SECTION 021080
REMOVING OLD STRUCTURES (S-55)

1. DESCRIPTION

This specification shall provide for the removal and disposal of old structures or portions of old structures, as noted on the plans, and shall include all excavation and backfilling necessary to complete the removal. The work shall be done in accordance with the provisions of these specifications.

2. METHOD OF REMOVAL

Culverts or Sewers. Pipe shall be removed by careful excavation of all dirt on top and the sides in such manner that the pipe will not be damaged. Removal of sewer appurtenances shall be included for removal with the pipe. Those pipes which are deemed unsatisfactory for reuse by the Engineer may be removed in any manner the Contractor may select.

Concrete Structures. Concrete structures or concrete portions of structures shall be removed by blasting and/or sledging the concrete into sizes not larger than one cubic foot.

Portions of the old structure shall be removed to the lines and dimensions shown on the plans, and these materials shall be disposed of as shown on the plans or as directed by the Engineer. Any portion of the existing structure, outside of the limits designated for removal, damaged during the operations of the Contractor, shall be restored to its original condition at the Contractor's entire expense. Explosives shall not be used in the removal of portions of the existing structure unless approved by the Engineer, in writing.

Concrete portions of structures below the permanent ground line, which will not interfere in any manner with the proposed construction, may be left in place, but removal shall be carried at least two (2) feet below the permanent ground line and neatly squared off. Reinforcement shall be cut off close to the concrete.

Steel Structures. Steel structures or steel portions of structures shall be dismantled in sections as determined by the Engineer. The sections shall be stored. Rivets and bolts connecting steel railing members, steel beams of beam spans and steel stringers of truss spans, shall be removed by butting the heads with a "cold cut" and punching or drilling from the hole, or by such other method as will not injure the members for re-use and will meet the approval of the Engineer. The removal of rivets and bolts from connections of truss members, bracing members, and other similar members in the structure will not be required unless specifically called for on the plans or special provisions, and the Contractor shall have the option of dismantling these members by flame-cutting the members immediately adjacent to the connections. Flame-cutting will not be permitted, however, when the plans or special provisions call for the structure unit to be salvaged in such manner as to permit re-

erection. In such case, all members shall be carefully matchmarked with paint in accordance with diagrams furnished by the Engineer prior to dismantling, and all rivets and bolts shall be removed from the connections in the manner specified in the first portion of this paragraph.

Timber Structures. Timber structures or timber portions of structures shall be removed in such manner as to damage the timber for further use as little as possible. All bolts and nails shall be removed from such lumber as deemed salvable by the Engineer.

Unless otherwise specified on the plans, timber piles shall be either pulled or cut off at the point not less than two (2) feet below ground line, with the choice between these two methods resting with the Contractor, unless otherwise specified.

Brick or Stone Structures. Brick or stone structures or stone portions of structures shall be removed by blasting and/or sledging the masonry into sizes not larger than one cubic foot.

Portions of such structures below the permanent ground line, which will not in any manner interfere with the proposed construction, may be left in place, but removal shall be carried at least two (2) feet below the permanent ground line and neatly squared off.

Salvage. All material such as pipe, timbers, railings, etc., which the Engineer deems as salvable for reuse, and all structural steel, shall be the property of the City unless otherwise specified, and delivered to a designated storage area.

The I-beams, stringers, etc., which are specified to be dismantled without damage for reuse, and all steel members when matchmarked and dismantled for reuse, shall be blocked off the ground in an upright position to protect the members against further damage.

Materials, other than structural steel, which are not deemed salvable by the Engineer, shall become the property of the Contractor and shall be removed to suitable disposal sites off of the right-of-way arranged for by the Contractor, or otherwise disposed of in a manner satisfactory to the Engineer.

Where temporary structures are necessary for a detour adjacent to the present structure, the Contractor will be permitted to use the material in the old structure for the detour structure, but he shall dismantle and stack or dispose of the material as required above as soon as the new structure is opened for traffic.

The bidder's attention is called to the section, "Use of Explosives" in the "General Provisions and Requirements", regarding the use of explosives.

Backfill. All excavations made in connection with this specification and all openings below the natural ground line caused by the removal of old structures or portions thereof shall be backfilled to the level of the original ground line, unless otherwise specified on the plans.

That portion of the backfill which will support any portion of the roadbed or embankment shall be placed in layers of the same depth as those required for placing embankment. Material in each layer shall be wetted uniformly, if required, and shall be compacted to the density required in the adjoining embankment. In places inaccessible to blading and rolling equipment, mechanical or hand tamps or rammers shall be used to obtain the required compaction.

That portion of the backfill which will not support any portion of the roadbed or embankment shall be placed as directed by the Engineer in such manner and to such state of compaction as will preclude objectionable amount of settlement.

3. MEASUREMENT AND PAYMENT

Unless indicated otherwise in the Proposal, the work governed by this specification shall not be measured for pay, but shall be subsidiary to the project.

SECTION 022420
SILT FENCE (S-97)

1. DESCRIPTION

This specification shall govern all work necessary for providing and installing silt fencing required to control sedimentation and erosion during construction of the project.

2. MATERIAL REQUIREMENTS

A. Geotextile shall meet the requirements for temporary silt fence per AASHTO M288.

B. Fence Reinforcement Materials:

Silt fence reinforcement shall be one of the following systems.

Type 1: Self-Supported Fence - This system consists of fence posts, spaced no more than 8-1/2 feet apart, and geotextile without net reinforcement. Fence posts shall be a minimum of 42 inches long, embedded at least one (1) foot into the ground, and constructed of either wood or steel. Soft wood posts shall be at least 3 inches in diameter or nominal 2 x 4 inches in cross section and essentially straight. Hardwood posts shall be a minimum of 1.5 x 1.5 inches in cross section. Fabric attachment may be by staples or locking plastic ties at least every 6 inches, or by sewn vertical pockets. Steel posts shall be T or L shaped with a minimum weight of 1.3 pounds per foot. Attachment shall be by pockets or by plastic ties if the posts have suitable projections.

Type 2: Net-Reinforced Fence - This system consists of fence posts, spaced no more than 8-1/2 feet apart, and geotextile with an attached reinforcing net. Fence posts shall meet the requirements of Self-Supported Fence. Net reinforcement shall be galvanized welded wire mesh of at least 12.5-gauge wire with maximum opening size of 4 inches square. The fabric shall be attached to the top of the net by crimping or cord at least every 2 feet, or as otherwise specified.

Type 3: Triangular Filter Dike - This system consists of a rigid wire mesh, at least 6-gauge, formed into an equilateral triangle cross-sectional shape with sides measuring 18 inches, wrapped with geotextile silt fence fabric. The fabric shall be continuously wrapped around the dike, with a skirt extending at least 12 inches from its upslope corner.

C. Packaging Requirements: Prior to installation, the fabric shall be protected from damage due to ultraviolet light and moisture by either wrappers or inside storage.

D. Certification and Identification: Each lot or shipment shall be accompanied by a certification of conformance to this specification. The shipment must be identified by a ticket or by labels securely affixed to the fabric rolls. This ticket or label must list the following information:

a. Name of manufacturer or supplier
b. Brand name and style
c. Manufacturer's lot number or control number
d. Roll size (length and width)
e. Chemical composition

3. MEASUREMENT AND PAYMENT

Unless indicated otherwise in the Proposal, silt fence shall not be measured for payment separately, but shall be considered subsidiary to the storm water pollution plan for which the silt fence is being used.

SECTION 025612
CONCRETE SIDEWALKS AND DRIVEWAYS (S-53)

1. DESCRIPTION

The specification shall consist of sidewalks and driveways, with or without reinforcing steel, composed of Portland cement concrete, constructed as herein specified on an approved subgrade, in conformity with the lines and grades established by the Engineer and the details shown on the plans.

2. MATERIALS

Materials and proportions used in construction under this item shall conform to the requirements as specified for Class "A" concrete under specification Section 030020 "Portland Cement Concrete". Reinforcing steel, if required, shall conform to the requirements as specified in specification Section 032020 "Reinforcing Steel". Expansion joint filler shall be ~~redwood or~~ premolded material meeting the requirements specified in specification Section 038000 "Concrete Structures". Cap seal shall be "Greenstreak" or approved equal.

3. CONSTRUCTION METHODS

The subgrade shall be excavated, compacted and shaped to line, grade and cross-section and, if considered necessary in the opinion of the Engineer, hand tamped and sprinkled with water. The subgrade shall be moist at the time the concrete is placed.

Forms shall be of wood or metal, of a section satisfactory to the Engineer, straight, free from warp, and of a depth equal to the thickness of the finished work. They shall be securely staked to line and grade and maintained in a true position during the depositing of concrete.

The reinforcing steel, if required, shall be placed in position as shown on the plans. Care shall be exercised to keep all reinforcing steel in its proper location.

Sidewalks shall be constructed in sections of the lengths shown on plans. Unless otherwise provided by the plans, no section shall be a length less than 8 feet and any section less than 8 feet shall be removed by the Contractor at his own expense.

The different sections shall be separated by a premolded insert ~~or board joint~~ of the thickness shown on the plans, placed vertically and at right angles to the longitudinal axis of the sidewalks. Where the sidewalk or driveways abut a curb or retaining wall, approved expansion joint material shall be placed along their entire length. Similar expansion joint material shall be placed around all obstructions protruding through sidewalks or driveways.

Concrete shall be mixed in a manner satisfactory to the Engineer, placed in the forms to the depth specified and spaded and tamped until thoroughly compacted and mortar entirely covers the surface. The top surface shall be floated with a wooden float to a gritty texture. The outer edges and joints shall then be rounded with approved tools to the radii shown on plans.

Sidewalks shall be marked into separate sections, each 4 feet in length, by the use of approved jointing tools.

When completed, the sidewalks and driveways shall be cured with Type 2, white pigmented curing compound. Other methods of curing as outlined in specification Section 038000 "Concrete Structures" will be acceptable with a required curing period of 72 hours.

4. MEASUREMENT AND PAYMENT

Unless indicated otherwise in the Proposal, concrete sidewalks and driveways shall be measured by the square foot of surface area of completed sidewalks, driveways, or sidewalks and driveways, as indicated on the plans.

Payment will be based on measured quantities only.

Payment shall be full compensation for preparing the subgrade; for furnishing and placing all materials including reinforcing steel and expansion joint materials; and for all manipulation, labor, tools, equipment and incidentals necessary to complete the work.

SECTION 028061
LANDSCAPING

1. GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and General Provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:
   1. Trees
   2. Shrubs
   3. Ground covers
   4. Plants
   5. Topsoil and soil amendments
   6. Fertilizers and mulches
   7. Stakes and guys
   8. Timber planter
   9. Boulders

B. Related Sections: The following Sections contain requirements that relate to this Section:

   1. SECTION 028100 "IRRIGATION SYSTEMS" an automatic irrigation system for palms and plantings.
   2. SECTION 108009 "DRINKING FOUNTAIN"
   3. SECTION 154100 "PLUMBING FIXTURES"

1.3 SUBMITTALS

A. General: Submit each item in this Article according to the Conditions of the General Provisions.

B. Product certificates signed by manufacturers certifying that their products comply with specified requirements.

   1. Manufacturer's certified analysis for standard products.

2. Analysis for other materials by a recognized laboratory made according to methods established by the Association of Official Analytical Chemists, where applicable.
3. Label data substantiating that plants, trees, shrubs, and planting materials comply with specified requirements.

C. Planting schedule indicating anticipated dates and locations for each type of planting.

D. Maintenance instructions recommending procedures to be established by Owner for maintenance of landscaping during an entire year. Submit before expiration of required maintenance periods.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experienced Installer who has completed landscaping work similar in material, design, and extent to that indicated for this Project and with a record of successful landscape establishment.

B. Provide quality, size, genus, species, and variety of trees and shrubs indicated, complying with applicable requirements of ANSI Z60.1 "American Standard for Nursery Stock."

C. Measurements: Measure trees and shrubs according to ANSI Z60.1 with branches and trunks or canes in their normal position. Do not prune to obtain required sizes. Take caliper measurements 6 inches above ground for trees up to 4-inch caliper size, and 12 inches above ground for larger sizes. Measure main body of tree or shrub for height and spread; do not measure branches tip-to-tip. Measure palms by trunk feet. Measure from top of root ball to bottom of heart fronds.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Packaged Materials: Deliver packaged materials in containers showing weight, analysis, and name of manufacturer. Protect materials from deterioration during delivery and while stored at site.

B. Trees and Shrubs: Deliver freshly dug trees and palms. Do not prune before delivery, except as approved by Landscape Architect. Protect bark, branches, and root systems from sunscald, drying, sweating, whipping, and other handling and tying damage. Do not bend or bind-tie trees or shrubs in such a manner as to destroy natural shape. Provide protective covering during delivery. Do not drop trees and shrubs during delivery.

C. Handle balled and burlapped stock by the root ball.

D. Deliver trees, shrubs, ground covers, and plants after preparations for planting have been completed and install immediately. If planting is delayed more than 6 hours after delivery, set planting materials in shade, protect from weather and mechanical damage, and keep roots moist.

1. Do not remove container-grown stock from containers before time of planting.
2. Water root systems of trees and shrubs stored on site with a fine-mist spray. Water as often as necessary to maintain root systems in a moist condition.

1.6 PROJECT CONDITIONS

A. Utilities: Determine location of above grade and underground utilities and perform work in a manner, which will avoid damage. Hand excavate, as required.

B. Excavation: When conditions detrimental to plant growth are encountered, such as rubble fill, adverse drainage conditions, or obstructions, notify Architect before planting.

1.7 COORDINATION AND SCHEDULING

A. Coordinate installation of planting materials during with project manager for each type of plant material required.

1.8 WARRANTY

A. General Warranty: The special warranty specified in this Article shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by the Contractor under requirements of the Contract Documents.

B. Special Warranty: Warrant the following living planting materials for a period of one year after date of Substantial Completion, against defects including death and unsatisfactory growth, except for defects resulting from lack of adequate maintenance, neglect, or abuse by Owner, abnormal weather conditions unusual for warranty period, or incidents that are beyond Contractor's control.
1. Trees
2. Shrubs
3. Ground covers
4. Palms

C. Remove and replace dead planting materials immediately unless required to plant in the succeeding planting season.

D. Replace planting materials (includes trees) that are more than 25 percent dead or in an unhealthy condition at end of warranty period.

E. A limit of one replacement of each plant material will be required, except for losses or replacements due to failure to comply with requirements.

1.9 TREE AND SHRUB MAINTENANCE

A. Maintain trees and shrubs by pruning, cultivating, watering, weeding, fertilizing, restoring planting saucers, tightening and repairing stakes and guy supports, and resetting to proper grades or vertical position, as required to establish healthy, viable plantings. Spray as required keeping trees and shrubs free of insects and disease. Maintain trees and shrubs until final acceptance from City.

1.10 GROUND COVER AND PLANT MAINTENANCE

A. Maintain ground cover and plants by watering, weeding, fertilizing, and other operations as required to establish healthy, viable plantings until final acceptance from City.

2. PRODUCTS

2.1 TREE AND SHRUB MATERIAL

A. General: Furnish nursery-grown trees and shrubs conforming to ANSI Z60.1, with healthy root systems. Provide well-shaped, fully branched, healthy, vigorous stock free of disease, insects, eggs, larvae, and defects such as knots, sunscald, injuries, abrasions, and disfigurement.

B. Grade: Provide trees and shrubs of sizes and grades conforming to ANSI Z60.1 for type of trees and shrubs required. Trees and shrubs of a larger size may be used if acceptable to Engineer, with a proportionate increase in size of roots or balls.

C. Palms: Provide palms of grade "A" quality.

2.2 LARGE TREES

A. Trees: Multi trunk trees with, well-balanced crown, and intact leaders, of height and caliper indicated, conforming to ANSI Z60.1 for type of trees required.

1. Branching Height: 1/3 of tree height.

B. Provide balled and burlapped Mexican fan palms.

1. Container-grown trees will be acceptable in lieu of balled and burlapped trees subject to meeting ANSI Z60.1 limitations for container stock.

2.3 SHRUBS

A. Form and Size: Shrubs with not less than the minimum number of canes required by and measured according to ANSI Z60.1 for type, shape, and height of shrub.

2.4 GROUND COVERS AND PLANTS

A. Provide ground covers and plants established and well rooted in removable containers and with not less than the minimum number and length of runners required by ANSI Z60.1 for the pot size indicated.

2.5 TOPSOIL

A. Topsoil: ASTM D 5268, pH range of 6.5 to 7.5 percent organic material minimum, free of stones 1 inch or larger in any dimension, and other extraneous materials harmful to plant growth. Topsoil shall be friable and brown in color.

1. Topsoil Source: Import topsoil from off-site sources. Obtain topsoil from naturally well-drained sites where topsoil occurs at least 4 inches (100 mm) deep; do not obtain from bogs or marshes.

2.6 SOIL AMENDMENTS

A. Ironite: 40 lb. bags.

B. Sand: Clean, washed, natural or manufactured sand, free of toxic materials.

C. Gypsum soil amendment grade.

D. Peat Humus or Compost: Finely divided or granular texture, with a pH range of 6 to 7.5, composed of partially decomposed moss peat, peat humus, or reed-sedge peat compost and decomposed organic material such as hay, leaves, twigs, bark, wood chip, grass clippings and manure. Manure should not be more than 20% of the volume.

E. Manure: Well-rotted, unbleached stable or cattle manure containing not more than 25 percent by volume of straw, sawdust, or other bedding materials; free of

toxic substances, stones, sticks, soil, weed seed, and material harmful to plant growth.

F. Herbicides: EPA registered and approved, of type recommended by manufacturer.

G. Water: Potable.

2.5 FERTILIZER

A. Slow-Release Fertilizer: Granular fertilizer consisting of 50 percent water-insoluble nitrogen, phosphorus, and potassium in the following composition:

1. Composition: 5 percent nitrogen, 10 percent phosphorous, and 5 percent potassium, by weight.

B. Fertilizer Tree Tablets: Agriform or approved equal.

2.6 MULCHES

A. Topdressing Mulch: Concrete sand and pea gravel mixture for top dressing of palms and shrubs, consisting of the following: Use 60% concrete sand and 40% pea gravel. Top dress with sand first and top dress the gravel on top. The thickness to be 4".

B. Landscape Fabric: white in color. Submit sample for approval.

2.8 STAKES AND GUYS

A. Wooden braces for staking Mexican Fan Palms See Detail Sheet 18.

3. EXECUTION

3.1 EXAMINATION

A. Examine areas to receive landscaping for compliance with requirements and for conditions affecting performance of work of this Section. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Lay out individual tree and shrub locations and areas for multiple plantings. Also include locations of Boulders in the event Add. Alt. A1 is accepted. Stake locations, outline areas, and secure Architect's acceptance before the start of planting work. Make minor adjustments as may be required.

3.3 PLANTING SOIL PREPARATION

A. Before mixing, clean topsoil of roots, stones, clay lumps, and other extraneous materials harmful to plant growth.

B. Mix soil amendments and fertilizers with topsoil at rates indicated. Delay mixing fertilizer if planting does not follow placing of planting soil within a few days.
   1. A "Planting Soil Amendments Schedule" is included at the end of this Section.

C. For tree pits backfill material, mix planting soil with topsoil before backfilling.

D. For planting beds mix planting soil with the specified amendment on the surface of existing topsoil and mix thoroughly before planting.

   1. Mix specified soil amendments prior to mixing fertilizer.

3.4 GROUND COVER AND PLANT BED PREPARATION

A. Loosen sub grade of planting bed areas to a minimum depth of 4 inches. Remove stones larger than 1-1/2 inches in any dimension and sticks, roots, rubbish, and other extraneous materials.

B. Spread top soil & planting soil mixture or amendments to depth required to meet thickness, elevations and shown, after light rolling and natural settlement. Place approximately ½ the thickness of planting soil mixture required. Work into top of loosened sub grade to create a transition layer and then place remainder of planting soil mixture.

C. Till soil in beds to a minimum depth of 8 inches and mix with specified soil amendments and fertilizers.

3.6 EXCAVATION FOR PALMS

A. Pits: Excavate with vertical sides and with bottom of excavation slightly raised at center to assist drainage. Loosen hard subsoil in bottom of excavation.

   1. Mexican Fan Palms: Excavate 12" wider than root ball with bottom of excavation slightly raised at center to provide proper drainage. Loosen hard subsoil in bottom of excavation.

B. Dispose of subsoil removed from landscape excavations. Do not mix with planting soil or use as backfill. Clean excavation soil may be used for watering

saucer.

C. Obstructions: Notify Architect if unexpected rock or obstructions detrimental to trees or shrubs are encountered in excavations.

D. Fill excavations with water and allow to percolate out, before placing setting layer and positioning trees.

3.7 PLANTING SHRUBS

A. Set container-grown stock plumb and in center of pit or trench with top of ball raised above adjacent finish grades as indicated.

1. Carefully remove containers so as not to damage root balls.
2. Place stock on setting layer of compacted planting soil.
3. Place backfill around ball in layers, tamping to settle backfill and eliminate voids and air pockets. When pit is approximately 1/2 backfilled, water thoroughly before placing remainder of backfill. Repeat watering until no more is absorbed. Water again after placing and tamping final layer of backfill.

B. Set Palms on a cushion of planting soil. Carefully work backfill around roots system. Plumb before backfilling, and maintain plumb while working backfill around roots and placing layers around roots.

C. Dish and tamp top of backfill to form a 4-inch high mound around the rim of the pit. Do not cover top of root ball with backfill.

D. Stake all Palms

3.8 PLANTING GROUND COVER AND PLANTS

A. Space ground cover and plants as indicated.

B. Dig holes large enough to allow spreading of roots, and backfill with planting soil. Work soil around roots to eliminate air pockets and leave a slight saucer indentation around plants to hold water. Water thoroughly after planting, taking care not to cover plant crowns with wet soil.

3.9 MULCHING

A. Top dress backfilled surfaces of pits, trenches, planted areas, and other areas indicated.

1. Thickness: 4 inches for all other planting beds on a landscape fabric.

3.10 CLEANUP AND PROTECTION

A. During landscaping, keep pavements clean and work area in an orderly condition.

B. Protect landscaping from damage due to landscape operations, operations by other contractors and trades, and trespassers. Maintain protection during installation. Treat, repair, or replace damaged landscape work as directed.

3.11 DISPOSAL OF SURPLUS AND WASTE MATERIALS

A. Disposal: Remove surplus soil and waste material, including excess subsoil, unsuitable soil, trash, and debris, and legally dispose of it off the Owner's property.

3.12 PLANTING MIX

A. Provide soil amendments in not less than the following quantities per cubic yard:

1. Ratio of 1/3 peat moss/compost, 2/3 top soil by volume
2. Weight of manure per cu. ft. of backfill: 60 lbs
3. Weight of ironite per cu. ft.: 5 lb.
4. Weight of gypsum per cu. ft.: 75 lbs.
5. Weight of commercial fertilizer per cu. ft.: 4 lbs.

3.13 MAINTENANCE

A. Landscape maintenance: Maintain landscape until completion and acceptance of the entire project. Additional three months of maintenance shall include pruning, cultivating, weeding, watering and application of appropriate insecticides and fungicides necessary to maintain trees free of insects and disease.

1. Reset settled trees to proper grade and position. Restore top dressing material, which has blown away due to dryness or disturbed by maintenance operations, and remove dead material.

2. Correct defective work when deficiencies become apparent and weather and season permits.

3. Water trees within the first 24 hours of initial planting, and not less than twice per week.

3.14 ACCEPTANCE

A. Planted will be approved by the Landscape Architect at substantial completion of all working operations and recommend beneficial acceptance upon completion of specified compliance with specifications and requirements.

3.15 CLEANING

1. Perform cleaning during installation of the work and upon completion of the work. Remove all excess materials, soil, debris, and equipment from site. Repair damages resulting from planting operations.

SECTION 028100
IRRIGATION SYSTEMS

1. GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and General Provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes valves, piping, sprinklers, specialties, accessories, controls, and wiring for lawn irrigation systems.

B. This Section includes valves, piping, sprinklers, specialties, accessories, controls, drip, and wiring for shrubbery irrigation systems.

C. Related Sections: The following Sections contain requirements that relate to this Section:

1. SECTION 028061 "LANDSCAPING"
2. SECTION 108009 "DRINKING FOUNTAIN"
3. SECTION 154100 "PLUMBING FIXTURES"

1.3 DEFINITIONS

A. Pipe sizes used in this Section are nominal pipe size (NPS) in inches. Tube sizes are Standard size in inches. Equivalent SI (metric) sizes are indicated in millimeters (mm) in parentheses.

B. Supply Piping: Piping from water source to connection to irrigation system pressure piping. Piping is under same pressure as water supply. Piping in this category is not included in this Section.

C. Pressure Piping: Piping downstream from supply piping to and including control valves. Piping is under irrigation system pressure. Piping in this category includes pressure regulators, water meters, and backflow preventers, when used.

D. Circuit Piping: Piping downstream from control valves to irrigation system sprinklers, drip, and devices. Piping is under pressure (less than pressure piping) during flow.

E. Control Valve: Manual or automatic (electrically operated) valve for control water flow to irrigation system zone.

1.4 SYSTEM PERFORMANCE REQUIREMENTS

A. Location of Sprinklers and Devices: Design location is approximate. Make minor adjustments necessary to avoid plantings and obstructions such as signs and light standards.

B. Minimum Water Coverage: Not less than:

1. Turf Areas: 100 percent.
2. Other Planting Areas: 100 percent.

C. Components and Installation: Capable of producing piping systems with the following minimum working pressure ratings except where indicated otherwise.

1. Pressure Piping: 150 psig.

1.5 SUBMITTALS

A. General: Submit the following according to the General Provisions.

B. Product data including pressure rating, rated capacity & settings, for the following:

1. Backflow preventers, Certification
2. Valves, including general-duty, underground, automatic control, and quick-coupler types, and valve boxes.
3. Sprinklers, sub surface drip and devices.
4. Controls, including controller wiring diagrams.

C. Submit written manufacturers standard operating and maintenance instructions, upon irrigation systems acceptance.

D. Submit reproducible irrigation system record drawings (as built).

1.6 QUALITY ASSURANCE

A. Comply with requirements of utility supplying water for prevention of backflow and backsiphonage.

B. Comply with requirements of authority with jurisdiction for irrigation systems

C. Installer Qualifications: Engage an experienced Installer who has completed irrigation systems similar in material, design, and extent to that indicated for Project that have resulted in construction with a record of successful in-service performance.

1.7 PROJECT CONDITIONS

A. Perform site survey, research city utility records, and verify existing utility locations. Verify that irrigation system piping may be installed in compliance with original design and referenced standards.

B. 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 and approved by the Landscape Architect

C. Protect existing or newly installed work, trees, plants, lawns, and other features designated to remain as part of the final landscape work. Promptly repair damage caused by irrigation system work. Cost of repairs is contractor's expense.

D. Promptly notify Landscape Architect of unexpected subsurface conditions.

E. Coordinate irrigation system work with landscape work specified in SECTION 028061 "LANDSCAPING".

2. PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Water Meters:

a. Existing at the bathrooms for the drinking fountain.

2. Irrigation Meters:

a. 1" Irrigation meters (3)

3. Backflow Preventers:

a. Febco 765, 1"

5. Battery Operated Valves

a. Hunter SVC 100 * SVC 200 Valves:

6. Control Valve Boxes:

a. Ametek by Plymouth Products Div., AMETEK, 10". & Jumbo Boxes

7. Quick Couplers:

a. Nelson or approved equal.

8. Sub-Surface Drip

a. Toro DL 2000

2.2 PIPES

A. Polyvinyl chloride pipe: ASTM D2241, rigid, unplasticized PVC, extruded from virgin parent material. Provide pipe homogenous throughout and free from visible cracks, holes, foreign materials, blisters, wrinkles and dents.

1. 3" diameter and under: SDR 21, Class 200.

2.3 PIPE AND TUBE FITTINGS

A. PVC pipe fittings: ASTM D2241 schedule 40 PVC molded fittings suitable for solvent weld, slip joint ring tight seal, or screwed connections.

1. Size slip fitting socket taper to permit a dry unsoftened pipe end to be inserted no more than halfway into the socket.
2. Schedule 80 PVC pipe may be threaded.

B. Insert fittings: ASTM D2466 insert type fittings.

1. Saddle and cross fittings not permitted.

2.4 BACKFLOW PREVENTERS

A. Febco Model 765, 1"

B. Description: Manufacturer's standard control valves for circuits, of type and size indicated.

2.5 QUICK COUPLER VALVE

1. 1" with key and swivel provided a total (3) to the owner. Install quick coupler valves in valve boxes.

2.6 VALVE BOXES

A. Control Valve Boxes: Tapered enclosure of rigid plastic material comprised of fibrous components chemically inert and unaffected by moisture corrosion and temperature changes. Provide lid of same material, green in color.

1. 1.10" deep x 13" diameter base dimension.
2. Drainage Backfill: Cleaned gravel, graded from 3 inches maximum to ¾" minimum.

2.7 ACCESSORIES

A. Backfill: Clean soil free of stones larger than 2" diameter, foreign matter, organic material, and debris. Suitable excavated materials removed to accommodate the irrigation system work may be used as fill material subject to the Landscape Architect review and acceptance.

B. Clamps: Stainless steel, worm gear hose clamps.

3. EXECUTION

3.1 EXAMINATION

A. Investigate and determine available water supply water pressure and flow characteristics.

B. Examine final grades and installation conditions. Do not start irrigation system work until satisfactory conditions are corrected.

3.2 PREPARATION

A. Set flags to identify proposed sprinkler locations. Obtain Architect's approval before excavation.

3.3 EARTHWORK

A. Excavation, trenching, and backfilling.

3.4 PAVING WORK

A. Install piping in sleeve under promenade walk. Some are bored and some are tunneled under existing walks. Refer to irrigation plan.

3.5 PIPING INSTALLATION

A. Excavation and backfilling: Excavation shall include all materials encountered, except materials that cannot be excavated by normal mechanical means. Excavate trenches of sufficient depth and width to permit proper handling and installation of pipe and fittings. If the pulling method is used, the pipe "plow" shall be a vibratory type. Starting and finishing holes for pipe pulling shall not exceed a 1'-0" by 3'-0" opening.

1. Fill to match adjacent grade elevations with approved earth fill material. Place and compact fill layers not greater than 8" depth. Provide approved earth fill, sand, excavated, or topsoil fill material free of debris and rocks larger than 1" in any dimension.
2. Install irrigation mains with a minimum cover of 15" based on finished grades. Install irrigation laterals with a minimum cover of 12" based on finished grades.
3. Excavate trenches and install piping and fill during the same working day. Do not leave open trenches or partially filled trenches open overnight.

B Plastic Pipe:

1. Install plastic pipe in accordance with manufacturer's installation instruction. Provide for thermal expansion and contraction. Where piping is shown under paved areas which are adjacent to turf areas, install the piping in the turf areas.
2. Ensure square cuts. 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 pipe fittings in accordance with pipe manufacturer's instructions. Contractor shall make arrangements with pipe manufacturer for all necessary field assistance.
4. Make plastic to metal joints with plastic male adapters.
5. Make solvent weld joints in accordance with manufacturer's recommendations.
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.

C. Subsurface Drip, fittings, valves and accessories.

1. Install fittings, valves, subsurface drip and accessories per manufacturer's instructions.
2. Obtain Landscape Architect's review and acceptance of drip rows, supply lines, rain sensor and valves prior to installation.
3. Install quick-coupling valves with an adjustable double swing joint riser.
4. Install backflow prevention valve, fittings, and accessories as required to complete the system.

D. Flushing, Testing and Adjustments

1. Flush and perform system testing upon completion of each section. Make necessary repairs and retest repaired sections as required.
2 Adjust all electric remote control valves flow control stems for system balance.
3 Test and demonstrate the controller by operating appropriate day, hour and station selection features as required to automatically start and shut down irrigation cycles.

3.6 VALVE INSTALLATION

A. Valves: Install underground valves in valve boxes or pits.

1. Install in-ground control valves in a valve access box as indicated.
2. Install valve access boxes on a suitable base of gravel to provide a level foundation at proper grade and to provide drainage of the access box.
3. Seal threaded connections on pressure side of control valves with teflon tape or approved plastic joint type compound.

B. Control Valves: Install in valve control valve boxes, arranged for easy adjustment and removal. Location to be approved by Parks & Recreation Department.

3.7 BACKFLOW PREVENTER INSTALLATION

A. Installer shall verify and certify that the pressure assembly is according to plumbing code and health department authorities with jurisdiction.

3.8 CONNECTIONS

A. Connect piping to sprinklers, devices, valves, control valves, specialties, and accessories.

B. Connect water supplies to irrigation systems. Include backflow preventers on potable water supplies.

3.9 FIELD QUALITY CONTROL

A. Testing:

1. Flush and perform system testing upon completion of each section. Make necessary repairs and retest repaired sections as required.
2. Repair leaks and defects with new materials and retest system or portion thereof until satisfactory results are obtained.
3. Adjust all electric remote control valves flow control stems for system balance.
4. Test and demonstrate the controller by operating appropriate day, hour and station selection features as required to automatically start and shut down irrigation cycles.

3.10 CLEANING AND ADJUSTING

A. Flush dirt and debris from piping before installing drip lines and other devices.

B. Adjust automatic control valves to provide flow rate of rated operating pressure required for each drip zone.

C. Carefully adjust drip lines.

D Adjust settings of controller/ automatic control valves.

3.11 DEMONSTRATION

A. Demonstrate to Architect that system meets coverage requirements and that automatic controls function properly.

B. Demonstrate to City's maintenance personnel operation of equipment, valves, specialties, and accessories. Review operating and maintenance information.

C. Provide 7 days' written notice in advance of demonstration.

3.12 DISPOSAL OF WASTE MATERIAL

A. Stockpile and dispose of waste materials, including unsuitable excavated materials. Maintain site clear, clean and free of debris.

3.13 ACCEPTANCE

A. Test and demonstrate to the Landscape Architect the satisfactory operation of the system free of leaks. Instruct the City's designated personnel in the operation of the system, including adjustments of drip, valves and battery operated controller.

B. Acceptance is defined as the date on which the City officially accepts the project. Said date is also the point at which the one year guarantee begins.

3.14 CLEANING

A. Perform cleaning during installation of the work and upon completion of the work. Remove from site all debris and equipment. Repair damage resulting from irrigation system installation.