pipe supplier's guidelines.

## 3.3 INSTALLATION

A. Where applicable, all of the following will conform to the City of Mesquite General Design Standards for installation.

B. Sanitary Sewer Pipe:
   1. Pipe Bursting – Install in accordance with Section 30050 Pipe Bursting
   2. Open Cut – Install in accordance with NCTSSPWC Items 505.1 and 507.3-507.4 except as amended by this specification.
      a. Warning tape shall be installed 24" above the top of pipe or as otherwise directed by the City Engineer. The tape shall be a plastic, high stretch, 4-inch width tape, green in color and have the words "Caution – Sanitary Sewer Main Buried Below" imprinted on the tape.

C. Manhole:
   1. Conform to City of Mesquite General Design Standards.
   2. Conform to NCTSSPWC Item 502.1 except as amended by this specification
   3. Non shrink grout to fill voids
   4. Manholes with a connecting pipe of fifteen (15) inches in diameter or larger shall be coated. All voids shall be sealed using cementitious patching prior to spraying coating materials.
   5. Marking - Each manhole shall be marked on the face of the curb with a four (4) inch high and 1/8" deep mark "**MH**" cut in the curb using an approved motor driven concrete saw. The double mark "**MH**" shall receive a coating of green paint, which

shall coat the interior and exterior of the cut to a width of one (1) inch.

D. Excavating, backfilling and compacting shall be done in accordance with Section 10030 Trenching and Backfilling.

### 3.4 EXISTING MANHOLES

A. For connections to existing manholes, all voids shall be filled using cementitious patching prior to spraying coating materials and invert repairs, if necessary.

B. Fill voids

1. The area to be repaired must be free of all debris and free water. All loose brick, mortar and concrete must be removed using a mason's hammer and chisel if necessary. The surface being repaired must be damp.
2. Patching shall be applied per manufacturer's recommendation.
3. After all preparation have been completed, remove all loose material and wash wall again. Any bench, invert or service line repairs shall be made at this time using quick setting patching mix and shall be used per manufacturer's recommendations. Invert repair shall be performed on all inverts with visible damage or where infiltration is present or when vacuum testing is specified. After blocking flow through the manhole and thoroughly cleaning invert, the quick-setting patch material shall be applied to the invert in an expeditious manner. The finished invert surfaces shall be smooth and free of ridges. The flow may be reestablished in the manhole within 30 minutes after placement of the material.

C. Lining:

1. Voids filled with patching shall be allowed a minimum of one (1) hour cure time before application of cementitious liner and shall not be finished to a smooth surface. Inverts and other areas not being covered with line material shall be troweled to a smooth surface and blended into surrounding material.
2. No application shall be made if ambient temperature is below 40 degrees Fahrenheit. No application shall be made to frozen surfaces or if freezing is expected to occur within the substrate within 24 hours after application. Precautions shall be taken to keep the mix temperatures at time of application below 90 degree Fahrenheit. Water temperature shall not exceed 80 degrees Fahrenheit. Chill with ice if necessary.

### 3.5 SANITARY SEWER SERVICES

A. Service fittings shall be a tee or wye fitting to be installed on the main. Saddle services are not allowed for new construction.

B. For rehabilitation of existing sanitary sewer lines, service laterals shall be connected by the use of a mechanical saddle. Mechanical saddles shall be rigid and made of polyethylene pipe compound that meets the requirements of ASTM D1248, Class C or polyvinyl chloride pipe compound that meets the requirements of ASTM D3034. Mechanical saddles shall have stainless steel straps and fasteners, neoprene gasket and backup plate. Mechanical saddles shall be Strap-On-Saddle Type or Tapping Saddle. Once the saddle is secured in place, drill hole full inside diameter of saddle outlet in pipe liner.

C. The Contractor shall be responsible for continuity of sanitary sewer service to each facility connected to the section of sewer during the execution of the work.

D. If sewage backup occurs and enters buildings, the Contractor shall be responsible for clean-up, repair, property damage cost and claims.

E. Each individual service location shall be marked on the face of the curb with a four (4) inch high and 1/8" deep double scribe mark "**II**" cut in the curb using an approved motor

driven concrete saw. The double scribe mark "**II**" shall receive a coating of green paint, which shall coat the interior and exterior of the cut to a width of one (1) inch.

### 3.6 BYPASSING SEWAGE

A. By-Pass Pumping:
   1. The Contractor, when and where required, shall provide diversion for the pipe bursting/replacement process. The pumps and by-pass lines shall be of adequate capacity and size to handle all flows. All costs for by-pass pumping, required during installation \of the pipe shall be subsidiary to the pipe reconstruction item. Contractor may pump and haul sewer via vacuum truck to a downstream manhole at Contractor's discretion.
   2. Contractor shall provide 100% redundancy including providing a back-up generator and pump on site. All equipment must meet city noise ordinance.

### 3.7 POST CONSTRUCTION TELEVISION INSPECTION

A. General Approach
   1. Television inspection of pipelines shall be performed by experienced personnel trained in locating breaks, obstacles and service connections by closed circuit color television.
   2. The camera should be set at the appropriate height for the pipe size and shape (centered in the middle of the circular pipe +/- 10%)
   3. The camera shall be moved through the pipe at a steady pace not to exceed 30 feet per minute
   4. If the line needs to be flushed prior to TV inspection, a minimum of 1-hour time must lapse between flushing and TV inspection.
   5. All flows tributary to reach of sewer being inspected are to be completely by-passed around the reach during inspection if necessary and required by City.

B. Television inspection deliverables shall include the following:
   1. A digital copy of the video (post) with a written report to be submitted to the city as they are made. Video recordings to remain property of the city; Contractor to retain second copy for his use.
   2. Post construction video upon completion of reconstruction of each reach of sewer with the voice description, as appropriate with stationing of services indicated. Data and stationing to be on video.
   3. Should any portion of the inspection video be of inadequate quality or coverage, as determined by the City, the Contractor will have the portion inspected again and video documentation provided at no additional expense to the City.

## PART 4 – MEASUREMENT AND PAYMENT

A. This section shall be measured by linear feet of sanitary sewer installed and accepted. Linear footage will be measured horizontally from center of manhole to center of manhole or dead end of pipe. Payment shall be full compensation for materials and installation including installation method, backfill, compaction, haul off and lawful disposal of excess trench spoils, any fittings, testing, by-pass pumping, television inspection and all manipulation, labor, tools, equipment and incidentals necessary to complete the work, all in accordance with the plans and these specifications.

B. This section shall be measured by each precast or cast in place manhole installed and accepted. Payment shall be full compensation for materials and installation including backfill, compaction, haul off and lawful disposal of excess trench spoils, connector fittings, testing, by-pass pumping, and all manipulation, labor, tools, equipment and

incidentals necessary to complete the work, all in accordance with the plans and these specifications.

C. This section shall be measured by each sanitary sewer service installed and accepted. Payment shall be full compensation for materials and installation including excavation, factory wye, connection to the main, pvc sanitary service line, saddle, backfill, compaction, haul off and lawful disposal of excess trench spoils, any fittings, testing, by-pass pumping, television inspection and all manipulation, labor, tools, equipment and incidentals necessary to complete the work, all in accordance with the plans and these specifications. A bid item for 'short side' shall mean a service connection where 10 or less linear feet of service line is laid. A bid item for 'long side' shall mean a service connection where more than 10 linear feet but less than 40 linear feet of service line is laid.

D. This section shall be measured by each sanitary sewer mainline cleanout, service cleanout and/or double service cleanout installed and accepted. Payment shall be full compensation for materials and installation including backfill, compaction, haul off and lawful disposal of excess trench spoils, any fittings and all manipulation, labor, tools, equipment and incidentals necessary to complete the work, all in accordance with the plans and these specifications.

E. This section shall be measured by each new pipe connection to an existing sanitary sewer manhole. Payment shall be full compensation for materials and installation including coring into existing manhole, filling voids, patching inside of manhole and all manipulation, labor, tools, equipment and incidentals necessary to complete the work, all in accordance with the plans and these specifications.

**END OF SECTION**

# SECTION 30050

# PIPE BURSTING

## PART 1 – GENERAL

### 1.1 DESCRIPTION

A. Replacement of existing water and/or sanitary sewer lines through the pipe bursting method which splits the existing pipe and immediately installs a new pipe.
B. Pipe bursting of water mains shall be done in accordance with Section 30010, Water Utilities except as amended herein.
C. Pipe bursting of sanitary sewer lines shall be done in accordance with Section 30030 Sanitary Sewer except as amended herein.

### 1.2 SUBMITTAL

A. Contractor pipe bursting experience
B. Pipe bursting equipment and operators
C. Pipe Material
D. Fittings
E. Insertion pit locations

### 1.3 QUALITY CONTROL

A. General
    1. Locations for testing will be determined by the City Public Works Construction Inspector. Materials must conform to City of Mesquite Approved Water Materials List and/or City of Mesquite Approved Sanitary Sewer Materials List.
B. Contractor Experience
    1. The Contractor shall be certified by the particular Pipe Bursting System Manufacturer that such firm is a licensed installer of their system.
    2. The Contractor shall have a minimum of five (5) years of verifiable experience in installing the Pipe Bursting System with evidence of 20,000 linear feet of comparable size pipe and same pipe type as required by project.
    3. Pipe jointing shall be performed by personnel trained in the use of thermal butt-fusion equipment and recommended methods for new pipe connections. Personnel directly involved with installing the new pipe shall receive training in the proper methods for handling and installing the pipe. Training shall be performed by qualified representative.
C. Testing Requirements, reference Section 10020 Testing Laboratory Services and the City of Mesquite General Design Standards for Testing Procedures
    1. Refer to Section 30010, Water Utilities and/or Section 30030, Sanitary Sewer

## PART 2 – MATERIALS AND EQUIPMENT

### 2.1 MATERIALS

A. General:
    1. All pipe shall be made of new material.
    2. The pipe shall be homogenous throughout and shall be free of visible cracks, holes, foreign material, blisters, or other deleterious faults.
    3. Material inside color shall be white or an alternative light color suitable for illumination during television inspection. The outside color may be different

provided the pipe is a homogeneous material and all colors are integral to the material (not painted or coated).

4. Pipe shall be installed with tracer wire that is intended for direct bury, coated in blue.

B. Pipe materials shall be either HDPE or Fusible PVC per the following requirements:

1. Polyethylene Plastic Pipe shall be high density polyethylene pipe and meet the applicable requirements of ASTM F714 Polyethylene (PE) Plastic Pipe (SDR-PR) Based on Outside Diameter, and shall be manufactured from a High Density High Molecular weight polyethylene compound which conforms to ASTM D1248, and meets the requirements for Type III, Class C, Grade P-34, Category 5, and has a PPI rating of PE 4710. The pipe produced shall have a minimum cell Classification of 445574E (inside shall be a light color) under ASTM D3550.
   a. Stiffener inserts per ASTM 240 shall be used for all fittings and connections to HDPE pipe. Stiffeners shall be 304 stainless steel and be of wedge type design.
2. Fusible PVC
   a. Fusible polyvinylchloride pipe shall conform to AWWA C900, AWWA C900, ASTM D2241 or ASTM D1785 for standard dimensions, as applicable. Testing shall be in accordance with the referenced AWWA standards for all pipe types.
   b. Fusible polyvinylchloride pipe shall be extruded with plain ends. The ends shall be square to the pipe and free of any bevel or chamfer. There shall be no bell or gasket of any kind incorporated into the pipe.
   c. All piping shall be made from PVC compound conforming to cell classification 12454 per ASTM D1784.
   d. Fusible polyvinylchloride pipe shall be used as manufactured under the trade names Fusible C-900®, Fusible C-900®, and FPVC®, for Underground Solutions, Inc., Poway, CA, (858) 679-9551. Fusion process shall be as patented by Underground Solutions, Inc., Poway, CA, Patent No. 6,982,051. Owner and engineer are aware of no other supplier of fusible polyvinylchloride pipe that is an equal to this specified pipe supplier and products.
3. Certa-lok® PVC Pressure Pipe AWWA C900/RJIB

C. Water Mains

1. Pipe shall have outside color of blue or have blue stripe along the length of the pipe to identify the pipe as potable water.
2. Water mains shall be in ductile iron pipe nominal dimensions (DIPS).
3. Fittings and appurtenances shall be in accordance with Section 30010, Water Utilities
4. Water mains shall be either:
   a. Fusible PVC in accordance with AWWA C900, Class 305, DR14,
   b. HDPE in accordance with PE4710, Class 333, DR7
   c. Certa-Lok® AWWA C900, Class 305, DR 14

D. Sanitary Sewer Mains

1. Pipe shall have outside color of green or have green stripe along the length of the pipe to identify the pipe as non-potable water.
2. Fittings and appurtenances shall be in accordance with Section 30030, Sanitary Sewer
3. Sanitary sewer mains shall be in iron pipe nominal dimensions (IPS).
4. Sanitary sewer mains shall be either:
   a. Fusible PVC in accordance with ASTM D3034, SDR 26, or

b. Fusible PVC in accordance with ASTM F679, SDR 26, or
c. HDPE in accordance with PE4710, DR 13.5
d. Certa-Lok® AWWA C900, Class 235, DR 18

### 2.2 EQUIPMENT

A. The pipe bursting tool shall be designed and manufactured to force its way through the existing pipe materials by fragmenting the pipe and compressing the old pipe sections into the surrounding soil as it progresses. The bursting unit shall generate sufficient force to burst and compact the existing pipeline. The bursting tool size shall be in accordance with the manufacturer's recommendations for the diameters being burst and replaced.
B. The bursting head shall incorporate a shield/expander to prevent collapse of the hole ahead of the new pipe insertion. The pipe bursting unit shall be remotely controlled. Sectional replacement pipe shall be pushed as well as pulled behind the bursting head.
C. The bursting action of the tool shall increase the external dimensions sufficiently to break the existing pipe and simultaneously expand the surrounding ground sufficiently to permit pulling the new pipe through the annular space.
D. Static pipe bursting will be allowed.
E. Under no circumstances will pneumatic or percussive bursting systems be allowed.

## PART 3 – EXECUTION

### 3.1 GENERAL

A. All service connections shall be identified, located and excavated prior to the pipe insertion to expedite reconnection. It is the contractor's sole responsibility to locate and reconnect all services. Contractor shall be responsible for any damage to adjacent properties resulting from failure to reconnect an existing service line. Contractor shall be required to return to the site to reconnect missed at their sole cost and expense including all materials, equipment and labor.
B. Insertion or launching pits shall only be allowed at locations approved by the Owner to minimize impact to existing improvements, trees and other topographic features. Contractor shall prepare and submit a plan showing location and approximate dimension of proposed insertion and receiving pits prior to construction.
C. Equipment used to perform the work shall be located away from buildings to minimize noise impact. Provide silencers or other devices to reduce machine noise as required to meet requirements.
D. The Contractor shall install all pulleys, rollers, bumpers, alignment control devices and other equipment required to protect existing structures (i.e. manholes), and to protect the pipe from damage during installation. Lubrication may be used as recommended by the manufacturer. Under no circumstances will the pipe be stressed beyond its elastic limit.

### 3.2 PIPE JOINING

A. The pipe shall be assembled and joined at the site using the thermal butt-fusion method to provide a leak proof joint. Electro fusion is not permitted. Threaded or solvent-cement joints and connections are not permitted. All equipment and procedures used shall be used in strict compliance with the manufacturer's recommendations. Fusing shall be accomplished by personnel certified as fusion technicians by a manufacturer of pipe and/or fusing equipment.
B. The butt-fused joint shall be true alignment and shall have uniform roll-back beads resulting from the use of proper temperature and pressure. The joint shall be allowed adequate cooling time before removal of pressure. The fused joint shall be watertight

and shall have tensile strength equal to that of the pipe. All joints shall be subject to acceptance by the Engineer and/or his representative prior to insertion. All defective joints shall be cut out and replaced at no cost to the City. Any section of the pipe with a gash, blister, abrasion, nick, scar, or other deleterious fault greater in depth than ten percent (10%) of the wall thickness, shall not be used and must be removed from the site. However, a defective area of the pipe may be cut out and the joint fused in accordance with the procedures stated above. In addition, any section of pipe having other defects such as concentrated ridges, discoloration, excessive spot roughness, pitting, variable wall thickness or any other defect of manufacturing or handling as determined by the Engineer and/or his representative shall be discarded and not used.

C. Terminal sections of pipe that are joined within the insertion pit shall be connected with a full circle pipe stainless steel repair clamp or a fused coupling. The butt gap between pipe ends shall not exceed one-half (1/2) inch.

**3.3 BURSTING OPERATIONS AND PIPE INSTALLATION**

A. Location and protection of underground utilities
   1. Utility location and notification services shall be contacted by the Contractor prior to the start of construction.
   2. All existing lines and underground utilities shall be positively identified, including exposing those facilities that are located within an envelope of possible impact of the bursting operation as determined for the project specific site conditions. It is the Contractor and pipe burst system operator's responsibility to determine this envelope of safe burial depth and offset from existing utilities. This will include, but is not limited to soil conditions and layering, utility proximity and material, pipe bursting system and equipment, and foreign subsurface material.

B. Excavation and access pits
   1. Access pit length shall be such that the minimum bending radius for the pipe, per the pipe supplier is maintained. Sheeting, shoring and bracing requirements shall be in accordance with these specifications and applicable jurisdictional standards.
   2. Access pit excavations shall be performed at all points where the pipe will be inserted into the existing pipeline. When possible, access pit excavations shall coincide with host pipe lateral connection points or other appurtenance installations.
   3. The pipe may be continuously or partially supported on rollers or other Owner and Engineer approved friction decreasing implement during joining and insertion, as long as the pipe is not over-stressed or critically abraded prior to or during installation.

C. Pipe bursting operation
   1. Any known pre-existing concrete encasements shall be excavated and broken out prior to the bursting operation to allow the steady and free passage of the pipe bursting head.
   2. The new pipe shall be inserted immediately behind the bursting head in accordance with the pipe supplier's recommended procedures. The bursting equipment shall be specifically designed and manufactured for the type of insertion process being used.
   3. Immediately following the completion of a pipe bursting installation, if possible, the pipe should be pushed back into the location of the insertion, at the pulling head, until a small amount of movement is realized at the insertion pit on the other side of the installation from the pulling equipment.

D. Pipe System Connection
   1. Approximate locations for existing piping systems are shown in the construction documents. Prior to making connections into existing piping systems, the contractor shall:

a. Field verify location, size, piping material, and piping system of the existing pipe.
b. Obtain all required fittings, which may include saddles, sleeve type couplings, flanges, tees, or others as shown in the construction documents.
c. Have installed all temporary pumps and/or pipes in accordance with established connection plans.

2. Unless otherwise approved, new piping systems shall be completely assembled and successfully tested prior to making connections into existing pipe systems.
3. Pipe connections shall be installed per applicable standards and regulations, as well as per the connection manufacturer's guidelines and as indicated in the construction documents. Pipe connections to structures shall be installed per applicable standards and regulations, as well as per the connection manufacturer's guidelines.

**3.4 TESTING**

A. Testing shall be performed per Section 30010, Water Utilities for water main installation and per Section 30030 Sanitary Sewer for sanitary sewer installation.

**3.5 SPECIFIC TO SANITARY SEWER INSTALLATION**

A. TV Inspection of Existing Pipeline
   1. The host pipe shall be cleaned and inspected by TV prior to the bursting operation.
      a. Cleaning and TV inspection of the host pipe shall indicate condition of host pipe and suitability of host pipe for pipe insertion by pipe bursting methods.
      b. Obstructions considered detrimental to the pipe bursting operation which may include corporation taps, valves and valve bodies, and collapsed piping shall be remedied prior to bursting and pipe insertion.
   2. Spot repairs shall be made in accordance with the drawings and these specifications.
   3. All existing service locations shall be noted
B. Upon commencement, pipe insertion shall be continuous and without interruption from one manhole to another, except as approved by the engineer and/or his representative. Upon completion of insertion of the new pipe, the Contractor shall expedite the reconnection of services to minimize any inconvenience to the customers.
C. Internal fusion bead shall be removed for sanitary sewer with slopes less than 1%.
D. Service laterals shall be connected by the use of a mechanical saddle. Mechanical saddles shall be made of polyethylene pipe compound that meets the requirements of ASTM D1248, Class C or polyvinyl chloride pipe compound that meets the requirements of ASTM D3034. Mechanical saddles shall have stainless steel straps and fasteners, neoprene gasket and backup plate. Mechanical saddles shall be Strap-On-Saddle Type or Tapping Saddle as manufactured by Fernco Joint Sealer Co., DFW Plastics, Inc. or approved equal. Once the saddle is secured in place, drill hole full inside diameter of saddle outlet in pipe liner.
E. Bypassing sewage shall be per 30030 Sanitary Sewer.
F. Post construction television inspection shall be per 30030 Sanitary Sewer.

**3.6 SPECIFIC TO WATER MAIN INSTALLATION**

A. Internal bead created by pipe fusion shall be removed.
B. Contractor can install water main through pipe bursting with either of the following methods:
   1. Pre-chlorination method – Contractor shall follow section 3.8 Pre-Chlorination Method if utilizing this method, or
   2. Traditional method:
      a. The following sequence shall be followed:

1. Install temporary service line to affected residences
2. Excavate Burst and Insertion Pit
3. Coordinate with Utility Division to isolate the section to be rehabilitated from the rest of the system so as to maintain pressure integrity of the system as well as preventing any backflow of chlorinated solution or non-potable water into the system.
4. Pipe-burst water main
5. Tap all services on new line
6. Test water main per Section 30010, Water Utilities
7. Connection of the replaced section of pipe into the system.
8. Connect all services to new taps on new water main
9. Disassemble temporary water service

C. Temporary Water Services

1. Contractor shall install temporary water services for all water pipe-bursting construction and unless otherwise specified, installation of temporary services shall be subsidiary to water main installation.
2. In the event that temperatures fall, Contractor shall take the necessary steps to prevent the temporary main from freezing.
3. Contractor shall be responsible for identifying source of water for temporary services and shall protect services from pedestrian and vehicular traffic.
4. The temporary water main will be chlorinated after installation, and service shall not be transferred to the temporary mains until the water in the temporary main has been checked and approved by the Owner.
5. In general, the temporary main shall be laid along the side of the roadway adjacent to the curb line edge of the pavement. Install temporary main in ditches wherever possible. At locations where the pipe is subject to minimal traffic, such as at driveways, residential streets, or where approved by the City, the pipe shall be adequately protected by "ramping". Ramping shall be provided through use of an approved method such as a combination of 2'x4' lumber and cold mix asphalt or other approved material. Alternately, the contractor shall furnish, install and maintain prefabricated hose ramps/bridges made of aluminum, steel or other approved material and capable of safely supporting AASHTO HS-20 loading. When "ramping" is installed across streets, the contractor shall furnish, install and maintain temporary street signs to adequately warn drivers of the ramps. This shall include, at a minimum, placing a CW8-1 sign (BUMP) with supplemental plaque showing "AHEAD" approximately 120 feet in advance of the "ramping" and a CW8-1 sign at the hose bridge/ramp (for both roadway directions).

## 3.7 PRE-CHLORINATION METHOD FOR WATER MAIN INSTALLATION

Unless stated on plans, contractor is not required to use pre-chlorination method. However, if this method is utilized the contractor shall comply with this section. Chlorination of pipes prior to bursting shall be carried out per ANSI/AWWA C651-05 Standard for Disinfecting Water Mains. Any information here shall facilitate that method when performed on pipes not yet placed on grade. In general, the method includes the following:

A. The following sequence shall be followed:

a. Chlorinate a length of product pipe that yields passing test results for potable water per AWWA, Regulatory Authority and City standards.
b. Excavate Burst and Insertion Pit
c. Excavate Service Connection Pits.
d. Install temporary services.

e. Coordinate with Utility Division to isolate the section to be rehabilitated from the rest of the system so as to maintain pressure integrity of the system as well as preventing any backflow of chlorinated solution or non-potable water into the system.
f. Excavate and remove hydrant tees and valve tees from the host pipe.
g. Install new water main through pipe bursting operation
h. Service Connections shall be made to the newly installed main.
i. Test water main per Section 30010, Water Utilities
j. Super-Chlorinate main for 15 minutes to 300 ppm. A de-chlorination unit will be used to neutralize the residual chlorine when flushing. Flush the newly installed main with potable water.
k. Inspect for leaks at new connections.
l. Final connection of the replaced section of pipe into the system.

B. Disinfect all equipment, tools, end caps, pipe fittings or product that may contact pipe.
C. Disinfection shall be carried out by immersing or rinsing items in a hypochlorus solution containing 1 to 5 percent chlorine measured by weight. See details of Chlorination solution in section 2.11.
D. Product pipe shall be fused into a string of sufficient length to complete the designated section or be coiled in a manner suitable for delivery on a pipe reel. Maximum allowable length is 800 feet.
E. The surface upon which the product pipe rests during Chlorination shall be relatively impervious and free from visible contamination. Coiled pipe must be laid horizontally to allow all air to be expelled.
F. Swabbing, Chlorination and testing of the inside diameter of the pipe shall be accomplished by:
    a. Swab being inserted at the lowest end of the pipe.
    b. Calcium Hypochlorite tablets or granules as described in section 2.11. shall be placed behind the swab.
    c. Pressure tight end cap shall be mounted to the low end of the pipe either by fusing or mechanically assembled to the pipe.
    d. Potable water shall be introduced through this end cap at a controlled rate such that the swab is propelled at a velocity less than or equal to one foot per second. All air is to be dispelled from the pipe.
    e. Upon discharge of the swab from the elevated end of the pipe, the elevated end shall be capped with a pressure tight seal. This seal having a tapped access hole of size at least 1.25” NPT or incorporating the ability to leak (purge) air or water at will by adjustment of clamping bolts. Additional potable water should be added after capping to ensure that no air remains between the caps.
    f. Pressure testing of the pipe section should be performed per details in section 2.12 upon replacement of the second end cap.
    g. Chlorinated solution should be maintained in the pipe for a minimum of 24 hours prior to flushing when water temperature is above 41 ºF (5ºC), 48 hours when water temperature is 41ºF (5ºC) or less. Time for retention of the chlorinated solution shall not be significantly over designated holding time so as to prevent damage to the pipe or end caps.
    h. After designated holding time, the pipe shall be drained, flushed and filled with potable water so as to expel the highly chlorinated solution. The spent Chlorinated solution shall not be allowed to enter any water shed, a sanitary sewer or any other area where environmental damage may occur without neutralizing it in an industry acceptable manner. Flushing water shall be from a source known to be of drinking water standard.
    i. Test samples shall be taken from each end of the pipe on consecutive days, 24

hours apart. Samples shall be tested by a state certified lab within 30 hours of being taken.

j. Failure of any sample to pass a bacteriological test should result in the related section of pipe being re-flushed and retested. Should any sample again fail, the section must be chlorinated before retest.
k. Time before re-connection of a passing pipe section shall be limited to 14 days from the last sampling. After this time the pipe must be retested to be acceptable for use.
l. Drain the section of pipe prior to pipe bursting. The pipe shall be drained on the day of the pipe bursting, and sealed after draining and for the pipe bursting process.
m. Swabs should be designated by the manufacturer as suitable for potable water system use. Swabs are to be manufactured by Knapp Industries or be of equivalent design.

## PART 4 – MEASUREMENT AND PAYMENT

### 4.1 MEASUREMENT

A. This section shall be measured by linear feet of utility installed and accepted.

### 4.2 PAYMENT

A. Payment shall be full compensation for the work performed and materials furnished in accordance with this section including excavation of insertion and receiving pits, bursting of existing utility pipe of all material types, backfill, compaction, haul off and lawful disposal of excess trench spoils, any fittings, and any testing required by the City, and all manipulation, labor, tools, equipment and incidentals necessary to complete the work.
B. Thrust blocks, fittings, bends, tees, joint restraints, appurtenances and any excavation, backfill, grading, compaction, testing will not be paid for directly but will be subsidiary to pertinent bid items.
C. Unless listed as separate bid item, temporary water service will be subsidiary to installation of waterlines.
D. Pre- and Post- TV inspection shall be subsidiary to installation of utilities.

**END OF SECTION**

# SECTION 30051

# ADJUSTMENT OF UTILITY APPURTENANCES

## PART 1 – GENERAL

### 1.1 DESCRIPTION

A. Adjustment of existing water valve covers to proposed grade.
B. Adjustment or replacement of existing meter boxes to proposed grade.
C. Adjustment of existing sanitary sewer manholes to proposed grade.

### 1.2 SUBMITTAL

### 1.3 QUALITY CONTROL

## PART 2 – MATERIALS AND EQUIPMENT

### 2.1 MATERIALS

A. General: Materials shall be in accordance with City of Mesquite Standard Details and current approved materials as listed in the Engineering Design Manual.

### 2.2 EQUIPMENT

## PART 3 – EXECUTION

### 3.1 GENERAL

A. Contractor shall take care that all existing utilities remain in service during adjustment of appurtenances.

### 3.2 WATER VALVE COVER ADJUSTMENT

A. Contractor shall adjust the top of the water valve box to the proposed finished surface elevations by adjusting or lowering it to conform to the final grade in accordance with the plans. The existing valve box and cover, if in good condition, may be salvaged and reused. Where the valve box is of the adjustable type, the top section of the existing valve box shall be adjusted up or down as necessary within its adjustable limits. A valve box extension adapter also may be added to the top of the existing valve box. If the existing valve box is tilted/ and/or far enough off center on the valve nut to make valve operation difficult, the Contractor shall plumb and center the valve box over the valve nut prior to placement of adjacent material. The valve box lid ears shall be aligned parallel to the direction of water flow. Final adjustment of water valve shall be made after paving.

### 3.3 WATER METER ADJUSTMENT

A. Contractor shall adjust the top of the water meter box to the proposed finished surface elevations by adjusting or lowering it to conform to the final grade in accordance with the plans.
B. If meter box needs to be replaced, a new box will be provided by the City, unless otherwise specified that contractor shall provide new box.

### 3.4 SANITARY SEWER MANHOLE ADJUSTMENT

A. Contractor shall install a false bottom in the manhole prior to initiation of grading and/or liming operations. The false bottom shall be 3/4” plywood. Contractor shall remove and salvage existing manhole lid and ring. Contact areas shall be cleaned of all mortar and grease. Contractor shall adjust the existing manhole casting to proper grade. If the adjustment involves lowering the top of a manhole, a sufficient depth of concrete shall be

removed to permit reconstruction on a batter if necessary to adjust the fixture to proposed new surface. If the adjustment involves raising the elevation of the top of the manhole, Contractor shall install grade rings as necessary to conform to the finished surface elevations. Installed grade rings shall fit within the existing casting without interference, shall not cause binding to the manhole lid, be immobile and watertight.

B. Contractor shall install a new bolt down type manhole lid and ring along with installing new anchor bolts to attach ring to cone. All manhole rings shall be sealed and contain a wrap as shown per the *City of Mesquite's Approved Sanitary Sewer Materials List*. The space between risers and cone basin, between risers and cover frame, and between multiple risers shall be sealed with an approved mastic sealer. Concrete grade rings are not allowed.

## PART 4 – MEASUREMENT AND PAYMENT

### 4.1 MEASUREMENT

A. This section shall be measured by each adjustment of existing water valve covers completed and accepted. Payment shall be full compensation for materials and installation including backfill, compaction, haul off and lawful disposal of spoils, and all manipulation, labor, tools, equipment and incidentals necessary to complete the work, all in accordance with the plans and these specifications.

B. This section shall be measured by each adjustment and/or replacement of existing water meter boxes completed and accepted. Payment shall be full compensation for materials and installation including backfill, compaction, haul off and lawful disposal of spoils, and all manipulation, labor, tools, equipment and incidentals necessary to complete the work, all in accordance with the plans and these specifications.

C. This section shall be measured by each adjustment of existing sanitary sewer manhole completed and accepted. Payment shall be full compensation for materials and installation including backfill, compaction, haul off and lawful disposal of spoils, grade rings, chimney seal and all manipulation, labor, tools, equipment and incidentals necessary to complete the work, all in accordance with the plans and these specifications.

**END OF SECTION**

# SECTION 40010

# PAVEMENT STRIPING, MARKERS, AND BUTTONS

## PART 1 – GENERAL

### 1.1 DESCRIPTION

A. All material, labor, equipment, tools, and superintendence necessary to furnish and install raised and/or retroreflectorized pavement markings.
B. Work shall be done in accordance with the current Texas Department of Transportation's Standard Specifications for Construction of Highways, Streets and Bridges, Item 662 "Work Zone Pavement Markings", Item 666 "Retroreflectorized Pavement Marking", Item 668 "Prefabricated Pavement Markings", Item 672 "Raised Pavement Marker", Item 677 "Eliminating Existing Pavement Marking and Markers" and Item 678 "Pavement Surface Preparation for Markings" with the exception of items specified herein.

## PART 2 – MATERIALS AND EQUIPMENT

### 2.1 MATERIALS

A. Where applicable, all of the following shall conform to the City of Mesquite General Design Standards for materials. Materials shall be from the City of Mesquite Approved Materials List.
B. All pavement markings wider than 6" thick on concrete pavement shall be prefabricated material in accordance with TxDOT DMS-8240 and be "Premark" brand or approved equal.
C. All markings on asphalt pavement shall be hot applied thermoplastic, type I in accordance with TxDOT DMS-8220

## PART 3 – EXECUTION

### 3.1 GENERAL

A. Surface shall be prepared prior to installation.
B. Contractor shall establish guide marks and the City shall verify the locations prior to installation.

## PART 4 – MEASUREMENT AND PAYMENT

A. Raised pavement markers shall be measured by each installed and accepted for the size, type, and color and shall be full compensation for pavement preparation, installment and for all manipulation, labor, tools, equipment and incidentals necessary to complete the work, all in accordance with the plans and these specifications.
B. Pavement striping shall be measured by the Linear Foot of stripe installed and accepted for the size, type and color, and shall be full compensation for preparation, installment and for all manipulation, labor, tools, equipment and incidentals necessary to complete the work, all in accordance with the plans and these specifications.
C. Pavement markings shall be measured by each marking installed and accepted for the size, type and color and shall be full compensation for pavement preparation, installment and for all manipulation, labor, tools, equipment and incidentals necessary to complete the work, all in accordance with the plans and these specifications.

**END OF SECTION**

# SECTION 40020

# TRAFFIC SIGNALS

## PART 1 – GENERAL

### 1.1 DESCRIPTION

A. All material, labor, equipment, tools, and superintendence necessary to furnish and install traffic signals.

B. Work shall be done in accordance with the current Texas Department of Transportation's Standard Specifications for Construction of Highways, Streets and Bridges, Item 680 "Highway Traffic Signals", Item 684 "Traffic Signal Cables, Item 686 "Traffic Signal Pole Assemblies", Item 687 "Pedestal Pole Assemblies" and Item 688 "Pedestrian Detectors and Vehicle Loop Detectors with the exception of items specified herein.

## PART 2 – MATERIALS AND EQUIPMENT

### 2.1 MATERIALS

A. Traffic Signal Poles
   1. All traffic signal poles with mast arm assemblies shall conform to 100 MPH wind speed design and conforming to TxDOT standards and specifications. The poles and mast arm assemblies shall be galvanized (ASTM 123 and 153 specifications) at all locations.
   2. ROWS overlay district exception: In the ROWs overlay district, all traffic signals will be Powder Coated Black (RAL 9017 – Traffic Black).
   3. Samples will be submitted to city staff for approval, before placing orders with the suppliers.

B. Signal Heads
   1. Yellow with black vented aluminum or polycarbonate back plates

C. The City will furnish the following materials to the contractor and the contractor shall be responsible for installation of items. The cost of items shall be borne by the developer through a development agreement:
   1. NEMA Controller (Siemens M 60) & Mesquite Spec TS2 TYPE 2 Cabinet
   2. Illuminated Street Name Signs (18" X 120" max) with either City or ROWs Logo.
   3. Video Detection equipment and cable.
   4. Opticom cards, receivers, and cable.
   5. Ethernet Switch (CISCO) with Fiber Optic Cable connections.
   6. PTZ camera and Cable

**END OF SECTION**

# SECTION 40030

# TRAFFIC SIGNS AND POSTS

## PART 1 – GENERAL

### 1.1 DESCRIPTION

A. All material, labor, equipment, tools, and superintendence necessary to furnish and install regulatory, warning and guide signs and posts.
B. Work shall be done in accordance with the current Texas Manual on Uniform Traffic Control Devices (TMUTCD).

## PART 2 – MATERIALS AND EQUIPMENT

### 2.1 MATERIALS

A. Sign Materials
   1. Sign materials and fabrication shall conform to Texas Department of Transportation (TxDOT) Item 636, Aluminum Signs (Type A).
   2. Aluminum sign blank substrates shall be 0.080 inch thick. Six (6) inch wide sign blades shall be extruded aluminum, and nine (9) inch wide sign blades shall be flat aluminum.
   3. Regulatory and warning signs shall be Type III, high-intensity retroreflective sheeting, as defined by ASTM D 4956-95.
   4. Guide signs, to include street name signs, shall be Type I, medium-intensity (engineer grade) retroreflective sheeting, as defined by ASTM D 4956-95.
   5. Sign identification decals shall be coded and applied in accordance with TxDOT Item 643, "Sign Identification Decals" to the rear of each sign.
   6. A manufacturer's warranty shall be provided to the City that warrants the sign against delamination and loss of retroreflectivity for seven (7) years.
B. Sign Posts
   1. Sign posts shall be roll-formed from 12 gauge (0.105") strip steel per ASTM Spec. #A570-79 or per ASTM Spec. #A446, Grade A. Sign posts shall be comer induction welded so that neither weld nor flash interferes with the telescoping properties.
   2. Sign post finish shall be in-line, hot dip galvanized zinc coating per ASSHTO M-120, or strips are pre-galvanized when roll formed from ASTM Spec. #A446, Grade A steel.
   3. Sign post holes shall be seven-sixteenths inches (minimum diameter) plus tolerance of one sixty-fourth inch. Holes shall be on exact one-inch centers along the longitudinal centerline of each of the four faces of each section. Thus, each set of four holes on respective section faces will be in exact lateral alignment, at each one-inch increment, longitudinally along the center section length. The centers of the end holes in each section are to be exactly one-half (1/2) inch from the section end. Each section therefore is to be in exact inch measurement with a tolerance of 0.025 inches.
   4. Sign Post Tolerances shall be as follows:
      a. Outside tolerance at all sides, at comers, shall be plus or minus 0.010 inches per respective specified (O.D.) section size.

b. The straightness tolerance shall be one-sixteenth of one inch per three (3) feet of section length.
c. Outside comer radii shall be three sixteenths of one inch, plus or minus one sixteenth of one inch.
d. Respective specified length tolerance shall be plus or minus one quarter of one inch
e. Convexity and concavity tolerance measured in the center of each section face shall be plus or minus 0.005 inches.

C. Hardware and Fasteners
1. All hardware and fasteners shall be galvanized steel, stainless steel or dichromate sealed aluminum conforming to TxDOT Materials Specification D-9-7120. When dissimilar metals are used, the metals shall be so selected or insulated to prevent corrosion.
2. Comer bolts, flat washers, and nuts used to secure the 1 % inch post to the base shall be 5116 inches in diameter galvanized steel.
3. Signs shall be fastened with 3/8 inch diameter zinc plated steel drive rivets.
4. Extruded sign blade holders used to secure six-inch sign blades shall be cast aluminum with stainless steel set screws.
5. Nine inch sign blades shall be affixed using 5/16 inch stainless steel round head machine screws with self-locking nuts, *Y,* inch diameter nonferrous spacers, and nylon washers.

## PART 3 – EXECUTION

### 3.1 INSTALLATION

A. The breakaway sign-support system (BS3) consists of dimensioned square section tubing secured together in a telescoped array to form. The system consists of three 12-gauge steel components; a 36 inch long anchor post of 2" x 2" O.D. square tubing, an 18 inch long anchor sleeve of 2-1/4" x 2-1/4" O.D. square tubing, and a sign post of 1-3/4" x 1-3/4" O.D. square tubing. The three components must be manufactured to tolerances that ensure telescoping of sections with minimal internal clearances that preclude excessive play between sections of the assembled support system.

B. The anchor post and anchor sleeve shall be driven into the ground as an assembly. Three holes shall remain visible above ground level for attachment of the 1 %inch sign post using two corner bolts.

C. Nine inch sign blades are installed along all arterial and secondary arterial streets as depicted on the current Thoroughfare Plan. Six inch sign blades are installed on all local and collector streets. Standard Construction Details- Signage- sheets T-1 and T-2 depict proper sign assembly and installation.

D. Street name blades may be affixed to streetlight poles with the approval of Oncor and the City. Street name blades will be attached to cast aluminum cantilever brackets with stainless steel set screws, and the cantilever bracket will be affixed to streetlight pole using stainless steel banding.

E. Ornamental Signage.
1. Standards for ornamental signage are determined on a case by case basis. In general, ornamental signage shall be compatible with Oncor street light poles and luminaires.
2. Standard Construction Details, Signage, sheets T-3 depicts proper sign placement on street light poles and free standing poles.

## PART 4 – MEASUREMENT AND PAYMENT

A. Signs shall be measured by each installed and accepted for the size and type and shall be full compensation for post installation, sign installation and for all manipulation, labor, tools, equipment and incidentals necessary to complete the work, all in accordance with the plans and these specifications.

**END OF SECTION**