

**TECHNICAL SPECIFICATIONS  
FOR  
DEAN ROAD LANDSCAPE IMPROVEMENTS**

**CITY OF BUCKEYE  
CONTRACT NO. 2014-09**



**March 2015**

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For the purpose of the Technical Specifications, both MAG standards and ADOT standards noted and revised shall be used for the City’s project; however where a direct conflict exists between the Technical Specifications and the City’s General Conditions, the more stringent will prevail.

## PROFESSIONAL ENGINEER SEALS

This book of specifications and related contract documents represents the efforts of the following firms:

(1) Kimley-Horn and Associates, Inc. (KHA)

A representative of various disciplines have affixed his/her professional seal below, which attests that those portions of these specifications, which relate to their respective discipline area, were prepared under his/her direction.

Kimley-Horn and Associates, Inc. (KHA)



Expires 03/31/2016

## PART 100 – GENERAL CONDITIONS

The City of Buckeye Engineering and Design Standards can be accessed at <http://www.buckeyeaz.gov/developers/engineering/> are part of these contract documents.

The "Uniform Standard Specifications for Public Works Construction" which are sponsored and distributed by the Maricopa Association of Governments (MAG), and which are hereinafter referred to as the "MAG Standard Specifications," are hereby adopted as part of these contract documents. Copies of these documents, with revisions, may be obtained at the Maricopa Association of Governments, 302 North 1st Avenue, Phoenix AZ 85003.

The Maricopa County Department of Transportation Supplement to the MAG Standard Specifications is also adopted as part of these contract documents. Copies of these documents may be accessed at: [http://www.mcdot.maricopa.gov/technical/engineering/manuals/2015\\_Suppl.pdf](http://www.mcdot.maricopa.gov/technical/engineering/manuals/2015_Suppl.pdf).

### SECTION 101 ABBREVIATIONS AND DEFINITIONS:

#### 101.2 Definitions and Terms

The following additions are made to definitions in Section 101.2 of the MAG Standard Specifications:

|                             |                               |
|-----------------------------|-------------------------------|
| Contracting Agency:         | City of Buckeye, Arizona      |
| Owner:                      | City of Buckeye, Arizona      |
| Design Landscape Architect: | Kimley-Horn                   |
| Survey:                     | Survey Innovation Group, Inc. |
| Engineer:                   | To be appointed               |
| Project Manager:            | To be appointed               |
| Owner's Representative:     | To be appointed               |
| Inspector:                  | To be appointed               |

The Engineer, Project Manager and/or an Owner's Representative may all be a same person and will be appointed by the City to represent the City of Buckeye.

## **SECTION 104 SCOPE OF WORK:**

### **104.1 Work to be Done:**

Section 104.1 of the MAG Standard Specifications is modified to add:

The landscape improvements project is located on the east side of Dean Road within in the City of Buckeye, Maricopa County. The project limits are generally from the Roosevelt Irrigation District canal right-of-way north to Yuma Road. The project includes the construction of a concrete sidewalk, and the installation of landscape materials within the Dean Road right-of-way. The work consists of subgrade preparation, new sidewalk, decomposed granite, landscaping, irrigation, and other related incidental work.

The above items of work along with the construction requirements are adequately described and defined in the Uniform Standard Specifications and Details for Public Works Construction sponsored and distributed by the Maricopa Association of Governments (MAG) together with the City of Buckeye and MCDOT supplements thereto, latest revisions, or within these technical specifications.

The information written into these project technical specifications will:

- Describe any special or unusual conditions
- Explain details of the work not covered in the MAG Specifications and Details
- Relate certain work to specific bid items or payment quantities
- Contain the specifications and/or drawings and specifications of this project.

### **104.1.5 Pre-construction video**

Contractor shall provide a copy of a pre-construction video to the City of Buckeye prior to commencing work and retain a copy for their records; at a minimum, this video shall show the existing condition of the roads adjacent to the project, condition of landscaping and fences in close proximity of the work, and the like. There will be no measurement or payment for this video.

### **104.2.6 Value Engineering Proposals by the Contractor**

Proposals may be submitted to the Engineer for modifying the plans, specifications, or other requirements of the contract for the sole purpose of reducing the total costs of construction without impairing in any manner the essential functions or characteristics of the project, including service life, economy of operations, ease of maintenance, benefits to traveling public, desired appearance or design and safety standards.

After execution of the contract, an initiative may be recommended by the Contractor. The initiative must be identified as a Value Engineering Proposal (VEP), and may

include modifications to the plans or specifications, construction phasing procedures, or other contract requirements.

Any cost savings generated to the contract as a result of the VEP offered by the Contractor and approved by the City will be shared equally between the Contractor and the City.

Bid prices are not to be based on the anticipated approval of a VEP. Additional costs should be included in the VEP for the engineer's evaluation and/or re-design that may be required for the VEP. If a VEP is rejected, the contract shall be completed in accordance with the original terms of the contract or as otherwise modified.

Any decision whether to approve or accept a VEP shall be within the sole discretion of the City. The City will bear no liability for any delay in considering a VEP, the refusal to accept or approve such a proposal, or any other matter connected with a VEP.

## **GENERAL INFORMATION**

The following items, though not a comprehensive list, are non-payment items being considered incidental to the project, the costs of which are to be included in project overhead or within other specific bid items:

Clearing and Grubbing  
Dust Control  
Temporary construction fencing  
Locating (or potholing) of new or existing utilities  
SWPPP Preparation and Document Maintenance  
SWPPP Best Management Practices (BMPs) installation and maintenance  
Contractor's site office or yard  
Hauling routes, construction entrances, or staging/stockpile yards  
Roadway sweeping  
Any and all permits - preparation costs and permit fees  
Protective fencing or plating for open trenches  
As-builts

## **CONTRACT STANDARD SPECIFICATIONS AND DRAWINGS**

The following Standard Specifications and Standard Drawings referenced in the project contract documents are required for construction of this project:

- City of Buckeye Engineering Design Standard Specifications and Details, latest adopted edition
- Maricopa Association of Governments (MAG) Uniform Standard Specifications for Public Works Construction, latest edition

- Maricopa Association of Governments Uniform Standard Details for Public Works Construction, latest edition
- Maricopa County Department of Transportation (MCDOT) Supplement to MAG Uniform Standard Specifications, latest edition
- AASHTO Manual of Uniform Traffic Control Devices, latest edition

## **CONSTRUCTION RESTRICTIONS**

General: The Contractor shall perform construction activities between normal work hours; 7 a.m. to 5 p.m., Monday through Friday excluding national holidays and holiday weekends, except as approved by the City.

Night work may be established by the Contractor as regular procedure with written permission of the City of Buckeye, and will be subject to the City's Noise Ordinance. Such permission may be revoked at any time by the City of Buckeye.

Work outside these hours may be permissible provided a construction schedule has been prepared, submitted to and found acceptable to the City of Buckeye. The schedule shall identify the details of the work to be performed, including the location and duration of planned activities. Submittals shall be made a minimum of seven days prior to the planned work to allow sufficient time for the City to review the request and schedule any necessary inspections and testing services that occur outside the normal and excepted working hours indicated above.

## **TRAFFIC CONTROL**

Traffic control shall be provided and maintained in accordance with the latest edition of the Manual of Uniform Traffic Control Devices and the City of Phoenix Barricading Manual, Maricopa County Department of Transportation, MAG Uniform Standard Detail 401, and City requirements. The Contractor is required to submit a Traffic Control Plan and Barricade Plan to the City for approval where the construction of the new improvements are adjacent to or connecting to any existing roadway or pedestrian facilities. The Traffic Control Plan and Barricade Plan shall be approved before a permit for the work will be issued. The Contractor shall install approved barricading and traffic control, as approved by the City, before work can take place. All overnight barricades shall be lit and functioning.

All required traffic control work for the project is being paid for under bid item 401.01000.

## **SAFETY FENCING FOR TRENCHES AND EXCAVATIONS**

The Contractor shall provide safety construction fencing around all open trenches and excavations during all non-working hours.

The Contractor shall provide for the safety and welfare of the general public by adequately fencing all excavations and trenches that are permitted by the Engineer to remain open when construction is not in progress.

Fencing shall be securely anchored to approved steel posts located six (6) feet on center, having a minimum height of six (6) feet, and shall consist of wire mesh fabric of sufficient weight and rigidity to adequately span a maximum supporting post separation of six (6) feet.

The fencing, when installed about the periphery of excavations and trenches, shall form an effective barrier against intrusion by the general public into areas of construction. The Contractor, at all times when construction is not in progress, shall be responsible for maintaining the fencing in good repair, and upon notification by the Engineer, shall take immediate action to rectify any deficiency. Prior to the start of any excavation or trenching required for the execution of the proposed work, the contractor shall submit to the Engineer for approval, detailed plans showing types of materials and methods of fabrication for the protective fencing.

There will be no separate measurement or payment for furnishing, installing, or maintaining protective fencing. The cost shall be considered included in other bid items for which the fence is necessary.

## **SOILS INFORMATION**

No geotechnical report was prepared for this project.

## **GENERAL REQUIREMENTS**

### **Measurement and Payment for Various Work Items:**

Utilities:

The contractor shall be responsible for determining exact location of utilities if present.

Subgrade Preparation:

Subgrade preparation shall be incidental to Bid Item 340.01210 Concrete Sidewalk, MAG Det. 230 and Bid Item 430.42000 Decomposed Granite, 2" thick.

All other materials removed and not designated to be salvaged or incorporated into the work shall become the property of the contractor.

The contractor shall not remove or damage any existing private improvements outside the right of way. Private improvements cannot be removed by the contractor unless

otherwise shown on the project plans. The contractor shall repair any damaged improvements at his own expense.

All new construction shall be completed within the public right of way areas shown on the project plans.

When working in the vicinity of mailboxes, the contractor shall maintain access to the mailboxes for mail delivery and pickup.

## **SECTION 105 CONTROL OF WORK:**

### **105.2 Plans and Shop Drawings:**

Section 105.2 of the MAG Standard Specifications is modified to add:

All materials and equipment not provided by City of Buckeye shall be approved by the Engineer prior to purchasing and installation. Any work in which materials or equipment not previously approved by the Engineer are used shall be performed at the Contractor's risk and may be considered as unauthorized and unacceptable and are not subject to the payment provisions of the contract. Such materials or equipment may be subject to removal at the discretion of the Engineer.

Before ordering or installing any material or equipment, the Contractor shall submit four (4) copies of each proposed material and/or equipment list, including shop drawings to the City for approval by the Engineer. To be acceptable, the list shall be complete and contain all items supplied on the project by the Contractor, including pre-approved items. The City of Buckeye reserves the right to reject an incomplete or unclear material submittal. All items on the list shall be identified by manufacturer's part number, model, specification or other pertinent catalogue information. The materials from any catalog cuts shall be clearly indicated by the Contractor. One (1) copy will be returned to the Contractor for further action.

All equipment or material specified or shown on plans, or other drawings, by brand name, part number, or model number is intended to be descriptive of the type and quality of material or equipment desired. Another equal brand name, part number, or model number may be substituted so long as it is in accordance with these specifications and is equal in form, fit, function, performance, reliability, and is approved by the Engineer.

#### **Materials**

The Contractor shall furnish to the City of Buckeye's Engineer product data, material certificates of compliance, mix designs and shop drawings in sufficient detail to show complete compliance with all specified requirements, including but not necessarily limited to the following:

- Soil Amendments and Conditioner
- Decomposed Granite
- Herbicides
- Fertilizer

Product data shall include information such as the manufacture's printed recommendations, compliance with recognized trade association standards, application of testing agency labels and seals, product dimensioning, and notation of coordination requirements.

The Certificates shall be prepared by the Manufacturer or testing agency thereof and should include technical specifications and compliance with industry trade association and testing agency standards.

#### Distribution and Review

The Contractor shall anticipate and schedule for a two week review period by the City of Buckeye and/or its designee during which time the City will approve, disapprove, or request modifications. The latter two will require re-submittal of the material and a subsequent additional review period. This process shall be repeated until all submitted materials have been approved.

Shop drawings shall be on sheets in standard size increments between 8 ½" X 11" and 24" x 36". All drawings shall indicate the name of the job, the City's job number, date, names of the Contractor, Subcontractor and Preparer, and the date of approval by the Contractor. All other data, certificates or mix design reports shall be presented on 8 ½"x11" formats, or as provided by the Supplier/Manufacturer.

#### **105.6 Cooperation with Utilities**

Section 105.6 of the MAG Standard Specifications is modified to add:

The Contractor shall notify the affected utility companies and Blue Stake (263-1100) prior to the start of construction and shall ascertain the approximate locations of the various underground utilities either shown on the plans and/or as may be brought to his attention by the utility companies. The exact locations of underground utilities shall be determined by "potholing" by the Contractor prior to any trenching or excavation operations.

No utility conflicts are anticipated, however, It shall be the Contractor's responsibility to notify Blue Stake at 602-263-1100 (1-800-STAKE-IT), field verify utility locations if existing and to coordinate in a timely manner with the pertinent utility companies so that any obstructing utility installation may be adjusted without delay to the Contractor's

project schedule.

The Contractor shall be responsible for potholing all utility conflicts in a timely manner; the cost for potholing new or existing utilities shall be included in the cost for other items of work.

### **105.7 Cooperation between Contractors**

Section 105.7 of the MAG Standard Specifications is modified to add:

The Contractor is hereby notified of the following proposed projects that may be ongoing during the project improvements. There will be no separate measurement or payment for the needed coordination, providing needed access, and sequencing of construction that may be needed for these projects.

Sundance Parcel 48 and 49A Drainage Improvements:

This project to install channel protection for an existing residential offsite drainage channel located adjacent to this project area may be ongoing. The project is currently under design development and no construction schedule is available as of writing of these requirements.

The Contractor is hereby notified of this project and shall coordinate work with this project and shall make no claim for any delays that may be associated with the City's Sundance Parcel 48 and 49A drainage improvements project.

### **105.8 Construction Stakes, Lines and Grades**

MAG Section 105.8, Construction Stakes, Lines and Grades are deleted and replaced with the following:

The Contractor shall furnish all materials, personnel, and equipment necessary to perform all surveying, staking, laying out of control lines and verifications of the accuracy of all existing control points which are delineated in the Contract Documents. The work shall be done under the direction of a Registered Land Surveyor licensed to practice in the State of Arizona.

**Staking Outline:** Prior to beginning any survey operations, the Contractor shall furnish to the City of Buckeye Project Manager, for approval, a written outline detailing the method of staking, interval of stakes, marking of stakes, grade control for various courses of materials, referencing, structure control, and any other procedures and controls necessary for survey completion. A part of this outline shall also be a schedule which will show the sequencing of the survey and layout work, throughout the course of the contract, listing a percentage of completion for each month.

**Field Books:** The Contractor shall furnish field books to be used for recording survey data and field notes. These books shall be available for inspection by the City at any time and shall become the property of the City upon completion of the work.

**Survey Control Verification:** The Contractor shall be responsible to stake construction elevations tied to the prime bench mark.

Coordinate and elevation information for other monuments and benchmarks has been provided in the project plans. If a discrepancy is discovered with respect to project elevations, the project prime benchmark will override all other monuments and/or benchmarks.

- a. **Control Points (horizontal and vertical)** – The existence and location of all survey monuments, bench marks and control points shall be verified prior to demolition or construction activity. Immediately notify the City of Buckeye Project Manager when location discrepancies greater than two-hundredths (0.02) foot horizontal or one-hundredth (0.01) foot vertical are found.
- b. **Control Lines** – Construction control lines with grade breaks, transition points, horizontal and vertical curves, etc., shall be established and referenced prior to construction.
- c. **Temporary Bench Marks** – Temporary bench marks shall be established and referenced at this time.

**Pre-Construction Location Survey:** All existing features which are located prior to construction shall be referenced to survey monuments along control lines by stationing in accordance with the construction documents and by offset distance from the control lines. All features shall be relocatable after construction. Distances measured shall be within one-hundredth (0.01) foot.

- a. **Survey monuments** - All survey monuments that lie within the construction area that may be disturbed shall be referenced to a specific point on at least four (4) stable objects by distance measurement. Reference objects shall be located no greater than three-hundred (300) feet from the survey monument being referenced.
- b. **Water and Sewer line appurtenances** - Water and sewer line surface appurtenances such as manholes, valves and cleanouts that lie within the construction area shall be located and noted on the Contractor's approved construction documents prior to any demolition or excavation.
- c. **Match Points and Removals** - Verify the location (horizontal and vertical) of existing facilities to which the project connects. Immediately notify the City of Buckeye Project manager when location discrepancies of connecting facilities greater than one-tenth (0.10) foot horizontal or two-hundredths (0.02) foot vertical are found.

**Construction Stakes:** The Contractor shall set construction stakes and marks establishing lines and grades for road work, curbs, gutters, path, structures, buildings, centerlines for utilities and necessary appurtenances and other work as indicated in the

Contract Documents and shall responsible for their conformance with the plans and specifications.

The stakes shall be established in accordance with the following guidelines which represent the minimum standard and the Contractor shall provide additional stakes and controls necessary to perform the work. The Contractor shall be held responsible for the preservation of all stakes and marks and will replace, at no additional cost to the City, any construction stakes or marks which have been carelessly or willfully destroyed by any party.

**a. Sidewalks:**

1. Sidewalk shall be staked and installed prior to construction.
2. Cut/fill stakes for rough grade shall be set at one-hundred (100) feet intervals with cuts to the top of curb.
3. Finish grade stakes shall be set to sidewalk grade at twenty-five (25) feet intervals, at grade breaks, angle points, transitions, returns, sidewalk ramps and other curb control points. The stakes shall be tacked for line on a two (2) foot offset to the back of curb.
4. Sidewalk forms shall be checked for grade at flow line prior to placing concrete where longitudinal grades are one-tenth (0.10) percent or less.

**b. Landscaping:** The Contractor shall delineate the procedures and controls to be utilized in the Staking Outline.

There will be no separate measurement or payment for furnishing and installing staking. The cost shall be considered included in other bid items for which staking is necessary.

**105.8.3.2 Resetting Monuments:**

**(A) General:**

The Contractor shall be responsible to maintain all existing monumentation, including section line, right-of-way and roadway monumentation. Monumentation disturbed during construction shall be re-established by the Contractor and recorded at the appropriate county recorder's office, at no additional cost to the City.

**(B) Monumentation Standards:**

Section corner, quarter corner and property corner monuments shall be re-established following the procedures in the Manual of Surveying Instructions 1973, published by the U.S. Department of the Interior, Bureau of Land Management and all applicable statutes and requirements specified in the current Arizona State Board of Technical Registration's "Arizona Boundary Survey Minimum Standards."

**(C) Procedures:**

Section line, right-of-way and roadway monumentation re-established by the Contractor shall bear the registration number of the Land Surveyor in responsible charge of the location.

Monuments used to define section lines shall be stamped in accordance with Manual of Surveying Instructions 1973, published by the Department of Interior, Bureau of Land Management. Roadway monumentation shall be stamped in accordance with the requirements of the appropriate municipal jurisdiction.

Monuments that are re-established shall be recorded at the appropriate county recorder's office and a copy of the Corner Recordation documentation shall be submitted to the Construction Manager within five working days of recordation.

Any discrepancies in grade, alignment, earthwork quantities, locations or dimensions detected by the Contractor shall immediately be brought to the attention of the Construction Manager. No changes in the project plans will be allowed without the approval of the Construction Manager.

Inspection and Acceptance of Work: The City reserves the right to make inspections and random checks of any portion of the staking and layout work. If, in the City's opinion, the work is not being performed in a manner that will assure proper control and accuracy of the work, the City will order any or all of the staking and layout work redone at no additional cost.

**Measurement and Payment:**

Construction survey and staking will be measured by the lump sum.

**105.10 Inspection of Work**

Section 105.10, add the following:

The Contractor shall hire an independent third party Material Testing firm to perform Quality Control testing for the project. The City reserves the right to do Quality Assurance testing.

All material testing for the project shall be paid under bid item 112.01000 Contractor Quality Control.

## **SECTION 107 LEGAL REGULATIONS AND RESPONSIBILITY TO PUBLIC**

### **107.1 Laws to be Observed**

Section 107.1 of the MAG Standard Specifications is modified to add the following:

The City of Buckeye will endeavor to ensure in every way possible that small, minority and woman-owned business enterprises shall have every opportunity to participate in providing professional services, purchased goods and contractual services to the City of Buckeye without fear of discrimination based on race, religion, sex, age, disability or national origin. A Small Business, Minority and Woman-Owned Business Enterprise goal has NOT been established for this contract, however participation is encouraged.

### **107.2 Permits**

Section 107.2 has been revised to read:

It is Contractor's responsibility to obtain all permits and licenses, pay all fees, charges, and taxes and prepare all required notices for the lawful execution of the work. Permits for earth moving may be obtained from Air Pollution Control, Maricopa County Department of Environmental Management, 2406 South 24th Street, Suite E-214, Phoenix, Arizona 85034, Telephone Number (602) 506-6700. A copy of the earthmoving permit and dust control plan shall be submitted to the Engineer prior to commencement of any earthmoving activities.

#### **107.2.1 AZPDES (NPDES) Construction General Permit Requirements:**

Unless otherwise directed by the City, the Contractor shall be responsible for compliance with the Arizona Pollutant Discharge Elimination System (AZPDES) requirements administered by the Arizona Department of Environmental Quality (ADEQ).

##### **107.2.1.1 Regulation Compliance:**

The Contractor shall take all necessary measures to assure compliance of employees and subcontractors with the AZPDES Construction General Permit for Arizona as well as all other applicable federal, state and local laws, ordinances, statutes, rules and regulations pertaining to stormwater discharge and air, ground water and surface water quality. As the permittee, the Contractor is responsible for preparing, in a manner acceptable to the ADEQ and the EPA, all documents required by regulation, which shall include but not necessarily be limited to the following:

##### **107.2.1.1.1 Notice of Intent (NOI).**

##### **107.2.1.1.2 Stormwater Pollution Prevention Plan (SWPPP).**

### **107.2.1.1.3 Notice of Termination (NOT).**

#### **107.2.1.2 NOI Submittal:**

Preliminary copies of the NOI and the SWPPP shall be submitted to the City during the pre-construction conference and shall be subject to review by the City prior to implementation.

The Contractor shall ensure the completed and duly signed NOI form(s) are submitted in a timely manner to prevent a delay to project construction.

The AZPDES form shall be submitted to ADEQ's Phoenix office by certified mail or hand delivered to the address below:

Stormwater Program-Water Permits Section/NOI  
Arizona Department of Environmental Quality  
1110 West Washington, 5415B-3  
Phoenix, AZ 85007

The form may also be faxed to ADEQ at 602-771-4674 or submitted via "smart NOI" accessible from the ADEQ's website: <http://www.ev.state.az.us/environ/water/permits/stormwater.html>.

If the construction is near an impaired or unique water, the SWPPP shall be submitted with the NOI. Permit activation may require 32 business days or more for construction sites near impaired or unique waters, as well as for construction sites with special concerns, therefore documentation is to be submitted to ADEQ as early as possible (preferably at least 32 business days prior to the desired start of construction).

All local municipalities within the construction project limits shall be notified, as applicable. A copy of all submitted NOI forms shall be posted at the construction site. An additional copy shall be submitted to the Engineer.

#### **107.2.1.3 Time Extension:**

Failure by the Contractor or subcontractor of any tier to submit a NOI within the mandated time frame shall result in delay of the construction start date and no claims for extension of time will be granted for such a delay.

#### **107.2.1.4 SWPPP:**

The Contractor shall develop, implement, update and revise the SWPPP, as necessary, to assure compliance with permit requirements. The SWPPP shall be retained on the project site at all times during construction. Copies of forms and guidance for preparing

the SWPPP are available in the “Drainage Design Manual for Maricopa County, Volume III Erosion Control.” The manual is available at the Flood Control District, 2801 West Durango Street, Phoenix, Arizona 85009. In addition, a “Construction SWPPP Checklist” can be obtained from ADEQ for assisting in the preparation of the SWPPP.

#### **107.2.1.5 Inspections:**

Contractor shall perform inspections of all stormwater pollution control devices on the project once every fourteen (14) days and within twenty-four (24) hours of each 0.5-inch or greater storm event, as required under the provisions of the AZPDES Construction General Permit for Arizona. Contractor shall prepare reports on such inspections and shall retain the reports for a period of at least three (3) years following the completion of the project. Inspection reports shall be submitted monthly to the City along with progress payment requests. Additionally, Contractor shall maintain all stormwater pollution control devices on the project in proper working order, which shall include cleaning and/or repair during the duration of the project.

#### **107.2.1.6 NOT Submittal:**

Upon project completion, acceptance and demobilization, Contractor shall submit to the permitting agency a completed, duly executed Notice of Termination form for each NOI issued, with a copy to appropriate municipalities, thereby terminating all AZPDES permit coverage for the project. Contractor shall then provide to the City copies of the SWPPP, inspection information and all other documents prepared and maintained by the Contractor in compliance with the AZPDES Construction General Permit. Contractor shall retain the originals of such documents for a period of at least three (3) years following the completion of the project and make such documents available for inspection by representatives of the Environmental Protection Agency, the Arizona Department of Environmental Quality, the County, and any municipality having jurisdiction, upon request.

#### **107.2.1.7 Fines and Penalties:**

Fines and penalties imposed by the ADEQ or the EPA for Contractor’s failure to comply with any or all of the permit requirements shall be borne by the Contractor.

#### **107.2.1.8 Payment:**

The lump sum price for AZPDES shall include all material, labor, and costs relating to the NOI, NOT, and the SWPPP. This includes but is not limited to the preparation, installation, maintenance, and removal of temporary SWPPP elements, assuring proper operation of the pollution control devices installed, and all maintenance, cleaning, and disposal costs associated with clean-up and repair following storm events, runoff or releases on the project. The lump sum price for AZPDES shall be inclusive of all related costs, and no additional claims shall be made by the Contractor under any other

specification provision, including changed conditions. Contractor shall be compensated for this bid item at a rate of 25% of the total bid price with the first progress payment, with the remaining 75% prorated over the entire length of the project.

### **107.7 Barricades and Warning Signs**

Section 107.7 of the MAG Standard Specifications is modified to add the following:

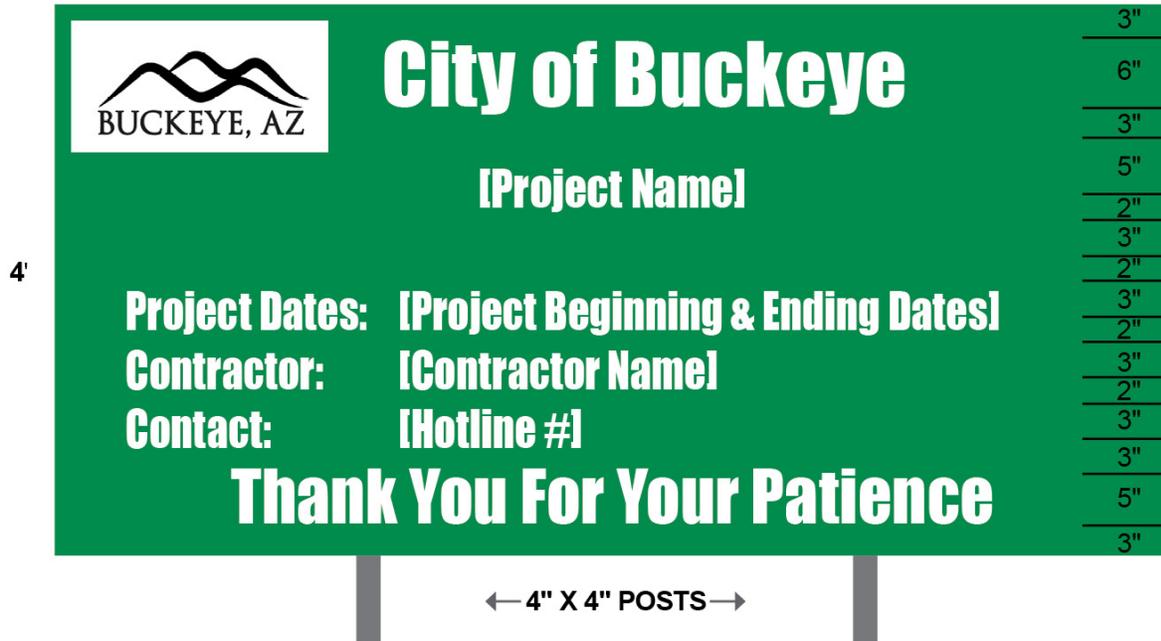
Construction Signs:

It shall be the responsibility of the Contractor to furnish and erect construction project signs in accordance with this Specification. The project signs shall be professionally prepared and subject to approval by the City, shall be maintained by the Contractor for the duration of the project and shall be removed by the Contractor during the final project clean up. Sign locations shall be determined by the City. The cost for the project sign(s) shall be considered included as part of other contract items. No separate payment will be made for the construction project sign(s).

The number of signs required, the size, shape, installation requirements and information to be included for construction signs are established in the paragraphs and detail provided below:

**CONSTRUCTION SIGN DETAIL**

8'



The Contractor shall provide a 4-foot by 8-foot green signboard, as detailed herein. Typical project identification sign for general projects shall be non-reflectORIZED green background and non-reflectORIZED white letters and numerals. Letter height and spacing shall be as shown on the attached detail. Lettering shall be manufactured according to the Federal Manual on Uniform Traffic Control Devices (MUTCD) using Type “C” letters. Sign shall list the following information:

1. Project Name
2. Project Dates (Scheduled beginning and ending dates.)
3. Construction Contractor Name
4. Contractor hotline number for project **and** City email address

The hotline number for the project will be supplied by the Contractor. The hotline is intended to be an answering service that actually answers the phone 24/7. The Contractor shall have a contact that is familiar with the project and will be reachable 24/7 to respond to any emergency that may arise in off work hours.

**The hotline cannot be a 24 hour “answering machine.”**

The Contractor shall submit a layout drawing to City Construction Manager for approval showing the location, size and color of lettering and logos. Sign supports shall be 4-inch by 4-inch pressure treated posts, set a minimum of 2-feet in the ground. The bottom of the sign shall be a minimum of 4-feet above the ground. All required construction signs shall be installed by the Contractor within seven days of issue of the Notice to Proceed. The sign shall be maintained in good condition until the completion of the Contract, at which time the sign shall become the property of the Contractor. One sign shall be erected for buildings and other limited area single sites. For multiple sites, one sign shall be erected at each site. For linear projects one half mile or longer, place one sign at each end of the project.

## **SECTION 109 MEASUREMENTS AND PAYMENTS**

Add the following subsections to the MAG Standard Specifications:

### **109.10 Mobilization**

Mobilization:

The City of Buckeye will compensate Contractor for one-time, round trip mobilization/demobilization of Contractor's personnel, equipment, supplies and incidentals, establishment of offices, buildings and other facilities required for the performance of the work on the project, as well as preparatory work and operations prior to the commencement of the work on the project site.

Measurement:

Measurement of all work completed under the contract will be measured by the Engineer according to United States standard measures. The methods of measurement and computation to be used in determination of quantities of materials furnished and of work performed under the contract will be those methods generally recognized as conforming to good engineering practice. Mobilization/demobilization will be measured for payment by the lump sum as a single complete unit of work.

Payment:

Payment for pay items in the proposal will be as indicated in the applicable standard specification or in the special provisions.

Payment for mobilization/demobilization, measured as provided above, will be made at the contract lump sum price. Payment shall be made in equal one-third portions. The first payment will be paid with Contractor's initial billing. The second payment will be made when the total payments to Contractor for the bid items, exclusive of payments for mobilization/demobilization, equals one-half of the total bid by Contractor, exclusive of mobilization/demobilization. The remaining one-third will be paid as part of the second

to last progress payment. Final payment due Contractor will be for retention.

When other contract items are adjusted as provided in Section 109, and if the costs applicable to such items of work include mobilization costs, such mobilization costs will be considered as recovered by Contractor in the lump sum price paid for mobilization, and will be excluded from consideration in determining compensation under Section 109.

If the Contractor performs a second mobilization/demobilization of personnel, material and/or equipment at the Engineer's express written request, the City will compensate the Contractor for such expenses at the Contractor's actual costs. The Contractor shall provide all documentation for these costs at the request of the Engineer.

Add the following new MAG Section:

## **SECTION 112      CONTRACTOR QUALITY CONTROL**

### **112.1      Work Specified Herein:**

This Section outlines requirements covering testing laboratory services and inspection required during the course of construction of the Project. Testing, when required, will be in accordance with pertinent codes and regulations and with selected standards of the American Society for Testing and Materials.

The Contractor shall select a pre-qualified City testing laboratory firm and will pay for material testing services of the testing laboratory as further described in this Section. Cooperate with the selected testing laboratory and all others responsible for testing and inspecting the Work.

Provide other testing and inspecting as specified to be furnished by the Contractor in this Section and/or elsewhere in these Specifications.

Conform to MAG Section 106, "Control of Materials."

### **112.2      Testing:**

The contractor shall pay for initial testing services required by the City. Additional tests, required due to failure of the initial compliance testing, shall be paid for by the Contractor.

Inspections and tests required by codes or ordinances, or by a plan approval authority, and which are made by a legally constituted authority, shall be the responsibility of and shall be paid for by the Contractor, unless otherwise provided in the Contract Documents.

Inspecting and testing performed exclusively for the Contractor's convenience shall be the sole responsibility of the Contractor.

Representatives of the testing laboratory shall have access to the Work at all times. Provide facilities for such access in order that the laboratory may properly perform its function.

Specimens and samples for testing, unless otherwise provided in the Contract Documents, will be taken by the testing personnel. Sampling equipment and personnel will be provided by the testing laboratory. Deliveries of specimens and samples to the testing laboratory will be performed by the testing laboratory.

#### Testing Laboratory Services:

1. All public Improvement Construction within the public right-of-way and onsite site improvements shall be conducted in accordance with, and conform to, the latest edition of the uniform standard specifications for Public Works Construction and Uniform Standard Details for Public Works Construction, Both as published by the Maricopa Association of Governments (M.A.G.).
2. Inspection of work per M.A.G. 105.10: The Engineer shall be permitted to inspect all materials, and each part or detail of the work at any time for the purpose of expediting and facilitating the progress of work. He shall be furnished with such information and assistance by the contractor, as is required to make a complete and detailed inspection. The City Engineer requires that the actual test result data sheet accompany all compaction test results submitted to the city's inspector. Pass/Fail statements are not acceptable without the attached data sheet. Failure to submit the test result data sheets will result in an incomplete submittal and the test will be rejected.
3. Testing laboratory shall report the results of all tests, in writing simultaneously to the following:

|                      |          |
|----------------------|----------|
| Engineer             | 2 copies |
| Contractor           | 2 copies |
| Owner Representative | 2 copies |
4. The office of the City Engineer shall be notified at least forty-eight (48) hours prior to the commencement of any work within the city right-of-way.
5. Contractor is to notify all public utilities at least two (2) working days prior to construction, for field locations of their respective facilities, by contacting the following: BLUE STAKE NUMBER: 1-800-782-5348.
6. Contractor shall give notice to the Owner's Representative and the City of Buckeye Engineer not less than three (2) working days in advance of when

he/she will perform construction testing services in connection with any portion of the work. Notification(s) in written format to the appropriate agency(s) shall be the Contractor's responsibility. The Owner's Representative will be copied on all notifications. If inspections are not performed, the Work will be subject to being uncovered and inspected and replaced by the Contractor accordingly. All Work associated with this process will be the financial responsibility of the Contractor.

7. Compaction testing is required and must be performed in the presence of a representative of the City Engineer.

**BACKFILL:** Backfill within the public utility easements and within public street right-of-way compact to 95% of maximum theoretical density per ASTM D698. All materials outside the moisture limit shall be considered unsuitable, and subject to removal. No hydraulic compaction or water jet compaction will be allowed. All compaction must be done by mechanical means. Moisture limit spec: 2.0 percent below optimum moisture, material shall be uniform.

8. Compaction testing for sub-grade will be done after the sub-grade has been string lined and is within tolerance and accepted by the City Engineer. The City Engineer or his representative will direct the number and location of density tests. All sub-grades shall have a blue-top elevation set to finished grade and left and right edges of pavement, and centerline of roadway.
9. One (1) sand cone test shall be required for every ten (10) nuclear density tests performed, or when requested by the City Engineer or his representative. The City Engineer or Engineer's representative shall determine the locations of these sand cone tests.
10. Compaction densities: M.A.G. type I Backfill material (Section 601.4.4) is modified to include areas under the pavement, right-of-way, and easements for all trenches including sewer, water, electric, gas, telephone, and storm drains, moisture spec. 2.0 percent below optimum moisture compact to 95% of maximum theoretical density. All materials outside the moisture spec-limit shall be considered unsuitable, subject to removal and material shall be uniform.
11. All curb, gutter and sidewalk expansion joint filler will be ½" bituminous pre-molded strips. All expansion joint spacing shall not exceed a maximum of (50') feet or as directed by the City Engineer. Concrete curing compound material shall be a white pigment membrane used on all concrete structures including curb & gutter, sidewalk, headwall, catch basins and sidewalk ramps.

**112.3 Payment:**

The sampling and testing under this section will be paid under, CONTRACTOR QUALITY CONTROL, bid item 112.01000.

**PART 200 – EARTHWORK**

**SECTION 201 CLEARING AND GRUBBING**

**201.1 Description:**

This work shall consist of removing objectionable material from areas within the limits of work as delineated on the project plans. Such limits may extend beyond the right-of-way to a noted distance or to an obstruction, such as a perimeter wall.

**201.3 Construction Methods:**

Any vegetation identified on the plans as to be preserved in place will be fenced with temporary protective fencing as shown on the plans, or as needed by proximity to high traffic construction areas. Vegetation that is willfully removed or that dies as a result of neglect, careless construction, or trampling of roots will be replaced in kind to the City of Buckeye in a location selected by the Owner, within the boundaries of the City of Buckeye.

**201.5 Payment, Clearing and Grubbing:**

Section 201.5 of the MAG Standard Specifications is modified to add the following:

No payment will be made for clearing and grubbing as such; the cost thereof shall be included in the bid price for the construction or installation of the items to which said clearing and grubbing are incidental or appurtenant.

No measurement or direct payment will be made for temporary construction fence used in the preservation of existing plants, the cost being considered included in the price of the items.

Add the following new MAG Section:

**SECTION 214 SITE GRADING**

**214.1 Description:**

This work shall include all labor, materials, equipment, and services necessary to

provide complete site grading and related items as indicated or specified. Site grading shall be provided to the full extents of the project limits as shown on the project plans.

Site grading for the project shall comply with Section 106 and Part 200 of the MAG Uniform Standard Specifications.

**214.1.2 General:**

All work shall be in accordance with MAG Specifications Section 107, 210, 211, 225, and 601, and all City of Buckeye modifications to the specifications.

Bidders must visit the site to form their own conclusions as to the character of the site preparation and grading work.

Construction staking is to be provided by the Contractor as part of their work.

“Finished Grade”, as used herein refers to the required final grade elevation indicated to the top surface of the structure, pavement, etc. If the finished grades indicated by spot elevations conflict with those indicated by contours, obtain clarification from Engineer. Set subgrades to allow for thickness of base, paving, etc.

Unless otherwise indicated, give Project site areas uniform slopes between points for which finished grades are indicated or between such points and existing established grade, except provide roundings at abrupt changes in slopes.

All testing will be in accordance with MAG Specification Section 106, and as required by the Soils Report.

**214.2 Materials:**

Fill material shall be in accordance with Section 211 of MAG Uniform Standard Specifications and approved by the Engineer.

**214.3 Construction Requirements:**

**214.3.1 Site Preparation:**

Prior to construction activity on the site, the property shall be cleared per MAG Section 201.

The entire site shall be inspected for any evidence of prior excavations, uncontrolled backfill or soft spots. Should these anomalies be encountered, the material shall be removed and replaced with suitable material. All compaction of backfill shall be accomplished by mechanical means and may not be water settled.

All existing rubble, building materials and rock over 6" diameter and other debris that exists on site shall be completely removed by the contractor and properly disposed of off-site at no additional cost to the City. This includes surface material and those materials encountered during grading, trenching, foundation preparation and other construction activities to a minimum depth 18" below finish grade in under paving and landscape areas, 24" under footings.

Finish grading shall include the removal of all surface rock over 1" diameter or as otherwise specified.

#### **214.3.2      Compaction and Density Criteria:**

Compaction of cleaned exposed native soils shall be accomplished to the density criteria recommended in Section 301 of the MAG Uniform Standard Specifications and in Section 430.4 Decomposed Granite Area of these specifications.

Natural undisturbed soils or compacted soils subsequently disturbed or removed by construction operations shall be replaced with materials compacted as specified above.

All areas of development- widen any pits, ditches, depressions, etc. as necessary to accommodate compaction equipment and to provide a level base for placing fill.

#### **214.3.3      Earthwork Quantities:**

The Contractor shall compute the earthwork quantities by a method best suited for an accurate quantity determination. The Contractor is solely responsible for using these numbers to determine his bid. The Contractor shall utilize the soils reported as a reference to determine the earthwork quantities. If major discrepancies between the engineer's estimate and the Contractor's estimate exist, the Contractor shall submit in writing as part of their bid the reason for the deviation and the difference in the quantities based upon this deviation within 14 days of being awarded the bid. The contractor shall supply the Engineer with the Contractor's earthwork calculations for evaluation and alternative generation as part of the submittal within 14 days of being awarded the bid.

#### **214.3.4      Excavating:**

Backfill and compact all over-excavated areas whether caused through error or carelessness as specified or fill below. Perform all of this without additional compensation.

Material to be excavated shall be non-classified and shall include all earth or other materials encountered in excavating. The Contract Sum is understood to cover the removal of all such materials to the depth and extent indicated or specified.

Remove all excess excavated material from the site and legally dispose of it at no additional cost.

#### **214.3.5 Preparation of Subgrade:**

Prior to placement of fill materials, all surfaces shall be even and free from ruts, hummocks, or other uneven features which could impede uniform compaction. Sloping areas steeper than 5:1 (horizontal: vertical) shall be benched to prevent slippage planes between existing slopes and fills. Benches shall be level and wide enough to accommodate compaction and earthmoving equipment.

Prepare subgrade at all areas to proper elevation to receive final material.

#### **214.3.6 Excess-Water Control:**

Do not place, spread, or roll any fill material during unfavorable weather conditions. Do not resume operations until moisture content and fill density are satisfactory to the Engineer.

Provide berms or channels to prevent flooding of subgrade. Promptly remove all water collecting in depressions.

Where soil has been softened and eroded by flooding or placement during unfavorable weather, remove all damaged areas and recompact as specified for fill and compaction below.

Dewatering:

1. Provide and maintain at all times during construction, ample means and devices with which to remove promptly and dispose of all water from every source entering the excavations or other parts of the Work.
2. Dewater by means that will ensure dry excavations and the preservation of the final lines and grades of bottoms of excavations.

#### **214.3.7 Grading:**

Grade site to slopes and elevations as shown on the Drawings, except as otherwise directed by the Owner's representative.

Graded areas shall be constructed with positive slopes to prevent surface water ponding. The contractor shall guarantee that all graded areas shall drain, except for closed retention basins shown on the Drawings. Make any and all needed modifications to achieve positive drainage.

Grading tolerances:

1. Rough grade: 0.10 foot

2. Finish grade: Base course under concrete slabs: Tolerance = 0.5 in. vertical in 10'-0" horizontal.
3. Planting areas: Shrub areas are typically to be set from 1 to 1 1/2 inches below adjacent grade of pavement or lawn, where grades are not indicated on Drawings.

Treatment after completion of grading:

1. After grading is completed and the Engineer has finished inspection, permit no further excavating, filling or grading except with the approval and inspection of the Engineer.
2. Use all means necessary to prevent erosion of freshly graded areas during construction and until such times as permanent drainage and erosion control measures have been installed.
3. Protect all newly graded areas from foot and vehicular traffic. Keep areas free from trash and debris.
4. Repair and re-establish grades in any areas settled, rutted, or eroded.
5. Scarify soils to a depth of 8 inches in all areas compacted by the passage of construction equipment which are to be stolonized or planted.

Areas suspected or known to be non-draining:

1. Immediately notify the Engineer if any areas are suspected or known to be closed depressions or non-draining areas, except for designated stormwater retention basins.
2. Take all necessary actions, at no cost to the Owner, including re-grading, adjustment of proposed pavement grades, and provision of culverts, needed to provide free drainage and prevent ponding and standing water.

## **SECTION 230 DUST PALLIATIVE APPLICATION**

### **230.11 Measurement:** *is revised to read:*

No separate measurement will be made for dust palliative surface course application and dust palliative materials. The cost being considered included with contract items.

### **230.12 Payment:** *Of the MAG Uniform Standard Specifications is modified to read:*

No payment will be made for dust palliative surface course application and dust palliative materials. The cost being considered included with contract items.

## **PART 400 – RIGHT-OF-WAY AND TRAFFIC CONTROL**

### **SECTION 401 TRAFFIC CONTROL:** *is modified:*

Traffic Control for the project shall comply with Section 401 of the current MCDOT Supplement to MAG Uniform Standard Specifications.

## **SECTION 430 LANDSCAPING AND PLANTING**

### **430.1 DESCRIPTION:**

Section 430.1 is modified to add the following:

The work under this section shall consist of furnishing all labor, materials, and equipment to install decomposed granite, trees, and shrubs as designated for installation.

This section shall govern the preparation and planting of landscape areas as depicted and as required in the plans and specifications. Determine the location of underground utilities (call Blue Stake) and perform all work in a manner which will avoid possible damages to utilities. Hand excavate around utilities as required.

### **430.2 GENERAL:**

Section 430.2 is modified to add the following:

The Contractor shall furnish all labor, materials, equipment, and incidental and appurtenant items of work needed to install the landscape, to the extents and details shown in the plans.

Applicable publications listed below form a part of this specification:

Arizona Nursery Association Growers Committee Recommended Average Tree Specifications (Revised 2005).

American Nursery Stock (2004).

The Contractor shall perform all work in accordance with all applicable laws, codes, and regulations required by authorities having jurisdiction over such work and provide for all inspections and permits required by Federal, State, and local authorities in furnishing, transporting, and installing materials shown or for completing the work identified herein.

All planting areas shall be left free of construction debris including but not limited to concrete, grout, rebar, wood, nails, debris, and/or toxic material and graded to a level to permit landscape and irrigation construction. Compact trenches, foundation backfill or other fill areas for planting shall be at 85 percent maximum. No soil preparation or planting shall begin before the site has been cleared and cleaned of debris. The Engineer shall approve the condition of all planting areas prior to commencement of soil preparation for planting. Commencement of work indicates acceptance of job site conditions by the Contractor.

The Contractor shall cooperate and coordinate with other contractors and trades working in and adjacent to landscape areas.

The Contractor shall maintain stakes set by others until all parties concerned mutually agree upon their removal.

The Contractor shall ship materials with Certificates of Inspection required by growing authorities.

If any of the specified plant material is not obtainable, submit proof of non-availability in writing, together with a proposal for use of equivalent materials, similar in appearance, ultimate height, shape, habit of growth and general soil requirements. Send the availability letter to the Engineer within 30 days of Notice to Proceed. The definition of non-availability is the Contractor contacting a minimum of five (5) different sources. The Contractor may not make substitutions of a larger size of the same species and variety without the approval by the Engineer and at no additional cost to the City.

Before delivery, submit Certificates of Compliance, certifying that materials meet the specified requirements. Submit certified copies of the compliance reports for the following materials:

- Soil amendments and conditioners
- Decomposed granite
- Herbicides
- Fertilizer

Certification shall indicate suppliers name, address, telephone number, date of purchase, model number and technical description of item purchased, and quantity of each item purchased.

The Engineer reserves the right to take and analyze samples of materials for conformity to the specifications at any time. The Contractor shall furnish the samples upon request. Immediately remove rejected materials from the site at the Contractor's expense. The Contractor shall pay for the cost of removing any materials not meeting specifications.

All herbicide/pesticide applicators shall possess a valid A-20 or A-21 license with Pesticide Endorsement from the State Registrar of Contractors and Structural Pest Control Commission for application of non-restricted use chemicals. All Landscape Contractors, which shall list the names of those employees approved as applicators by the Registrar of Contractors. Application of non-restricted use pesticides shall not take place until the Engineer receives a copy of the application.

As directed by the Engineer, treat all non-paved areas with a post-emergent chemical

contact herbicide, such as Round Up or approved equal, to kill the existing weeds. Clear, grub, and remove the weeds after weed kill has been established, to the satisfaction of the Engineer.

Finished grades for landscape areas shall be smooth, uniform surface, free of abrupt grade changes or depressions. Finished soil grades adjacent to paving, curbs or headers shall be as shown in the drawings and may be adjusted by the Engineer for surface materials.

Provide proper surface drainage within all planted areas. Any grading conditions found in the plans or specifications, in obstructions on the site, or in prior work done by another party that the Contractor feels precludes establishing proper drainage, shall be brought to the attention of the Engineer in writing for resolution.

During the installation of landscape plantings, keep pavements clean and work areas in a neat and orderly condition on a daily basis. Remove all debris, trash and excess materials generated by the landscape installation. Sweep, scrub or hose affected areas as directed by the Engineer to maintain a clean and neat work area.

Landscape Contractor shall call for "blue stake" as required. Exercise extreme caution in all planting operations, as there are underground utilities throughout the entire area. Contractor shall study and be familiar with the location of these obstructions and underground utilities. Place plantings where shown on the plans. If there are obstructions or underground utilities, relocate plants clear of any interference but within the Right of Way at the direction of the Engineer.

Contractor shall not begin planting operations until landscape grading and irrigation system installation is complete, tested, and is fully operable by the irrigation controller.

#### Product Data and Samples

Submit product data and samples for the following items:

- Decomposed Granite – Samples for review and selection by Engineer
- Soil Amendments and Conditioner – Sample for review by Engineer
- Tree Stakes – Product Data for review by Engineer

#### Root Barrier

**Description:** All work shall comply with MAG Standard Section 430. The work for this item shall include providing Root Barrier.

**Submittals:** Product Data: Manufacturer's descriptive data and performance characteristics.

**Materials:** Contractor shall furnish 'Deep Root Barrier' by DeepRoot Green Infrastructure, LLC as specified or approved equal.

**Installation:** Contractor to install as per the manufactures recommendations. The installation will be where the new or existing tree is within 7 feet of the hardscape or underground utilities.

#### **430.4 DECOMPOSED GRANITE AREA:**

Section 430.4 is replaced with the following:

Decomposed granite shall be native, local, desert, decomposed granite at the size and color specified on the plans. The decomposed granite shall be from a single source, free from coating, clay, caliche or organic matter. The Contractor shall provide the Engineer with a sample of material for approval before installation.

Contractor must examine the subgrade, verify the elevations, and observe the conditions under which the work is to be performed. The existing grade shall be fine graded and raked free of organic matter and other debris one inch diameter and larger and then compacted. The area for fine grading shall be to the extents of the project limits as shown on the project plans and as described in Section 214 of these specifications.

Any existing weeds or Bermuda grass growing in designated landscape areas shall be treated with a post-emergent spray, such as Round-Up or approved equal. Any existing or new trees or vegetation shall be protected from the spray drift. There will be no separate payment for the weed spraying. Bermuda grass or weeds must be completely eradicated from all areas of the landscape and where designated by the Engineer. The Contractor shall remove all non-planted vegetation from all areas designated to receive decomposed granite (by chemical or mechanical means) and maintain the designated areas "vegetation-free" for a minimum period of 40 working days prior to placement of the decomposed granite, or as specified by the Engineer. Prior to placement of the decomposed granite, designated areas to receive decomposed granite shall be completely free of all grass, weeds, or other miscellaneous vegetation growth. All dead grass and weeds shall be removed and properly disposed of. There will be no separate payment for the weed spraying. Bermuda grass or weeds must be completely eradicated where designated by the Engineer from landscape or decomposed granite areas.

All weed control products and herbicides shall be approved for use by the Engineer prior to any applications. The Contractor shall submit copies of all manufacturer specifications and application rates to the Engineer for review and approval prior to application. Herbicides and weed control shall only be performed by a licensed applicator; Contractor shall supply information on applicator to the Engineer for approval.

The sub-grade, prior to granite placement, shall be compacted to between 85 to 90-percent of the maximum proctor density, as determined in accordance with the requirements of Arizona Test Methods 230 or 235, depending on the test method used to determine the compaction density (Sand Cone or Nuclear Method).

The Contractor shall apply two (2) applications of pre-emergent. One application of pre-emergent herbicide as per manufacturer's directions prior to installing granite and one application after granite has been installed, compacted, and raked level. The pre-emergent herbicide shall be applied in the manner recommended by the manufacturer to prevent germination of noxious weeds, and shall be equivalent to Gallery, Surflan, or an approved equal, and shall be applied at a rate per manufacturers recommendations. Pre-emergent herbicide shall be applied to the designated granite areas, prior to the final water settling operation. The Engineer is to be notified prior to all pre-emergent applications. Water to activate the pre-emergent herbicide shall be applied to the areas of the herbicide application as recommended by the manufacturer's label. The amount of water specified by the manufacturer may be adjusted due to rainfall, if approved by the Engineer.

After the first application of pre-emergent, the granite shall be installed and shall be rolled or raked to remove any irregularities, tire marks etc. Installation shall provide a two-inch depth of decomposed granite after compacting. During the final spreading and final grading operations, all surfaces within the decomposed granite areas shall be passed over by the spreading and grading equipment a minimum of two (2) times. Equipment operations for spreading, grading, raking, chemical application, water settling, and any other operations shall be done in a manner that uniformly maximizes the vehicle(s) wheel compaction over the surface area. All vehicles used for spreading, grading and raking the decomposed granite shall have one set of wheels with floatation tires having a minimum width of 18-inches to allow equal compaction of the granite mulch. The use or application of granite by any method (conveyor belt etc.) shall not relieve the Contractor of providing granite compaction to a level approved by the Engineer. Methods of compacting such as rolling, water settling, etc., shall be approved by the Engineer.

After placing, spreading, compacting, and grading the decomposed granite the Contractor shall water settle the total thickness of the decomposed granite to remove the fine material from the surface. The water settling operation, noted above, shall be completed by applying water at minimum depth of one-half inch over the decomposed granite areas placed or as approved by the Engineer. This water settling technique can be used to water in the second application of pre-emergent in compliance with pre-emergent Manufacturer recommendations and as approved by the Engineer.

Unless otherwise specified in the drawings, granite finish grade shall be one inch (1") below top of curb or adjacent sidewalk surfaces.

Add the following new Subsection:

**430.4.1 Decomposed Granite 3/4 Inch Screened:**

Contractor shall supply and place decomposed granite in areas and colors as designated on the plans. Gradation requirements for the decomposed granite 3/4" screened are as follows:

Decomposed Granite 1/2 Inch Screened

| Sieve Size | Percent Passing |
|------------|-----------------|
| 3/4 Inch   | 100             |
| 1/2 Inch   | 45-70           |
| No. 40     | 5-20            |

The Contractor shall provide samples to the Engineer for all granite as specified above for approval prior to placement.

**430.5 TREE, SHRUB, AND GROUND COVER PLANTING:**

Section 430.5 is modified to add the following:

The Contractor shall coordinate pre-approval of plant material and delivery with the Engineer and applicable nurseries as required.

Upon delivery to the site, plant all nursery stock as soon as possible. Until planting, plants shall not be exposed to excessive sun or drying winds. The Contractor shall immediately replace any stock which is not satisfactory in the opinion of the Engineer with acceptable stock.

Perform the planting of all trees during favorable weather conditions, during the season or seasons, which are normal for such work, as determined by acceptable local practice.

Planting pit width only for trees and shrubs shall be excavated to three (3) times the width or diameter of the root ball of the plant to be planted. Contractor shall stockpile excavated native soil to use for preparing the planting backfill mix. Contractor shall scarify the walls of the planting pit to the satisfaction of the Engineer.

Planting pits shall be backfilled with two parts native soil and one part amended soil. Planting backfill mix shall be water settled to a grade sufficient that in the setting of the plant, the finish grade is level, after settlement, will be the same as that at which the

plants were grown (see details in landscape plans).

#### Box Removal:

Remove bottom of plant boxes before planting. Remove sides of box without damage to root ball after positioning plant.

Set container and boxed stock on undisturbed native soil, plumb, and hold rigidly in center of pit or trench with top of ball at elevation as shown on planting details. When set, place additional soil backfill and fertilizer tablets around base and sides of ball, and work each layer to settle planting soil backfill to eliminate voids and air pockets. Working in six-inch (6") lifts of planting backfill mix, water settle the area every twelve inches (12") of depth applied around plant thoroughly before placing next two lifts, repeat process until completed.

After removal of plants from containers or box sides, superficially cut edge-roots with a sharp knife on sides and tease out feeder roots to assure positive contact and embedment into planting soil.

After watering, refill any settlement within basins to required grade with native soil.

Prune, thin out and shape trees and shrubs in accordance with standard horticultural practice. Prune trees to retain required height and spread. Unless otherwise directed by the Engineer, do not cut tree leaders, and remove only injured or dead branches. All pruning shall occur per the direction of the Engineer.

Remove from site any excessively pruned or malformed stock resulting from improper pruning and replace at no additional cost to the City.

Remove any rock or other underground obstructions, if possible, to the depth necessary to permit proper planting, according to plans and specifications. When encountering underground construction, obstructions, or rock in the excavation of planting areas, the Contractor may select other locations of the planting only upon approval of the Engineer. Prior to any work, the Contractor must be knowledgeable of the locations of all existing underground installations, and their protection is his responsibility. At the expense of the Contractor, correct all damage to the satisfaction of the Engineer. Coordinate all work with other trades so conflicts will not exist or delay the work in any way. Coordinate grades with earthwork and with placement of irrigation systems fixtures.

Stake all trees. Set stakes in line with prevailing winds. Stakes shall be 2-inch round knot-free pine, length as shown on details and installed as follows:

Stakes shall be placed immediately adjacent to, but in no case through, the root ball, and penetrate at least 6 inches into undisturbed soil, be aligned vertically, be pointed at

one end, and be aligned so as not to interfere with the existing branch structure of the tree.

Provide two (2) stakes spaced equally around trees per tree staking details. After the Engineer has reviewed tree staking, remove all growth stakes, labels, and ties from trunks of trees and shrubs and be properly disposed of.

#### **430.5.1 Substitutions:**

Section 430.5.1 is modified to add the following:

If any of the specified plant material is not obtainable, submit proof of non-availability in writing, together with a proposal for use of equivalent materials, similar in appearance, ultimate height, shape, habit of growth and general soil requirements. Send the availability letter to the Engineer within 30 calendar days of Notice to Proceed. The definition of non-availability is the Contractor contacting a minimum of five (5) different sources. The Contractor may make substitutions of a larger size of the same species and variety with the approval by the Engineer and at no additional cost to the City.

#### **430.5.6 Shrub and Tree Pits:**

Section 430.5.6 is modified to add the following:

Plant Layout:

The Contractor shall stake the location of individual trees in accordance with the plans for the Engineer to approve. The Contractor shall also make adjustments in the plant locations as directed by the Engineer and plant trees after establishing final grades and plant locations with approval of the Engineer.

Delivery:

Deliver plants just prior to planting. Deliver all packaged materials in containers showing weight, analysis and name of manufacturer that the Contractor will use during the planting operations. Contractor shall protect materials from deterioration during delivery and while stored on site. Submit certification of contents, quantity and source of all plants and planting materials to the Engineer for approval.

Protection of Plant Materials:

If there is a delay in planting for more than 6 hours after delivery, protect the plants from the sun, wind and mechanical damage. Keep roots and root balls moist, watering as often as necessary to maintain good health and vigor. Remove and replace all damaged and unhealthy plants as directed by the Engineer. Do not bend or bind any plants in such a manner as to damage bark, break branches or destroy their natural

shape. Provide adequate protection for root systems. Do not handle container plants by their foliage, branches or trunks.

#### Pre-Delivery Inspection of Materials:

Prior to delivery of any species to the project site, the Contractor shall make the necessary arrangements with the Engineer for an inspection of the plant material. The Contractor will pay for travel and expenses to non-local nurseries, out of the metropolitan Phoenix area, when requested by the Contractor. Remove immediately from the site any plants found to be unsuitable in growth habit or condition, or plants, which are not true to the specification, and replaced with acceptable plants.

The Contractor shall notify the Engineer at least 48 hours in advance for any inspection of the plant material at the offsite location. Prior to notifying the Engineer, the Contractor shall physically verify that all of the designated plant material meets the specified sizes and conditions.

#### Constructions of Plant Pits and Trenches:

Prior to planting, perform a percolation test on all plant pits to determine that adequate drainage exists. Fill the pits half-full with water. Allow the pits 24 hours to drain. If any pit has not substantially drained, install a rock caisson. Each caisson shall have a four-foot deep (4') by 8-inch (8") diameter hole filled with 1-1/2-inch diameter crushed stone filled to the bottom of the pit. Increase the depth of the caissons if encountering ground water, caliche, or impervious rock.

Modify the second paragraph to read:

Planting backfill mix - The planting backfill mix for trees shall consist of two parts native soil and one part amended soil.

#### **430.8 PLANT GUARANTEE AND MAINTENANCE:**

Section 430.8 is modified to add the following:

The Contractor shall begin maintenance immediately after planting and continue until the start of the Plant Establishment Period.

The Contractor shall maintain landscape work until final acceptance, but in no case less than 365 days after the Engineer accepts the work.

The Contractor shall furnish all labor, materials, equipment, tools, services, skill, etc., required to maintain the landscape in an attractive condition throughout the contract period. Maintenance of plant materials shall include, but not be limited to, pruning, weeding, fertilizing, irrigation programming, pest control, and landscaped areas trash

and debris clean up, per specifications. Maintenance shall be performed a minimum of once a week throughout the maintenance period.

The Contractor's supervisor shall be responsible for the training and supervision of the maintenance personnel's performance of their duties during the maintenance period.

All materials as noted (but not limited to this list) shall conform to the bid specifications:

- Pre-emergent
- Fertilizer
- Plant material
- Decomposed granite

#### Tree and Shrub Care:

Maintain trees in a healthy, growing condition by performing necessary operations, including the following:

#### Pruning:

Prune and shape only as necessary to maintain the usual form of the plant, to stimulate growth, to maintain growth within space limitations, and to maintain a natural appearance. Do not shear plant material. Any plant material improperly maintained, as determined by the Engineer, the Contractor shall remove and replace at no additional cost to the City.

#### Staking:

Inspect stakes weekly and adjusted or removed as necessary.

#### Weed Control:

In landscape areas, keep areas free of weeds. Use recommended, legally approved, herbicides whenever possible. Avoid frequent soil cultivation.

#### Ground Cover Care:

Foster attractiveness at all times by following these practices:

#### Granite Areas:

Inspect landscape granite weekly. Remove man-made debris, weeds, and grass controlled with chemicals. Any erosion that has occurred in any granite areas the Contractor shall be remedy, repair and replace granite at the Contractor's

expense.

#### Weed Control:

Keep all landscape areas free of broadleaf or grassy weeds and Bermuda grass, with pre-emergent and/or selective herbicides. Cultivating or hoeing weeds is not an allowed practice. The Contractor shall eradicate all noxious weeds or the City will not accept the project.

Unless otherwise authorized, the Contractor shall maintain all landscape areas, as they are completed during the course of work, on a continuous basis and until Engineer's final project acceptance. The Contractor shall provide adequate and experienced personnel to accomplish the maintenance. Maintenance shall include keeping the landscape areas free of debris on a weekly basis, chemical control and hand removal of weeds, fertilization as needed, cultivating the planting areas, and repairing tree stakes. An Arizona pesticide licensed Contractor shall perform all chemical control.

All plant material and installation shall be 100 percent guaranteed by the Contractor for a period of 365 Calendar Days beginning at the start of the Plant Establishment Period.

The Contractor shall replace plants within seven days of notification from the Engineer. Remove and replace dead, damaged or vandalized plants within seven days of notification. Install replacement plants of the same kind and size as originally specified and as described in the contract documents.

Keep plants in a healthy, growing condition by watering, pruning, spraying, weeding and any other necessary operation of maintenance. Keep plant beds free of weeds, grass and other undesirable vegetation. The Contractor shall inspect the plants at least once per week and perform appropriate maintenance. Pruning and re-staking shall be required as needed to remove any plant growth conflicting with vehicular or pedestrian movement.

The Contractor shall maintain the irrigation system as specified in Section 440 and make any necessary repairs regardless of cause to assure a complete and operational system as originally designed and constructed. Make repairs within 24 hours of detection.

The Contractor shall notify the Engineer 48 hours prior to the application of any chemical treatments. Qualified personnel shall mix chemicals and use the application equipment in the presence of the Engineer. An Arizona pesticide licensed Contractor shall perform all chemical control. The Engineer shall approve the personnel, materials and methods of application of chemicals prior to beginning the operation.

There shall be no separate measurement and payment for the Plant Guarantee and Maintenance Period. This cost shall be included in landscape bid items for: plant

materials and inert groundcover.

#### **430.9 PLANT ESTABLISHMENT PERIOD:**

Section 430.9 is replaced with the following:

The Contractor shall request an inspection by the Engineer when the Contractor believes the landscape work is substantially complete and the planting and related work is complete. After this initial inspection, and subject to his approval of the work, the Engineer will issue written notification to the Contractor setting the effective, beginning date for the Plant Establishment Period. The Plant Establishment Period for trees shall be for a period of 365 Calendar Days, but is subject to extension by the Engineer if the Contractor improperly maintains the landscape planting, appreciable plant replacement is required, or other corrective work becomes necessary. This work is incidental to other bid items within this section and there is no separate payment for the Plant Establishment Period.

All landscape areas, plant materials and decomposed granite shall be maintained as specified in Paragraph 430.8 – Plant Guarantee and Maintenance.

At final project acceptance or at the end of the plant establishment period, the Engineer will make a final acceptance inspection of the planted areas.

#### **430.10 MEASUREMENT AND PAYMENT:**

Section 430.10 is modified to add the following:

The basis of Measurement and Payment for Bid Item 430.01001, Landscape Establishment – Ninety (90) days, will be made at the lump sum bid price and shall be full compensation for the work, complete as described herein.

Measurement and Payment for Bid Item 430.01024, Tree - 24" Box and 430.01025, Shrub – 5 Gallon, shall be the price bid per each complete in place as shown on the project plans, details, and special provisions. Payment shall be full compensation for all labor, material, equipment, and incidental and appurtenant work.

Measurement and Payment for Bid Item 430.42000, Decomposed Granite, 2" Thick, shall be at the contract unit price bid per square yard for the inert materials as shown on the project plans, details, and special provisions and shall include all costs, materials, equipment, labor, and operations necessary for the installation and associated weed control and pre-emergent applications.

### **SECTION 440 SPRINKLER IRRIGATION SYSTEM INSTALLATION**

#### **440.1 DESCRIPTION:**

Section 440.1 is modified to add the following:

The Contractor shall furnish all labor, materials, tools, equipment, and services necessary for the execution and completion of a sprinkler irrigation system as indicated on the drawings and as described in these Technical Specifications and the General Conditions.

The plans indicate a detailed layout of irrigation lines, laterals, and emitter locations; however, some of the piping may be shown diagrammatically outside of the planting areas for graphic clarity. The Contractor shall follow the intent of the plan layout and shall review and obtain written approval from the Engineer for any requested changes.

Due to the scale of the drawings, it is not possible to indicate all offsets, fittings and sleeves that may be required. The Contractor shall carefully investigate the structural and finished conditions affecting all of his work and plan his work accordingly, furnishing such offsets, fittings and sleeves as may be required to meet such conditions. All work called for on the drawings by notes or details shall be furnished and installed whether or not specifically mentioned in the Technical Specifications.

The irrigation system shall be constructed using the emitters, valves, piping, fittings, controllers, wiring, and other components, of sizes and types as shown on the drawings and as called for in these Technical Specifications. The system shall be constructed to grades and conform to areas and locations as shown on the drawings.

#### **440.2 GENERAL:**

The third paragraph of Subsection 440.2 is revised as follows:

The Contractor shall maintain project record (as-built) drawings during the irrigation system construction as described below:

A. Maintain on-site and separate from documents used for construction, one complete set of contract documents as Project Record Documents. Keep documents current. Current up-to-date Record Drawings are a prerequisite for scheduled payments. Do not permanently cover work until Record Drawing information is recorded.

B. Record pipe and wiring network alterations. Record work that is installed differently than shown on the construction drawings. Record accurate reference dimensions, measured from at least two permanent reference points, of each irrigation system valve assembly, each controller, each sleeve end, each wire splice location, each stub-out for future pipe or wiring connections, and all other irrigation components including those enclosed within any valve box.

C. Prior to Final Review, obtain from the Engineer a copy of the drawings. Using

technical drafting pens, duplicate information contained on the project drawings maintained on site. Label each sheet "Record Drawing". Completion of the Record Drawings will be a prerequisite for the Final Acceptance.

If quantities are furnished either in Technical Specifications or on drawings, quantities are furnished for information only. It is the Contractor's responsibility to determine actual quantities of material, equipment, and supplies required by the project and to complete independent estimate of quantities and wastage.

Add the following new Subsections:

**440.2.1 Permits:**

All permits for installation or construction of the work included under this section, which are required by legally constituted authorities having jurisdiction, shall be obtained and paid for by the Contractor, each at the proper time. The Contractor shall also arrange for and pay all costs in connection with any inspections and examination required by these authorities.

**440.2.2 Execution:**

The Contractor shall examine the work areas and working conditions that will affect the work of this section. The Contractor shall not proceed with work until correcting the unsatisfactory conditions.

**440.2.3 References:**

The Contractor shall conform to the requirements of reference information listed below except where more stringent requirements are shown or specified in the Contract Documents.

American Society of Testing Materials (ASTM) - Specifications and Test Methods specifically referenced in this Section, and Underwriter Laboratories (UL) - UL wires and cables, and MAG Standards.

**440.2.4 Quality Assurance:**

Tolerances:

Specified depths of mains and lateral pipes are minimums. Settlement of trenches is cause for removal of finish grade treatment, refilling, re-compaction, and repair of finish grade treatment.

Coordinate work with other trades:

The Contractor shall guarantee/warranty irrigation materials, equipment, and workmanship against defects during the warranty period. The Contractor shall replace any pavement damage resulting from the installation of the irrigation system and repair damage to grading, soil preparation, or planting at no additional costs to the City and make repairs within 24 hours following notification by the Engineer.

#### **440.2.5      Cleaning:**

The Contractor shall maintain continuous cleaning operations throughout the duration of the work. Dispose of, off-site at no cost to the City, all trash and debris generated by installation of the irrigation system.

#### **440.2.6      Operation and Maintenance Manuals:**

Submit four (4) operation and maintenance manuals to the Engineer for review prior to final acceptance. The manuals should include the complete technical description of materials and products used; guarantee statement, complete operating and maintenance instructions on all major equipment. The Contractor shall provide a demonstration to maintenance personnel, with Engineer present, of how to adjust and maintain all emitter types, controller functions, and recommended controller programs, as established by the Contractor. The Contractor shall also review recommended watering rates for new plant materials.

#### **440.2.7      Preliminary, Substantial, and Final Walk-Through Inspections:**

Arrange for a preliminary walk-through with the Engineer, when the entire system is operational. Operate each zone in its entirety, additionally, open all valve boxes and expose item covered, if directed. Generate a list of items to be corrected and make adjustments, "fine tuning" the entire system by regulating valves, and setting pressure regulators at proper and similar pressure to provide proper coverage. Flush and adjust all emitters for optimum performance while preventing water from getting onto walks, roadways, and buildings. Adjustments may include, at no additional cost to the City of Buckeye, additional emitters, tubing, and outlet caps as required.

The Contractor shall correct all items generated from the preliminary walk-through and then arrange for a substantial completion walk-through. The Contractor shall rework any items deemed not acceptable by the Engineer to the Engineer's complete satisfaction. The maintenance period will not begin unless authorized by the Engineer. Provide all accessories, charts, record drawings and equipment, as required, before scheduling the Final walk-through.

Following the Landscape Maintenance Period the Contractor shall schedule a Final Walk-through inspection to review the system and make any necessary adjustments to the watering schedule.

### **440.3 MATERIALS:**

Section 440.3 is modified to add the following:

Prior to the start of construction, the Contractor shall submit shop drawings per Section 105 of the MAG Standard Specifications on all material for approval by the Engineer. Submittals shall include but not be limited to the following:

Materials List:

Include pipe, fittings, valves and mainline components, water emission components, control system components. Quantities of materials need not be included.

Manufacturers' Data:

Submit manufacturers' catalog cuts, specifications, and operating instruction for equipment shown on the materials list.

Shop Drawings:

Submit shop drawings called for by the details. Show products required for proper installation, their relative locations, and critical dimensions.

Add the following new Subsections:

#### **440.3.1 Equipment to be Furnished:**

All materials to be new and bear the appropriate National Association seal of approval, for example, NSF, US, etc. Similar equipment shall be procured from the same manufacturer and internal parts shall be common and interchangeable. Parts listing and source replacement will be furnished to the Engineer.

Equipment to be furnished:

Extra stock to be furnished:

Ten (10) emitters of each type used. Fifty (50) emitter bug caps of the type used.

#### **440.3.2 Submittals:**

Shop Drawings and Product Information:

Prepare and make submittals in accordance with conditions of the Contract, and as follows: A minimum of fifteen (15) working days prior to beginning work on the irrigation

system the Contractor shall submit five (5) copies of manufacturers' literature including name and numbers covering materials listed below and any other items requested by the Engineer. Do not order materials until the products are approved by the Engineer.

Items to be submitted:

- Pipe
- Drip Equipment Fittings and Solvents PVC nipples
- Ball Valves
- Controllers
- Valve Boxes
- All other Items Required for a Complete Irrigation System

All items shall be those specified and approved by the Engineer. Substitutions will not be allowed without approval.

#### **440.3.3 Staking:**

The Contractor shall mark with powdered lime, routing of pressure supply line and stake locations of various components, control valves and emitters. Unless otherwise specified, the system layout shall be considered schematic. Preliminary adjustments to conform to actual site conditions shall be accomplished during staking. Should changes be required the Contractor shall obtain approval of the Engineer prior to actual work being performed.

#### **440.5 TRENCH EXCAVATION AND BACKFILL:**

Section 440.5 is revised to add the following:

Trenches and other excavations shall be sized to accommodate the irrigation system components, conduit, and other required facilities. Additional space shall be provided to assure proper installation and access for inspection. Unless otherwise specified, the minimum depth of cover over pipes lines shall be as follows:

Electrical Conduit for A/C wire – Per electrical plans and specifications

Control wire – 2-inches minimum below top of mainline pipe or 18-inches minimum where installed in separate trench from mainline pipe. Conduit shall be run under paving in separate sleeve from irrigation pipe.

Lateral lines – 12-inches minimum

Plastic lines in sleeves under sidewalks – Depth required for item that is in sleeve

Each irrigation pipe or wire located beneath asphalt and concrete shall be installed in a PVC Schedule 40 DWV sleeve per note on the plans.

Add the following new Subsection:

**440.5.1 Bedding, Backfilling, and Compaction:**

The CONTRACTOR shall bed pipe in at least four inches (4") of finely graded native soil or sand to provide a firm, uniform bearing. After leveling, surround the pipe with additional finely grained native soil or sand to at least 2" over the top of the pipe.

Bedding sand shall be required when site conditions dictate and clean backfill meeting the specifications is not available. It shall also be required under asphalt and concrete pavements such as roadways, parking surfaces and plazas.

Trench backfill, sufficient to anchor the pipes, may be deposited before pipeline pressure testing, except that joints shall remain exposed until satisfactory completion of testing.

Trenches and excavations shall be backfilled with clean material from excavations. Remove organic material as well as rocks larger than 1" in diameter. Place acceptable material in lifts, the height of which shall not exceed that which can be effectively compacted, depending on the type of equipment and methods used. The Contractor shall backfill trenches and excavations restoring the specified thickness of topsoil to the upper part of the trench. Compaction shall be in accordance with Section 301. The Contractor shall not water settle the trenches unless approved by the Engineer.

Pipe trenches shall be straight but if obstructions necessitate a change of direction, the limits of curvature for PVC pipe shall be followed in strict accordance with pipe manufacturer recommendations.

Trenches may be curved to change direction or avoid obstructions within the limits of the curvature for PVC pipe. Minimum radii of curvature are 25 feet for 2-inch diameter pipe, 100 feet for 3- and 4-inch diameter pipe, and 150 feet for 6-inch pipe. All curvature results from the bending of the pipe lengths. No deflection will be allowed at a pipe joint.

In appropriate types of soil, the Engineer may authorize the use of flooding in lieu of tamping.

Under no circumstances shall vehicle wheels be used for compacting soil.

If settlement occurs and subsequent adjustments in pipe, valves, irrigation heads, plantings, or other construction are necessary, the Contractor shall make all required adjustments without cost to the City.

#### **440.6 PIPE INSTALLATIONS:**

Section 440.6 is modified to add the following subsections:

##### **440.6.1 Piping:**

Provide pipe, schedule and size as shown on the drawings and per Section 757 and as specified herein.

PVC pipe:

Snake pipe in trench as much as possible to allow for expansion and contraction. Provide a firm, uniform bearing for the entire length of each pipe line to prevent uneven settlement. Installation of pipe shall be installed in accordance with ASAE Standard; ASAE 376. Pipe shall be clean prior to installation and shall be maintained in that condition during installation. When pipe installation is not in progress, the open ends of the pipe shall be closed by means approved by the Engineer.

Sand bedding or fine grained material shall be provided where ledge rock, hard pan, or boulders are encountered. The Contractor shall compact bedding material to provide a minimum depth of bed between pipe and rock of 2 inches.

Solvent welded joints shall be made in accordance with ASTM D-2855, and the type of solvent and primer recommended by the pipe manufacturers shall be used. Primer and solvent shall be applied to the pipe ends in such a manner that no material is deposited on the interior surface or forced into the interior of the pipe during insertion. Excess solvent on the exterior of the joint shall be wiped clean immediately after assembly. The pipeline will not be exposed to water for at least 12 hours after the last solvent welded joint has been made.

Schedule 80 pipe shall be used for threaded joints. Solvent will not be used on threaded pipe. Threaded joints shall be hand tightened, with final tightening with a strap wrench as necessary to prevent leaks.

The pipe shall be protected from damage during assembly. All vises shall have padded jaws and only strap wrenches will be used. Any plastic pipe which has been nicked, scarred, or otherwise damaged shall be removed and replaced. Care shall be exercised so that stress on a previously made joint is avoided.

When PVC to metal pipe connections is required, these connections shall be accomplished first. A plastic adapter with external pipe thread should be used, screwing it into the metal internal pipe threads. Use teflon tape, or equal, on all plastic to metal threaded joints. The joint shall be hand-tightened. Utilize a light wrench, as necessary, to prevent leaks.

Piping or conduit of different trades crossing each other shall be separated by a minimum of 6 inches in the vertical direction.

Provide Flush End Caps at the end of lateral drip lines at locations shown on the plans or as directed by the Engineer. Construct Flush End Caps as per the plan details.

#### **440.6.2 Sleaving:**

Piping located under asphalt, concrete, stabilized decomposed granite, or other pavements shall be sleeved, size and schedule as noted on the plans. If not noted, sleeves shall be PVC Schedule 40, and minimum of 2 times larger than the pipe being sleeved. Use separate sleeve within the main sleeve for wiring, or as directed by Engineer.

Boring will be permitted only where pipe must pass under obstructions which cannot be removed or when approved by the Engineer. When any cutting or removal of asphalt and/or concrete work is necessary, it shall be saw cut in accordance with Section 601. Permission to cut asphalt or concrete shall be obtained from the Engineer. When piping on the drawings is shown in paved area, but running parallel and adjacent to planted areas, the intent of the drawings is to install the piping in the planted area.

Extend sleeve ends twelve inches beyond edge of hard scape, or sidewalks. Cap sleeve ends and mark with stakes. Provide rope or wire through sleeve and secure to stake at surface grade at each end for future sleeve location. Sleeve ends shall be covered with duct tape prior to backfill.

Asphalt cut and patch operations necessary for sleeve installation shall be considered incidental to the sleeve installation. All asphalt cutting shall be done with proper equipment to allow straight and true cuts through the entire depth of the asphalt being removed. The Contractor shall replace any patch work if the patch compacts more than 1/2 inch or if any of the patches becomes dislodged within one year. All asphalt shall comply with MAG Section 336.

#### **440.8 SPRINKLER HEAD INSTALLATION AND ADJUSTMENT:**

Section 440.8 is modified to add the following:

All emitter heads shall be of the types and sizes as indicated on the plans. Install emitters in relation to finished grade as indicated on the plans.

The Contractor shall be responsible for sprinkler and emitter outlet adjustment for a period of ninety days (90) days as described in the establishment period below.

Make wire connections to remote control electric valves and splices in the field

if approved by Engineer using 3M DBY-6 or Paige DB14-4 wire splices, no others will be accepted.

It is important that the wire splice be waterproof so that there is no chance for leakage of water and corrosion build-up on the joint.

#### **440.10 FLUSHING AND TESTING:**

Section 440.10 is modified to add the following:

The Contractor may perform the following volumetric leakage test for gasketed mainline piping segments only, in lieu of the mainline pressure testing procedure.

Provide all necessary pumps, bypass piping, storage tanks, meters, supply piping, and fittings in order to perform testing properly. The Contractor shall backfill the trench to prevent movement of the pipe under pressure. Expose couplings and fitting. Purge air from pipeline before test. Subject the mainline pipe to 120 PSI for two hours. Maintain constant pressure by adding water as necessary to the subject mainline pipe. The Contractor shall pump water added to the mainline pipe through a water meter capable of reading in 1/10 of gallon increments.

The maximum allowable volume lost during the test period is as follows:

- 3-inch pipe = 1.40 gallons/100 joints
- 4-inch pipe = 1.82 gallons/100 joints
- 6-inch pipe = 2.68 gallons/100 joint
- 8-inch pipe = 3.48 gallons/100 joints
- 10-inch pipe = 4.38 gallons/100 joints
- 12-inch pipe = 5.12 gallons/100 joints.

Replace any defective pipe, fitting, joint, valve, or appurtenance. Repeat the test until the subject mainline pipe meets the above maximum allowable volume loss during the test period.

Perform an operational test of the irrigation system in the presence of the Engineer and a representative from the City. Contact the Engineer and City Authorized Representative three working days prior to testing.

The coverage test shall be performed after sprinkler heads have been installed and shall demonstrate that each section or unit in the irrigation system is constructed to provide uniform head-to-head coverage of the areas serviced.

Operation of all valves, flow sensors, gate and ball valves, drip systems, ET devices and remote monitoring equipment shall be demonstrated prior to project acceptance

and start of maintenance.

Add new Subsection:

**440.10.1 Project Close-out:**

**PART 1 – GENERAL**

**A. WORK SPECIFIED HEREIN:**

All requirements and procedures for submittal of pertinent data relation to closing out of Project upon completion of the project work. Detailed instructions elsewhere in these Technical Specifications may require that certain items listed herein to be submitted prior to Substantial Completion of the Project. This Section is complementary to the General Conditions and Technical Specifications and nothing herein shall be considered to waive any requirements of the General Conditions or Technical Specifications.

**B. FINAL PAYMENT:**

Receipt and approval of all items specified in this Section is a prerequisite for final payment.

**C. RECORD DRAWINGS:**

1. The Contractor shall provide Record Drawings which shall clearly show all differences between the Contract work as drawn and as installed for all work, as well as work added to the Contract which is not shown on the Contract drawings.
2. The Contractor shall maintain a set of Record Drawings at the job site. These shall be kept legible and current and shall be available for inspection at all times by the City. The Record Drawings shall show all changes in the Contract work, or work added, on the Record Drawings in a contrasting color, including work changed by Addendum or Bulletin.
3. Prepare Record Drawings for the irrigation control system that shows the location of and id codes for all valve decoders, sensors, and surge protectors. The decoders shall accurately show which remote control valves that they activate.
4. In showing changes in the work, or added work, use the same legends as were used on the Contract Drawings. Indicate exact locations by dimensions and exact elevations given in job datum, by depth. Give dimensions from two permanent points.
5. Record Drawings shall indicate exact routing of all piping, irrigation, power and control wiring, etc., any irrigation lateral line modifications or adjustments shall be

depicted on the plans.

6. Record Drawings shall contain the names, addresses, and phone number of the Subcontractors and shall be signed by the Contractor.
7. The City shall review the Record Drawings and shall be the sole judge of the acceptability of these drawings.
8. Upon Substantial Completion of the project the Contractor shall submit the redlined record drawings to the City for preliminary review. The Contractor shall make all corrections required and resubmit a new copy to the City for review and approval. Upon acceptance of the redlined record drawings and prior to final payment the Contractor shall submit to the City the corrected and final version of the record drawing red-lines. The Contractor will be responsible for recording the red lines onto the mylars for the final record set of drawings prior to final project acceptance.

**D. MAINTENANCE MANUAL AND OPERATING INSTRUCTIONS:**

1. Upon completion of the installation of all work the Contractor shall furnish four (4) complete bound copies of operating and maintenance instructions and parts lists for all materials and equipment, including electrical, irrigation, pump and control items, being supplied.
2. Operating instructions shall include complete operating sequence, control diagrams, description of method of operating machinery, machine serial numbers, factory order numbers, parts lists, instruction books, supplier's phone numbers and addresses and individual equipment guarantee. Parts lists shall be complete in every respect, showing all parts and part numbers for ready reference.
3. Assemble Maintenance Manual and Operating Instructions in hard back 3- ring loose-leaf binders. Suitably label and index all material contained therein for ready reference.
4. Upon Substantial Completion of the Project work, submit one copy of the Maintenance Manual and Operating Instructions to the City for review. Upon receipt of notice of acceptance, deliver the additional copies to the City.

**E. GUARANTEES and WARRANTIES:**

Submit all required guarantees and warranties to the Engineer and the City. Provide all written guarantees, warranties or certificates required. Guarantees and warranties shall be a part of maintenance manual.

**F. SPARE PARTS AND MAINTENANCE MATERIALS:**

The Contractor shall deliver to the City the spare parts, extra stock and maintenance materials listed below, and shall obtain a signed receipt for these materials. Materials shall be neatly packaged and identified, per each specification section.

Spare parts required prior to project closeout:

1. Fifty (50) of each emitter type and volume installed
2. Two (2) keys (5' handle) for each type of gate and ball valve installed

**G. SEMI-FINAL AND FINAL REVIEW:**

When the Contractor is of the opinion that the project is substantially complete, he shall send to the Engineer a written statement that the project is substantially complete (naming a date) and shall request a semi-final inspection by the Engineer to determine the status of completion. Such notice shall be received at least three days before the requested inspection date.

If the Engineer finds that the project is substantially complete, he will prepare a Certificate of Substantial Completion, attaching thereto a list or "Punch List" of items to be completed or corrected.

If the Engineer does not concur in the Contractor's claim of Substantial Completion, the Contractor shall continue to maintain the site until the Engineer accepts the project.

When all items on the "Punch List" are completed or corrected, the Contractor shall send to the Engineer a statement that the project is complete and request a final inspection.

If the project is complete and all "Punch List" items are completed or corrected, the Engineer will issue a final acceptance letter.

After completion of the procedures outlined above, the Contractor shall submit his final application for payment in accordance with the Agreement, the General Conditions and Technical Specifications.

**H. SEMI-FINAL AND FINAL REVIEW:**

Before acceptance and final payment, at a time arrived at with the Engineer, a complete checkout and test shall be made of all irrigation, mechanical and electrical systems, architectural and structural devices, etc., with the Engineer. For this purpose, each trade concerned shall provide a skilled operating engineer or technician for a period of at least one day. This person, together with selected operating personnel, shall test all systems and devices and demonstrate the complete operation and required

maintenance of each.

#### **I. MAINTENANCE:**

Maintain irrigation system for a duration of 90 days from formal written acceptance by Engineer. Make periodic examinations and adjustments to irrigation system components in order to achieve the most desirable application of water.

Following completion of the Contractor's maintenance period, the City of Buckeye will be responsible for maintaining system in working order during remainder of guarantee/warranty period, for performing necessary minor maintenance, for protecting against vandalism, and for preventing damage after landscape maintenance operation.

For a period of one year from Final Acceptance, guarantee/warranty irrigation materials, equipment, and workmanship against defects. The Contractor shall replace any pavement damage resulting from the installation of the irrigation system and repair damage to grading, soil preparation, or planting at no additional cost to the City. Make repairs within 24 hours following notification by the Engineer. The City has the right to make emergency corrections and back-charge to the contract for his/her costs when determined necessary by the Engineer.

#### **J. CLEAN UP:**

Remove from site machinery, tools, excess materials, and rubbish upon completion of work.

Maintain a clean and orderly jobsite on a daily and ongoing basis. Trash, discarded material and other debris shall not be allowed to blow around on the project. Discard all materials off site at an approved sanitary landfill.

#### **440.11 MEASUREMENT AND PAYMENT:**

Payment for the irrigation system shall be made on the basis of the bid price for each element of work identified on the bid schedule. These unit cost prices shall be full compensation for the system complete and in-place as described herein and on the plans.

No measurement or direct payment will be made for other items of work that are shown on the plans or are otherwise necessary to provide a fully functioning irrigation system which includes but is not limited to materials and labor, hydrostatic testing, trenching, hand trenching, fittings and adaptors, expansion joints, locating and exposing existing pipe at connection points, and coatings, the cost being considered as included in the price of other items for which this work is necessary.