

**AMENDMENT OF SOLICITATION/ MODIFICATION OF CONTRACT**

1. CONTRACT ID CODE \_\_\_\_\_ PAGE OF PAGES  
1

2. AMENDMENT/ NO. 0006 3. EFFECTIVE DATE 2002 September 04 4. REQUISITION/PURCHASE REQ. NO. 5. PROJECT NO. (If applicable) DACW09-02-B-0010

6. ISSUED BY CODE \_\_\_\_\_ 7. ADMINISTERED BY (If other than Item 6) CODE \_\_\_\_\_  
U.S. ARMY ENGINEER DISTRICT, Los Angeles  
P.O. Box 532711  
Los Angeles, California 90053-2325

8. NAME AND ADDRESS OF CONTRACTOR (No., street, county, State and ZIP Code) \_\_\_\_\_ (√) 9A. AMENDMENT OF SOLICITATION NO. X DACW09-02-B-0010  
9B. DATED (SEE ITEM 11) 2002 Sept. 11 (Bid Opening)  
10A. MODIFICATION OF CONTRACTS/ORDER NO. \_\_\_\_\_  
10B. DATED (SEE ITEM 13) \_\_\_\_\_  
CODE \_\_\_\_\_ FACILITY CODE \_\_\_\_\_

**11. THIS ITEM ONLY APPLIES TO AMENDMENTS OF SOLICITATIONS**

The above numbered solicitation is amended as set forth in Item 14. The hour and date specified for receipt of Offers  is extended,  is not extended.

Offers must acknowledge receipt of this amendment prior to the hour and date specified in the solicitation or as amended, by one of the following methods:

(a) By completing Items 8 and 15, and returning \_\_\_\_\_ copies of the amendment; (b) By acknowledging receipt of this amendment on each copy of the offer submitted; or (c) By separate letter or telegram which includes a reference to the solicitation and amendment numbers. FAILURE OF YOUR ACKNOWLEDGMENT TO BE RECEIVED AT THE PLACE DESIGNATED FOR THE RECEIPT OF OFFERS PRIOR TO THE HOUR AND DATE SPECIFIED MAY RESULT IN REJECTION OF YOUR OFFER. If by virtue of this amendment you desire to change an offer already submitted, such change may be made by telegram or letter, provided each telegram or letter makes reference to the solicitation and this amendment, and is received prior to the opening hour and date specified.

12. ACCOUNTING AND APPROPRIATION DATA (If required)

**13. THIS ITEM APPLIES ONLY TO MODIFICATIONS OF CONTRACTS/ORDERS, IT MODIFIES THE CONTRACT/ORDER NO. AS DESCRIBED IN ITEM 14.**

A. THIS CHANGE ORDER IS ISSUED PURSUANT TO: (Specify authority) THE CHANGES SET FORTH IN ITEM 14 ARE MADE IN THE CONTRACT ORDER NO. IN ITEM 10A.  
 B. THE ABOVE NUMBERED CONTRACT/ORDER IS MODIFIED TO REFLECT THE ADMINISTRATIVE CHANGES (such as changes in paying office, appropriation date, etc.) SET FORTH IN ITEM 14, PURSUANT TO THE AUTHORITY OF FAR 43.103(b).  
 C. THIS SUPPLEMENTAL AGREEMENT IS ENTERED INTO PURSUANT TO AUTHORITY OF:  
 D. OTHER (Specify type of modification and authority)

**E. IMPORTANT:** Contractor  is not,  is required to sign this document and return \_\_\_\_\_ copies to the issuing office.

14. DESCRIPTION OF AMENDMENT/ (Organized by UCF section headings, including solicitation/contract subject matter where feasible.)

PHASE 1A, RIO SALADO ENVIRONMENTAL RESTORATION, MARICOPA COUNTY, ARIZONA

**CONTINUED ON NEXT SHEET**

Except as provided herein, all terms and conditions of the document referenced in Item 9A or 10A, as heretofore changed, remains unchanged and in full force and effect.

15A. NAME AND TITLE OF SIGNER (Type or print) \_\_\_\_\_ 16A. NAME AND TITLE OF CONTRACTING OFFICER (Type or print) \_\_\_\_\_  
15B. CONTRACTOR/OFFEROR \_\_\_\_\_ 15C. DATE SIGNED \_\_\_\_\_ 16B. UNITED STATES OF AMERICA \_\_\_\_\_ 16C. DATE SIGNED \_\_\_\_\_  
(Signature of person authorized to sign) \_\_\_\_\_ BY \_\_\_\_\_ (Signature of Contracting Officer)

PHASE 1A, RIO SALADO ENVIRONMENTAL RESTORATION, MARICOPA COUNTY, ARIZONA (Continued)

**BLOCK 14 – Continued**

- **REPLACE** the following Specification Sections in the Original Solicitation with the enclosed Specification Sections:

Section 00010  
 Section 01200  
 Section 01270  
 Section 02846B  
 Section 02921  
 Section 02930

- **ADD** the attached ADOT Top Soil and Corrosiveness Parameters chart

- **REPLACE** the following Plans/Drawings in the Original Solicitation with the enclosed Plans/Drawings:

<u>File No.</u>	<u>Sheet No.</u>	<u>Drawing Title</u>
471-0366	L-5	HABITAT RESTORATION, PLANT LEGEND AND QUANTITIES
471-0392	L-31	HABITAT RESTORATION, WETLAND PLANTING PLAN
471-0393	L-32	HABITAT RESTORATION, WETLAND PLANTING PLAN
471-0394	L-33	HABITAT RESTORATION, WETLAND PLANTING PLAN
471-0412	I-4	DRIP IRRIGATION SYSTEM DETAILS
471-0462	M-7	MECHANICAL STANDARD DETAILS
471-0490	E-14	RAW WATER WELL RSPW-1, ONE LINE DIAGRAM, ELEVATION AND SCHEDULE
471-0493	E-17	RAW WATER WELL RSPW-2 – PLAN, WIRING DIAGRAM AND ELEVATION
471-0524	E-22	GATEWAY ELECTRICAL PLAN

**END OF SF30**

**TABLE 2**  
**ADOT Top Soil and Corrosiveness Parameters**

*Geotechnical Investigation Data Report, Rio Salado Phoenix Reach, Environmental Restoration Project Phase 1A*

Location	Sample Number	Sulfur Content ARIZ 733 (ppm)	Chloride Content ARIZ 736 (ppm)	Soluble Salts ARIZ 237b (ppm)	Calcium Carbonates ARIZ 732 (%)	Exchangeable Sodium		Resistivity (ohm-cm)	pH <sup>b</sup> ARIZ 238b
						(%)	(ppm)		
TP-26	Bulk-1	--	--	3,200	6.2	3.1	290	--	--
TP-26	Bulk-2	110	90	--	--	--	--	1,200	8.3
TP-27	Bulk-1	7.5	20	--	--	--	--	3,200	8.2
TP-28	Bulk-1	47	120	--	--	--	--	1,200	8.5
TP-32	Bulk-1	--	--	2,560	9.4	4.2	390	--	--
TP-32	Bulk-2	36	100	--	--	--	--	1,330	8.5
TP-36	Bulk-1	15	4.9	380	5.7	1.6	100	3,740	8.6
TP-55	Bulk-2	30	6.7	1,280	1.9	2.4	77	4,600	8.5
TP-56	Bulk-1	170	50	1,900	3.6	2.7	170	1,000	8.1
TP-57	Bulk-1	4.3	0.64	320	1.6	1.7	32	7,670	8.7
TP-58	Bulk-1	40	120	1,500	3.4	4.8	210	1,270	8.5
B-64	SS-2	4.3	4.4	--	--	--	--	--	--

<sup>a</sup>pH from ADOT Top Soil testing

<sup>b</sup>pH from pH and Resistivity testing

## SECTION 00010

## BID SCHEDULE

## PART 1 GENERAL

## 1.1 Base Bid (Item 0001 through Item 0064)

Item	Description	Quantity	Unit	Unit Price	Amount
0001	Clearing, Grubbing, and Demolition	1	Job	L.S.	_____.
0002	General Site Excavation for Project Facilities				
0002A	First 20,000 cubic yards	20,000	Cu.Yd.	_____	_____.
0002B	Over 20,000 cubic yards	3,468	Cu.Yd.	_____	_____.
0003	General Site Fills and Embankments for Project Facilities				
0003A	First 70,000 cubic yards	70,000	Cu.Yd.	_____	_____.
0003B	Over 70,000 cubic yards	17,452	Cu.Yd.	_____	_____.
0004	Excavation and Disposal of Construction Debris, Household Waste, Inert Material, and Mixed Waste				
0004A	First 2000 cubic yards	2,000	Cu.Yd.	_____	_____.
0004B	Over 2000 cubic yards	400	Cu.Yd.	_____	_____.
0005	Storm Drain Piping and Structures	1	Job	L.S.	_____.
0006	Debris Screen Drop Structure	1	Job	L.S.	_____.
0007	Fence	4,000	Lin.Ft.	_____	_____.
0008	Shotcrete Lined Canal	2,729	Sq.Yd.	_____	_____.
0009	LLDPE Lined Canal	1,711	Sq.Yd.	_____	_____.
0010	Canal Control Structure	13	Each	_____	_____.
0011	Canal Feed Splitter Box	1	Job	L.S.	_____.
0012	Canal Gravity Piping	190	Lin.Ft.	_____	_____.

Item	Description	Quantity	Unit	Unit	
				Price	Amount
0013	Canal Pump Station Discharge Piping (6")	530	Lin.Ft.	_____	_____.
0014	Canal Pump Station Discharge Piping (4")	1,132	Lin.Ft.	_____	_____.
0015	Canal Transfer Pump Station	2	Each	_____	_____.
0016	Pressurized Water Distribution Piping (8")	399	Lin.Ft.	_____	_____.
0017	Pressurized Water Distribution Piping (12")	7,658	Lin.Ft.	_____	_____.
0018	Pressurized Water Distribution Piping (16")	350	Lin.Ft.	_____	_____.
0019	Pressurized Water Distribution Piping Connected to Bridge (12")	1,185	Lin.Ft.	_____	_____.
0020	Connection to Future High Pressure Sprinkler	13	Each	_____	_____.
0021	Water Distribution Pumping Station	1	Job	L.S.	_____.
0022	Production Well RSPW No. 1	1	Job	L.S.	_____.
0023	Completion of Production Well RSPW No. 2	1	Job	L.S.	_____.
0024	Reservoir Liner and Edge Treatment	1	Job	L.S.	_____.
0025	Reservoir Plantings- Emergent Marsh I	0.03	Acre	_____	_____.
0026	Reservoir Plantings- Emergent Marsh II	0.02	Acre	_____	_____.
0027	Reservoir Plantings- Transitional Marsh	0.01	Acre	_____	_____.
0028	Reservoir Plantings- Floating Aquatics	0.02	Acre	_____	_____.
0029	Wetlands Liners	30,606	Sq.Yd.	_____	_____.
0030	Wetlands Plantings- Emergent Marsh I	0.66	Acre	_____	_____.

Item	Description	Quantity	Unit	Unit	
				Price	Amount
0031	Wetlands Plantings- Emergent Marsh II	0.74	Acre	_____	_____.
0032	Wetlands Plantings- Emergent Marsh III	0.47	Acre	_____	_____.
0033	Wetlands Plantings- Typha Species	0.06	Acre	_____	_____.
0034	Wetlands Plantings- Transitional Marsh	0.61	Acre	_____	_____.
0035	Wetlands Plantings- Floating Aquatics	0.05	Acre	_____	_____.
0036	Wetlands Plantings- Open Water Deep Zone Submerged	0.27	Acre	_____	_____.
0037	Wetlands Piping and Control/ Drainage Structures	1	Job	L.S.	_____.
0038	Decomposed Granite	10,142	Sq.Yd.	_____	_____.
0039	Seeding	1,308,279	Sq.Ft.	_____	_____.
0040	Transplanting of Pine Trees	66	Each	_____	_____.
0041	Transplanting of Native Trees	30	Each	_____	_____.
0042	Planting of 1 gallon plants	4,256	Each	_____	_____.
0043	Planting of 5 gallon plants	4,741	Each	_____	_____.
0044	Planting of 15 gallon plants	2,081	Each	_____	_____.
0045	Planting of 24" box plants	502	Each	_____	_____.
0046	Overbank and Gateway Permanent Drip Irrigation System	1	Job	L.S.	_____.
0047	Terrace and Slope Temporary Drip Irrigation System	1	Job	L.S.	_____.
0048	Plant Establishment (12 months duration)	1	Job	L.S.	_____.
0049	Staging Area Sitework	1	Job	L.S.	_____.
0050	Maintenance Road Base Course	7,111	Cu.Yd.	_____	_____.

Item	Description	Quantity	Unit	Unit	
				Price	Amount
0051	Maintenance Road Asphaltic Concrete	890	Tons	_____	_____.
0052	Undercrossing Gabion Retaining Wall	4,428	Sq.Ft.	_____	_____.
<b>*0053</b>	<b>Concrete Walks</b>				
		14,786	Sq.Ft.	_____	_____.
0054	Decomposed Granite Pathways	2,075	Sq.Ft.	_____	_____.
0055	Main Entry Gate	2	Each	_____	_____.
<b>*0056</b>	<b>Pedestrian Bridge</b>	1	<b>Job</b>	<b>L.S.</b>	_____.
0057	Seating Node Area	1	Job	L.S.	_____.
0058	Interpretive Staging Area	1	Job	L.S.	_____.
0059	Sewer System	1	Job	L.S.	_____.
0060	Potable Water System	1	Job	L.S.	_____.
0061	Restroom Building	1	Job	L.S.	_____.
0062	Overlook A on North Bank	1	Job	L.S.	_____.
0063	Overlook B on South Bank	1	Job	L.S.	_____.
0064	Waterfall	1	Job	L.S.	_____.
1.2 Optional Bid Items					
0065	Gateway Gabion Retaining Wall	9,240	Sq.Ft.	_____	_____.
0066	Gateway Hardscape	1	Job	L.S.	_____.
0067	Gateway Canopy Structure	1	Job	L.S.	_____.
0068	Gateway Electrical	1	Job	L.S.	_____.
0069	Additional Plant Establishment Period	12	Months	_____	_____.

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TOTAL ESTIMATED AMOUNT                      \$\_\_\_\_\_.

BIDDERS NOTES:

Abbreviations:

- Lin.Ft. = Lineal Feet
- Sq.Ft. = Square Feet
- Sq.Yd. = Square Yard
- Cu.Yd. = Cubic Yard
- L.S. = Lump Sum

1. All extensions of the unit prices shown will be subject to verification by the Government. In case of variation between the unit price and the extension, the unit price will be considered to be the bid.
2. If a modification to a bid based on unit prices is submitted which provides for a lump sum adjustment to the total estimated amount, the application of the lump sum adjustment to each unit price in the Price Schedule must be stated. If it is not stated, the bidder agrees that the lump sum adjustment shall be applied on a pro rata basis to every unit price in the Price Schedule.
3. For the purpose of initial evaluation of bids, the following will be utilized in resolving arithmetic discrepancies found on the face of the Price Schedule as submitted by the bidder:
  - a. Obviously misplaced decimal points will be corrected;
  - b. In case of discrepancy between the unit price and the extended price, the unit price will govern;
  - c. Apparent errors in extensions of unit prices will be corrected;
  - d. Apparent errors in addition of lump sum and extended prices will be corrected.
4. For the purpose of bid evaluation, the Government will proceed on the assumption that the bidder intends the bid to be evaluated on the basis of unit prices the totals arrived at by the resolution of arithmetic discrepancies as provided above and the bid will be so reflected on the abstract of bids.
5. The lump sum "L.S." line items in the Price Schedule are not "Estimated Quantity" line items and are not subject to the "Variation in Estimated Quantity" contract clause.
6. The Contract Clause 52.232-27, "Prompt Payment for Construction Contracts" requires that the name and address of the contractor official, to whom payment is to be sent, be the same as that in the contract or in a proper Notice of Assignment.
7. Principal Contracting Officer. The Contracting Officer who signs this contract will be the Principal Contracting Officer for this contract. However, any Contracting Officer assigned to the Los Angeles District, contracting within his authority, may take formal action on this contract when the Principal Contracting Officer is unavailable and the action needs to be taken.
8. Amounts and prices shall be indicated in either words or figures, NOT BOTH.
9. Payment of Electronic Funds Transfer (EFT) is the mandatory method of payment. The Contractors attention is directed to Contract Clause "52.232-33 Mandatory Information for Electronic Funds Transfer" located in Section 00800 SPECIAL CONTRACT REQUIREMENTS.
10. The bidder shall distribute his indirect costs (overhead, profit, bond, etc.,) over all items in the Price Schedule. The Government will review all submitted Price Schedules for any unbalancing of the items. Any submitted Price Schedule determined to be unbalanced may be considered non-responsive and cause the bidder to be ineligible for contract award.

11. The bidder shall furnish all plant, labor, material, equipment, etc., necessary to perform all work in strict accordance with the terms and conditions set forth in the contract in include all attachments thereto.

12. Some quantities are ESTIMATED, the bidders prices MUST BE FIRM.

13. Bidder is cautioned to check his Price Schedule carefully prior to submission. If the Price Schedule contains unit prices, they should be round off to the second decimal point only NOT EXTENDED FUTHER.

14. At the formal bid opening for this solicitation, all hand carried bids submitted prior to 12:45 p.m. on the bid opening date will be accepted in Room 980 by available personnel. For the time period 12:30 p.m. to 1:00 p.m., bids must be submitted to Room 980, to the bid-opening officer only. Bids will not be accepted by any other personnel or at any other location. No bid will be accepted after 1:00 p.m. The official bid opening time will be called by the Bid Opening Officer.

15. Contractor is required to fill in Cage code (Reference Section 00600, entitled "Required Central Contractor Registration" Mar 1998) and DUNS Number (Reference Section 00600 REPRESENTATIONS & CERTIFICATIONS, paragraph entitled, "Data Universal Numbering System (DUNS) Number" Jun 1999) in Block No. 15 on Standard Form 1442, Name and Address Block (Cage Code under Code and DUNS No. under Facility Code respectively).

16. Bidders are to submit prices on all line items in the Base Bid (0001 through 0064). In addition, bidders must submit prices on all of the Optional Bid Items (0065 through 0069). The Government contemplates award of one contract to the responsive, responsible bidder who submits the lowest bid for the Base Bid and Optional Items.

CERTIFICATE OF CORPORATE PRINCIPAL

1) IF THE OFFEROR IS A JOINT VENTURE, COMPLETE THE FOLLOWING:

_____	_____	_____
(Company Name)	(Signature)	(Title)

_____	_____	_____
(Company Name)	(Signature)	(Title)

_____	_____	_____
(Company Name)	(Signature)	(Title)

2) IF THE OFFEROR IS PARTNERSHIP, LIST FULL NAME OF ALL PARTNERS:

_____	_____	_____
(Company Name)	(Signature)	(Title)

_____	_____	_____
-------	-------	-------

(Company Name)

(Signature)

(Title)

\_\_\_\_\_  
(Company Name)

\_\_\_\_\_  
(Signature)

\_\_\_\_\_  
(Title)

3) IF THE OFFEROR IS A CORPORATION, THE FOLLOWING CERTIFICATION SHOULD BE COMPLETED:

CERTIFICATION AS TO CORPORATE PRINCIPAL

I, \_\_\_\_\_, certify that I am the Secretary of the corporation named as principal in the within contract; that \_\_\_\_\_, who signed the said contract on behalf of the principal, was the \_\_\_\_\_ of the corporation; that I know his signature and that his signature is genuine; and that said contract was duly signed, sealed and attested for in behalf of said corporation by authority of its governing body.

\_\_\_\_\_  
CORPORATE PRINCIPAL

CORPORATE SEAL

\_\_\_\_\_  
SECRETARY

PART 2 PRODUCTS (Not Used)

PART 3 EXECUTION (Not Used)

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SECTION 01200

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## SECTION 01200

## GENERAL REQUIREMENTS

## PART 1 GENERAL

## 1.1 REFERENCES

The publications listed below form a part of the specification to the extent referenced. The publications are referenced in the text by basic designation only.

## ENGINEERING REGULATIONS (ER)

ER 1-1-11	(1995) Progress, Schedules, and Network Analysis Systems
ERM 385-1-1	(1996) U.S. Army Corps of Engineers Survey and Health Requirements

## 1.2 SUBMITTALS

SD-01 Preconstruction Submittals

Temporary Electrical Layout Plan  
Contractor's Work Area Plan  
Storm Water Management Plan

## 1.3 QUALIFICATIONS

The Contractor shall designate an authorized representative who shall be responsible for the preparation of all required project schedule reports.

## 1.4 PROJECT LIMITS

The legal Description for the entire project boundary is included in Appendix A

## 1.5 TEMPORARY ELECTRIC WIRING

## 1.5.1 Temporary Power and Lighting

The Contractor shall provide construction power facilities in accordance with the safety requirements of the National Electrical Code NFPA No. 70 and the SAFETY AND HEALTH REQUIREMENTS MANUAL EM 385-1-1. The Contractor, or his delegated subcontractor, shall enforce all the safety requirements of electrical extensions for the work of all subcontractors. All work shall be accomplished by skilled electrical tradesmen in a workmanlike manner, as approved by the Contracting Officer. Prior to construction the Contractor shall provide a Temporary Electrical Layout Plan.

## 1.5.2 Construction Equipment

In addition to the requirements of EM 385-1-1, SAFETY AND HEALTH

REQUIREMENTS MANUAL, all temporary wiring conductors installed for operation of construction tools and equipment shall be either Type TW or THW contained in metal raceways, or may be multiconductor cord. Temporary wiring shall be secured above the ground or floor in a workmanlike manner and shall not present an obstacle to persons or equipment. Open wiring may only be used outside of buildings, and then only in strict accordance with the provisions of the National Electrical Code.

### 1.5.3 Circuit Protection

In addition to the present requirements in EM 385-1-1 and the National Electrical Code, all 15 and 20-ampere receptacle outlets used for obtaining power during construction shall have ground fault circuit interrupters (GFCI) for personnel protection. Block and brick saws shall also be equipped with GFCI. The Contracting Officer may allow an exception to this requirement for circuits for concrete vibrators or circuits operating at other than 60 Hertz normal (in both cases an assured grounding program as described in the National Electrical Code, except utilizing the daily inspection frequency of the grounding means of such equipment, may be permitted). The assured grounding program will not be permitted as a substitute for usage of GFCI'S except as described above. All generator-powered 15- and 20-ampere, 60 Hertz receptacle outlets shall have GFCI'S, and shall be properly grounded. A testing means shall be provided which will impose a measured fault of 5 milliamperes, plus or minus 1 milliamperes, and result in tripping the GFCI unit.

## 1.6 UTILITIES

### 1.6.1 Cooperation with Utilities

An attempt has been made to determine the location of all underground utilities, drainage pipes, and structures; however, it shall be the Contractor's responsibility to cooperate with the pertinent utility companies so that any obstructing utility installation(s) may be adjusted. The location of the underground and overhead utilities as shown on the plans is based on the best available information. The Contractor shall not assume that this represents an exact location of the line. No guarantee is made to the accuracy of the location shown on the plans. The Contractor shall determine for himself the exact location of all utilities. Should Contractor's operations result in damage to any utility the location of which has been brought to its attention, he shall assume full responsibility for such damage. There also exists the likelihood that other abandoned older and undocumented underground utility and irrigation lines exist within the project area. Contractor shall contact Arizona Blue Stake (telephone number 602-263-1100) a minimum of two (2) working days before beginning any underground work. In addition, Blue Stake notification(s) shall be maintained on a current basis.

The following phone numbers should put the Contractor in contact with the proper personnel:

Arizona Public Service Company (APS)	
Ms. Lois Winkler	(623) 371-6837
City of Phoenix (COP) Water Services Department	
Mr. Jerry Arakaki, Senior Engineer	(602) 261-8229
Salt River Project Power Distribution (SRPPD)	
Mr. James Frescholtz	(602) 236-8040

Salt River Project Power Transmission (SRPPT)  
Mr. Bill Phillips, Senior Engineer (602) 236-8092

Salt River Project Irrigation  
Mr. Al Baizel (602) 236-0840

Qwest  
Mr. John Nevilis (602) 630-6891

Southwest Gas  
Ms. Heather Symons (602) 484-5244

It shall be the responsibility of the Contractor to verify the location of all utilities prior to any construction activities in a particular area where such facilities may exist. All existing overhead and underground utilities shall be Protected-in-Place (P.I.P.) unless noted otherwise on the plans.

#### 1.6.2 APS and SRPPT

Both APS and SRP maintain high voltage (230kV and 500kV) overhead electric transmission lines in the vicinity of the project. The lines are within the construction limits of the project and shall be protected in place. The Contractor shall use caution in the adjacent area.

At all times during construction, the Contractor shall comply with all laws, ordinances, rules, regulations, and safety requirements, including but not limited to the National Electric Safety Code, and the Occupational Safety and Health Standards for General Industry and specific requirements of both SRP and APS when working in the vicinity of these high voltage lines.

#### 1.6.3 Salt River Project Water Operations

All construction activities will occur within the bottom of the Salt River. Flows can occur at any time in the river, and nuisance flows are ever present in the river bottom.

The Contractor must contact Salt River Project (SRP) Water Operations, Joe Rauch at 602-236-5461 or Dallas Reigle 602-236-2271 for information regarding SRP releases into the Salt River.

The Contractor should also request that SRP include the Contractor on a call list for anticipated releases into the river. Both the Flood Control District and the City of Phoenix are on the call list and could be used as an information resource for flow releases into the river by SRP. However, it remains the Contractor's responsibility to determine when flows will occur in the river and what impacts those flows will have on his equipment and his work.

A stormwater management plan shall be prepared which addresses the management of stormwater in and under the Salt River around construction areas. Design of the stormwater plan is the sole responsibility of Contractor. Prior to beginning the project, and within 45 days after award of contract, Contractor shall submit a draft copy of a Certificate of Design for the Management Plan with the seal of Contractor's engineer. This plan shall address the proposed method for the management of stormwater during construction. The plan shall include descriptions of proposed

groundwater and surface water control facilities including, but no limited to, equipment; methods; standby equipment and power supply; pollution control facilities, and discharge locations to be utilized. Drawings shall show locations, dimensions, and relationships of elements of each system. Design calculations shall be provided demonstrating adequacy of proposed dewatering systems and components. If the system is modified during installation or operation, revise or amend and resubmit Stormwater Management Plan. Following review by the Contracting Officer, the Contractor shall address and incorporate any comments. The draft and final stormwater management plan shall be designed, stamped, signed, and certified by an independent professional consulting engineer, registered in the State of Arizona, who is not an employee of the Contractor. Contractor's engineer shall certify on a monthly basis that the facilities required for the management of stormwater are constructed, operated and maintained substantially in accordance with the design.

#### 1.6.4 Existing Wells and Probes

Several groundwater monitor wells and methane gas probes exist within the project area, some of which are shown in the plans. The Contractor shall determine for himself the exact location of each of these wells and probes, and any other wells that may have been installed in the project area. The Contractor shall take the necessary precautions to protect in place these wells and probes. Any damage caused by the Contractor to these wells and/or probes shall be repaired by the Contractor to the satisfaction of the owner at no cost to the project.

### 1.7 GENERAL SAFETY REQUIREMENTS

#### 1.7.1 General

The Corps of Engineers Safety and Health Requirements Manual, EM 385-1-1, (see Contract Clauses, Section 00700, ACCIDENT PREVENTION) and the Occupational Safety and Health Act (OSHA) Standards for Construction (Title 29, Code of Federal Regulations Part 1926 as revised from time to time); General Industry Standards (Title 29, Code of Federal Regulations Part 1910 as revised from time to time); and the National Fire Protection Association Codes are applicable to this contract. In case of conflict the most stringent requirement of the standards is applicable.

#### 1.7.2 The Prime Contractor's superintendent

The Prime Contractor's superintendent shall take an active role in enforcing the safety requirements by participation in safety conferences, hazard analysis, tool box meetings, walk-through inspections, correction of violations, etc., and including that of the subcontractor's work.

#### 1.7.3 Additional Health and Safety Requirements

Additional project specific health and safety requirements are presented in Section 01355, ENVIRONMENTAL PROTECTION.

#### 1.7.4 Violations

If recurring violations and/or gross violation indicate that the safety performance is unsatisfactory, corrective action shall be taken as directed, and at the discretion of the Contracting Officer the retention or some part thereof will be withheld from the progress payment until corrective action has been completed.

#### 1.7.5 Elevated Work Areas

Workers in elevated work areas in excess of 6 feet above an adjoining surface require special safety attention. In addition to the provisions of EM 385-1-1, the following safety measures are required to be submitted to the Contracting Officer's Representative. Prior to commencement of work in elevated work areas, the Contractor shall submit drawings depicting all provisions of his positive protection system including, but not limited to, all details of guard rails.

- (1) Positive protection for workmen engaged in the installation of structural steel and steel joists shall be provided by safety nets, tie-off's, hydraulic man lifts, scaffolds, or other required means. Decking crews must be tied-off or work over nets or platforms not over 6 feet below the work area. Walking on beams and/or girders and the climbing of columns is prohibited without positive protection.

#### 1.7.6 Fire Prevention

The Contractor shall coordinate with the Fire Department and the Contracting Officer's prior to conducting any fire hazardous operation. Cutting or welding will be permitted only in areas that are or have been made fire safe. Where possible, all combustibles shall be located at least 35 feet horizontally from the work site. Where such location is impracticable, combustibles shall be protected with fire blankets and/or protective welding screens to prevent slag from running out of the work area.

#### 1.7.7 Recordkeeping/Reporting Requirements

On all contract operations, the Prime Contractor shall be responsible for recording and reporting all accident exposure and experience incident work. (This includes exposure and experience of the prime contractor and his/her sub-contractor(s)). As a minimum these records shall include exposure work-hours and a log of occupational injuries and illnesses. (OSHA Form 200 or state equivalent as prescribed by 29 CFR 1904.5) Reference EM 385-1-1, 01.D.04.

#### 1.7.8 Accident Reporting

In addition to the requirements for reporting accidents in accordance with EM 385-1-1, Section 1, the Prime Contractor will submit at the 50% point and 100% of project completion, a written summary of worker's compensation claims filed by workers on the project. The report will include all subcontractors. The main report covering the Prime Contractor claims will be certified as "correct and true" by the Contractor's compensation insurance carrier. The same certification will be required for subcontractor reports.

#### 1.8 TIME EXTENSIONS FOR UNUSUALLY SEVERE WEATHER

This provision specifies the procedure for the determination of time extensions for unusually severe weather in accordance with the CONTRACT CLAUSE, Section 00700, entitled "DEFAULT (FIXED-PRICE CONSTRUCTION)". In order for the Contracting Officer to award a time extension under this clause, the following conditions must be satisfied:

- (1) The weather experienced at the project site during the contract period

must be found to be unusually severe, that is, more severe than the adverse weather anticipated for the project location during any given month.

- (2) The unusually severe weather must actually cause a delay to the completion of the project. The delay must be beyond the control and without the fault or negligence of the Contractor.

The following schedule of monthly anticipated adverse weather delays is based on National Oceanic and Atmospheric Administration (NOAA) or similar data for the project location and will constitute the base line for monthly weather time evaluations. The Contractor's progress schedule must reflect these anticipated adverse weather delays in all weather dependent activities.

MONTHLY ANTICIPATED ADVERSE WEATHER DELAY  
WORK DAYS BASED ON (5) AND (6) DAY WORK WEEK

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
5 Day	(08)	(04)	(01)	(01)	(05)	(06)	(07)	(07)	(06)	(04)	(02)	(06)
6 Day	(09)	(05)	(01)	(01)	(06)	(08)	(09)	(09)	(07)	(09)	(03)	(08)

Upon acknowledgement of the Notice to Proceed (NTP) and continuing throughout the contract, the Contractor will record on the daily CQC report, the occurrence of adverse weather and resultant impact to normally scheduled work. Actual adverse weather delay days must prevent work on critical activities for 50 percent or more of the Contractor's scheduled work day. (ER 415-1-15, 31 OCT 89)

1.9 SUPERVISION BY THE CONTRACTOR

The following requirements, in addition to those contained in the Contract Clause entitled: SUPERINTENDENCE BY CONTRACTOR, shall be met by the Contractor. The site representative appointed by the Contractor and approved by the Contracting Officer shall, as a minimum, have the authority to negotiate and execute Supplemental Agreements having a value up to \$100,000.

1.10 WASTE MATERIAL

Unless otherwise specified, waste material shall be disposed of by the Contractor at a licensed off site sanitary landfill or sewage disposal plant. Permission to use the off-site sanitary landfill or sewage disposal plant shall be obtained by the Contractor and any costs attendant thereto shall be borne by the Contractor.

1.11 SEWAGE DISPOSAL FOR TEMPORARY FACILITIES

A sewage disposal location is not available at the site for use under this contract.

1.12 INTERRUPTION OF EXISTING UTILITIES SERVICES

The Contractor shall perform the work under this contract with a minimum of outage time for all utilities. Interruption shall be by approved Sections of the utility. In some cases, the Contractor may be required to perform the work while the existing utility is in service. The existing utilities services may be interrupted only when approved by the Contracting Officer. When it is necessary to interrupt the existing utilities, the Contractor shall notify the Contracting Officer in writing at least 14 calendar days

in advance of the time the Contractor desires the existing service to be interrupted. The interruption time shall be kept to a minimum. Depending upon the activities at the facility which require continuous service from the existing utility, an interruption may not be subject to schedule at the time desired by the Contractor. In such cases the interruption may have to be scheduled at a time of minimum requirement of demand for the utility. The amount of time requested by the Contractor for interruption of existing utility service shall be as approved by the Contracting Officer.

#### 1.13 UTILITY OUTAGES

##### 1.13.1 Utility Outages

The Contractor shall schedule work requiring disruption of utility distribution systems, electrical power, gas, sewage, water, and telephone. Contractor shall schedule this work such that work starts and is completed with continuous effort. For the convenience of the Government, the Contractor shall conduct outages on weekends or during non-duty hours. With the permission of the Contracting Officer, the Contractor shall work overtime for outages and shall not disrupt government operations.

#### 1.14 PUBLIC UTILITY COMPANIES

Arizona Blue Stake Laws govern digging clearance requirements for all public utilities such as US West, Southwest Gas, Salt River Project or Arizona Public Service. If there are public utilities in the area, the words "Blue Staking Required" will be written on the form.

#### 1.15 UTILITY OUTAGES AND ROAD CUTTING

The Contractor shall provide a written request for utility outages or road cutting to the Contracting Officer ten working days in advance for approval. All outages and road cutting shall be programmed to occur at the convenience of the Government.

#### 1.16 COOPERATION BETWEEN CONTRACTORS

The Government may have construction activities underway, including the site preparation within and adjacent to the project site. The COP may also have under construction at the time of this project their Habitat Demonstration Project located along the north side of the low flow channel and east of Central Avenue. The Contractor shall be aware of these possible City Of Phoenix construction activities and shall work cooperatively with the COP Contractors to minimize impacts to all projects. The Contractor shall KEEP OUT of the Habitat Demonstration Project area.

#### 1.17 CONTRACTORS WORK AREA

##### 1.17.1 Site Plan

The Contractor shall prepare a Contractor's Work Area Plan indicating the proposed location and dimensions of any area to be fenced and used by the Contractor, the number of trailers to be used, avenues of ingress/egress to the fenced area and details of the fence installation. Any areas which may have to be graveled to prevent the tracking of mud shall also be identified. The Contractor shall also indicate if the use of a supplemental or other staging area is desired.

##### 1.17.2 Employee Parking

Contractor employees shall park privately owned vehicles in an area designated by the CONTRACTING OFFICER'S REPRESENTATIVE. This area will be within reasonable walking distance of the construction site.

#### 1.18 AVAILABILITY AND USE OF UTILITY SERVICES

##### 1.18.1 Payment for Utility Services

The Government will make all reasonably required utilities available to the Contractor from existing outlets and supplies, as specified in the contract. Unless otherwise provided in the contract, the amount of each utility service consumed shall be charged to or paid for by the Contractor.

##### 1.18.2 Meters and Temporary Connections

The Contractor, at its expense and in a manner satisfactory to the CONTRACTING OFFICER'S REPRESENTATIVE, shall provide and maintain necessary temporary connections, distribution lines, and meter bases required to measure the amount of each utility used for the purpose of determining charges. The Contractor shall notify the CONTRACTING OFFICER'S REPRESENTATIVE, in writing, 5 working days before final electrical connection is made.

##### 1.18.3 Construction Water

Construction water is available from City of Phoenix hydrants as follows:

1. There are eleven hydrants located within one-quarter to one-half mile of the river between 7th Street and 24th Street that could be used for such purposes.
2. The Contractor will obtain a permit from the City at the second floor of the City Hall Building. The Contractor should allow two weeks for the City installation of the meter.
3. A fee of \$500 will be charged for each hydrant and meter, some of this fee being refundable.
4. The charge for the water is approximately \$1.37/100 cubic feet.
5. The Contractor will contact the City for specific information regarding the use of City water and for all costs associated with its use.

The Contractor may obtain construction water from Production Wells RSPW-1 and RSPW-2 subject to the approval of the CONTRACTING OFFICER'S REPRESENTATIVE.

The Contractor cannot use groundwater from dewatering activities or from within excavations for construction purposes including dust control.

##### 1.18.4 Sanitation

The Contractor shall provide and maintain within the construction area minimum field-type sanitary facilities approved by the CONTRACTING OFFICER'S REPRESENTATIVE. Government toilet facilities will not be available to Contractor's personnel.

#### 1.18.5 Communications

The Contractor shall make arrangements with the utility and pay all costs for communication facilities (telephone and high speed T-1 internet service) required for the Government field office and Contractor's temporary facilities.

#### 1.19 BULLETIN BOARD, PROJECT SIGN, AND PROJECT SAFETY SIGN

##### 1.19.1 Bulletin Board

Immediately upon beginning of work, the Contractor shall provide a weatherproof glass-covered bulletin board not less than 36 by 48 inches in size for displaying the Equal Employment Opportunity poster, a copy of the wage decision contained in the contract, Wage Rate Information poster, and other information approved by the CONTRACTING OFFICER'S REPRESENTATIVE. The bulletin board shall be located at the project site in a conspicuous place easily accessible to all employees, as approved by the CONTRACTING OFFICER'S REPRESENTATIVE. Legible copies of the aforementioned data shall be displayed until work is completed. Upon completion of work the bulletin board shall be removed by and remain the property of the Contractor.

##### 1.19.2 Project and Safety Signs

###### 1.19.2.1 Project Information Signs

Contractor shall provide and install six (6) project information signs, at locations to be determined by the CONTRACTING OFFICER'S REPRESENTATIVE, at the start of construction to inform the public of the forthcoming project, construction dates, and suggested alternate travel routes. Project signs shall include the names of all agencies participating in the project. The signs shall be in English and Spanish and include the 24-hour hot line complaint telephone number. Signs shall be constructed in accordance with the Project Sign Information Figures 1 and 2 included at the end of this section to be provided to the Contractor at the pre-construction meeting. The signs shall be installed at the location(s) approved by the CONTRACTING OFFICER'S REPRESENTATIVE. The Contractor shall maintain the signs as necessary, and update the information as requested by the CONTRACTING OFFICER'S REPRESENTATIVE.

###### 1.19.2.2 Warning Signs

Contractor shall provide and install warning signs facing approaching traffic on all roads crossing under overhead power lines. Contractor shall also supply warning signs at sand and gravel operations cross traffic at locations shown on the plans or directed by the CONTRACTING OFFICER'S REPRESENTATIVE.

###### 1.19.2.3 Hard Hat Signs

Contractor shall provide and install six hard hat signs as shown in the Hard Hat Sign figure at the end of this section, at locations directed by the CONTRACTING OFFICER'S REPRESENTATIVE.

#### 1.20 PROTECTION AND MAINTENANCE OF TRAFFIC

During construction the Contractor shall provide access and temporary relocated roads as necessary to maintain traffic. The Contractor shall maintain and protect traffic on all affected roads during the construction

period except as otherwise specifically directed by the CONTRACTING OFFICER'S REPRESENTATIVE. Measures for the protection and diversion of traffic, including the provision of watchmen and flagmen, erection of barricades, placing of lights around and in front of equipment and the work, and the erection and maintenance of adequate warning, danger, and direction signs, shall be as required by the State and local authorities having jurisdiction. The traveling public shall be protected from damage to person and property. The Contractor's traffic on roads selected for hauling material to and from the site shall interfere as little as possible with public traffic. The Contractor shall investigate the adequacy of existing roads and the allowable load limit on these roads. The Contractor shall be responsible for the repair of any damage to roads caused by construction operations.

#### 1.20.1 Haul Roads

Where ever possible the Contractor shall use existing haul roads. The Contractor shall, at its own expense, construct access and haul roads necessary for proper prosecution of the work under this contract. Haul roads shall be constructed with suitable grades and widths; sharp curves, blind corners, and dangerous cross traffic shall be avoided. The Contractor shall provide necessary lighting, signs, barricades, and distinctive markings for the safe movement of traffic. The method of dust control, although optional, shall be adequate to ensure safe operation at all times. Dust control shall be compliant with Section 01355, ENVIRONMENTAL PROTECTION. Location, grade, width, and alignment of construction and hauling roads shall be submitted on a site haul road plans and subject to approval by the CONTRACTING OFFICER'S REPRESENTATIVE. Lighting shall be adequate to assure full and clear visibility for full width of haul road and work areas during any night work operations. Upon completion of the work, haul roads designated by the CONTRACTING OFFICER'S REPRESENTATIVE shall be removed.

#### 1.20.2 Barricades

The Contractor shall erect and maintain temporary barricades to limit public access to hazardous areas. Such barricades shall be required whenever safe public access to paved areas such as roads, parking areas or sidewalks is prevented by construction activities or as otherwise necessary to ensure the safety of both pedestrian and vehicular traffic. Barricades shall be securely placed, clearly visible with adequate illumination to provide sufficient visual warning of the hazard during both day and night.

#### 1.20.3 Contractor Access

Contractor access to the river bottom is available at the following locations using City of Phoenix rights-of-way:

1. On the south side of the river, east of Central Avenue there is an existing curb cut along the east side of Central Avenue south of the bridge. The curb cut gains access to an existing dirt road along the south side of the river, which leads to an existing ramp which grades to the bottom of the Salt River approximately 600 feet west of 7th Street. The Contractor may modify the ramp as necessary to provide safe access to the project site. There is also an existing high clearance box culvert crossing under Central Avenue at this location that provides access from the east side to the west side of the bridge and the river bottom. In using this access off of Central Avenue the Contractor must protect-in-place

the Gateway Facility located on the east side of the Central Avenue bridge. The Contractor will need to coordinate this access point with the Demonstration Site Contractor.

2. On the north side of the river, about 2200 feet east of 7th street is a Temporary Construction Easement (TCE) from the dead-end of East University Drive off of 7th Street to the project area. The TCE gains access to an existing dirt road along the top of the north river bank. The road leads to an existing concrete paved ramp, which provides access to the river bottom about 1300 feet east of 16th Street. The Contractor may determine that this access will only be useable for pick-up trucks, or other similar light traffic loads. Any damage to the ramp, the existing dirt road along the riverbank, or within the TCE, will be repaired by the Contractor at no additional cost to the project. The Contractor may need to remove an existing barricade located at the dead-end of East University drive in order to obtain equipment access to the TCE. Advance written permission from the City of Phoenix will be required for the removal of the barricade, and the Contractor shall replace the barricade in-kind to the satisfaction of the City of Phoenix. The cost of such barricade removal and reinstallation will be considered incidental to the project.
3. On the south side of the river, west of 7th Avenue is a gated ramp that can be used by the Contractor for access to the project site.
4. The Contractor may elect to obtain permission on his own for the use of other access locations to the river bottom. This would include the use of other existing ramps that gain access from the riverbank to the river bottom.

The Contractor must obtain prior written approval of the property owner for such access use and submit a copy of the approval to the CONTRACTING OFFICER'S REPRESENTATIVE prior to use of the property and/or ramps. Any damage to the property and/or ramps, caused by the Contractor's use, shall be repaired by the Contractor at no cost to the project.

#### 1.21 CONTRACTOR'S TEMPORARY FACILITIES

##### 1.21.1 Administrative Field Offices

The Contractor shall provide and maintain administrative field office facilities within the construction area at the designated site. Government office and warehouse facilities will not be available to the Contractor's personnel.

##### 1.21.2 Storage Area

The Contractor shall construct a temporary 6 foot high chain link fence around trailers and materials. Fence posts may be driven, in lieu of concrete bases, where soil conditions permit. Trailers, materials, or equipment shall not be placed or stored outside the fenced area. Trailers, equipment, or materials shall not be open to public view with the exception of those items which are in support of ongoing work on any given day. Materials shall not be stockpiled outside the fence in preparation for the next day's work. Mobile equipment, such as tractors, wheeled lifting equipment, cranes, trucks, and like equipment, shall be parked within the fenced area at the end of each work day.

## 1.21.3 Contractor's Work

The Contractor may establish a Contractor's Work Area (CWA) in the bottom of the Salt River for the purpose of parking and servicing equipment. The Contractor understands that his use of the river bottom for a CWA is solely at his own risk. No compensation will be made to the Contractor for any damage to or loss of equipment caused by the Contractor's establishment of a CWA in the river bottom.

- a. The CWA must cover the least amount of acreage possible to accomplish the tasks required for the material storage and servicing of equipment.
- b. Contractor shall not damage native plants or trees to establish CWA. The CWA shall not be located in the Low Flow Channel.
- c. The Contractor will monitor on a daily basis all activities in the CWA that may result in the leakage of oils, fluids, fuels, etc. which may contaminate soils in the river bottom, and promptly report any suspected leaks to the CONTRACTING OFFICER'S REPRESENTATIVE.
- d. The Contractor will remove or clean up to background concentrations, and in accordance with applicable regulations test and properly dispose of all such contaminated soils resulting from the Contractors activities within the CWA and the river bottom on at least a biweekly basis, or more frequently at the direction of the CONTRACTING OFFICER'S REPRESENTATIVE. The Contractor shall provide all necessary documentation to the CONTRACTING OFFICER'S REPRESENTATIVE, including at a minimum the location, quantity, test results, and documentation of disposal of any such contaminated soils within one month after removal. At the discretion of the CONTRACTING OFFICER'S REPRESENTATIVE, the Contractor may be required to provide a cleanup plan for approval prior to addressing such contaminated soils.
- e. The Contractor must create low diversion berms to direct surface flows away from the CWA so as to minimize the transport of contaminated soils downstream.

The Contractor must coordinate with the Site Preparation Contractor such that there is no interference with either project.

The Contractor may stockpile materials in the river bottom. However the following criteria will be applied to the stockpiles:

1. The stockpiles can be no more than 100 feet wide at the base.
2. The long axis of the stockpiles must be oriented parallel to the direction of flow in the river.
3. Any remnant materials remaining from the stockpiles after completion of the project must be completely removed from the river bottom.

The Contractor shall obtain approval of the CONTRACTING OFFICER'S REPRESENTATIVE when using property outside the project limits of the river to park and service equipment and store materials for use. The Contractor will obtain prior written approval of the property owner for such use and

submit a copy of the approval to the CONTRACTING OFFICER'S REPRESENTATIVE prior to use of the property.

The Contractor must provide the Government field office construction trailer area outside of the river bottom at locations shown on the plans.

The Contractor shall grade all construction yards, easements and limits of construction which are disturbed by construction or construction related activities to the lines and grades shown on the plans; or as a minimum, where no line or grade is shown, to a condition similar to or better than the pre-existing condition.

#### 1.21.4 Appearance of Trailers

Trailers utilized by the Contractor for administrative or material storage purposes shall present a clean and neat exterior appearance and shall be in a state of good repair. Trailers which, in the opinion of the CONTRACTING OFFICER'S REPRESENTATIVE, require exterior painting or maintenance will not be allowed on the property.

#### 1.21.5 Maintenance of Storage Area

Fencing shall be kept in a state of good repair and proper alignment. Should the Contractor elect to traverse, with construction equipment or other vehicles, unpaved areas which are not established roadways, such areas shall be covered with a layer of gravel as necessary to prevent rutting and the tracking of mud onto paved or established roadways; gravel gradation shall be at the Contractor's discretion.

#### 1.21.6 Security Provisions

Adequate outside security lighting shall be provided at the Contractor's temporary facilities. The Contractor shall be responsible for the security of its own equipment; in addition, the Contractor shall notify the appropriate law enforcement agency requesting periodic security checks of the temporary project field office.

### 1.22 GOVERNMENT FIELD OFFICE

#### 1.22.1 Resident Engineer's Office

The Contractor shall provide for the exclusive use of the Government Resident Engineer with an office building, approximately 1,200 square feet in floor area, 8-foot eave height, located where directed. The building shall have two 10' by 10' separated rooms. The facility shall be equipped with potable water, chilled drinking water, electric power, adequate lighting, air conditioning and heating equipment, and combination male/female toilet facility with locking door. Connections to water and sewer mains shall be provided. Locks, keyed alike, shall be provided for all exterior doors. Six telephone sets with 9 lines shall be provided (2 voice, 1 fax and 6 data). A T.1 service line is also required. A mail slot in the door or a lockable mail box mounted on the surface of the door shall be provided. Open parking space for 18 vehicles shall be located convenient to the office. The combined parking and building area shall be enclosed with a woven wire fence approximately 6 feet high with a 10-foot wide lockable gate accessible at all times from a road or street. At the completion of the project, the office shall remain the property of the Contractor and shall be removed from the site. Utilities shall be connected and disconnected in accordance with local codes and to the

**satisfaction of the Contracting Officer. Facilities, furnishings, materials, and equipment need not be new provided they are adequate for the intended use. All charges for utilities service for the office shall be borne by the Contractor, including long distance charges up to a maximum of \$75.00 per month.**

#### 1.22.2 Trailer-Type Mobile Office

The Contractor may, at its option, furnish and maintain a double-wide trailer-type mobile office acceptable to the CONTRACTING OFFICER'S REPRESENTATIVE and providing as a minimum the facilities specified above. The trailer shall be securely anchored to the ground at all four corners to guard against movement during high winds.

#### 1.22.3 Furniture

The Contractor shall provide furniture including the following:

- a. 1 drafting table with stool.
- b. 6 desks with one revolving chair for each desk.
- c. 1 conference table, 4-foot by 8-foot minimum.
- d. 10 straight back chairs.
- e. 6 bookcases.
- f. 4 legal size file cabinets with four drawers.
- g. 1 plan rack.
- h. 3 30-inch by 72-inch tables.
- i. 3 30-inch by 40-inch white board with 5 markers and 2 erasers.

Note: Used furniture, in good condition, may be acceptable if approved by the CONTRACTING OFFICER'S REPRESENTATIVE.

#### 1.22.4 Janitorial Services

The Contractor shall furnish one laborer, once weekly, for janitorial services for cleaning the office building and performing normal maintenance of facilities and grounds as deemed necessary by the CONTRACTING OFFICER'S REPRESENTATIVE during the entire life of the Contract. Services shall be performed at such a time and in such a manner to least interfere with the operations, but shall be accomplished during normal working hours. The Contractor shall provide bi-weekly trash collection. Services shall be accomplished to the satisfaction of the CONTRACTING OFFICER'S REPRESENTATIVE.

#### 1.23 APPROVAL OF BUILDING

Approval of the adequacy of the building shall be obtained from the CONTRACTING OFFICER'S REPRESENTATIVE prior to the construction of the building.

#### 1.24 OPTION

At the option of the Contractor, a portable-type building approved by the CONTRACTING OFFICER'S REPRESENTATIVE may be used.

#### 1.25 MAINTENANCE AND REMOVAL

The building, including all furniture, utilities and facilities, shall be maintained in good repair by the Contractor during the life of this contract. After completion of work under this contract, all facilities shall be removed from the site by the Contractor.

#### 1.26 GENERAL

The Contractor shall provide, for all the exclusive use of the CONTRACTING OFFICER'S REPRESENTATIVE and/or his representative, all temporary office equipment specified herein including appropriate software and accessories. Office equipment shall be new or like new and shall be located in the Corps of Engineers temporary office facility.

##### 1.26.1 Digital Camera

Epson PhotoPC 750Z with PhotoSuite II photo finishing software or approved equal.

##### 1.26.2 Fax/Copy/Telephone Answering Machine

Brother MFC 7160c Multi-Function Center, or approved equal.

##### 1.26.3 Copy Machine

One Xerox 5830 copy machine with automatic document feeder, two-sided copy, and 11-inch by 7-inch paper, or approved equal, to be retained until final payment.

#### 1.27 APPROVAL OF OFFICE EQUIPMENT

Approval of the adequacy of the office equipment shall be obtained from the CONTRACTING OFFICER'S REPRESENTATIVE prior to installation in the job site.

#### 1.28 MAINTENANCE AND REMOVAL

The office equipment shall be serviced and maintain in good repair by the Contractor during the life of this Contract. After receipt of final payment, all office equipment shall be removed from the site by the Contractor, unless otherwise specified.

#### 1.29 PAYMENT

No separate payment will be made for the items covered under this section and all costs in connection with such work will be considered as a subsidiary obligation of the Contractor.

#### 1.30 WORK SITE COMMUNICATION

Whenever the Contractor has the individual elements of its work site so located that operation by normal voice between these elements is not satisfactory, the Contractor shall install a satisfactory means of communication, such as telephone or other suitable devices. The devices shall be made available for use by Government personnel.

## 1.31 TEMPORARY PROJECT SAFETY FENCING

The safety fencing shall be a high visibility orange colored, high density polyethylene grid or approved equal, a minimum of 42 inches high, supported and tightly secured to steel posts located on maximum 10 foot centers, constructed at the approved location. The safety fencing shall be maintained by the Contractor during the life of the contract and, upon completion and acceptance of the work, shall become the property of the Contractor and shall be removed from the work site.

## 1.32 CLEANUP

Contractor generated construction debris, waste materials, packaging material and the like shall be removed from the work site daily. Any dirt or mud which is tracked onto paved or surfaced roadways shall be cleaned away. Stored material not in trailers, whether new or salvaged, shall be neatly stacked when stored.

## 1.33 RESTORATION OF STORAGE AREA

Upon completion of the project and after removal of trailers, materials, and equipment from within the fenced area, the fence shall be removed and will become the property of the Contractor. Areas used by the Contractor for the storage of equipment or material, or other use, shall be restored to the original or better condition as determined by the CONTRACTING OFFICER'S REPRESENTATIVE.

## PART 2 PRODUCTS

## 2.1 CONSTRUCTION SIGNS

## 2.1.1 Materials

## 2.1.1.1 Lumber

Lumber shall conform to NIST PS 20, and shall be seasoned Douglas Fir, S4S, Grade D or better except that posts, braces and spacers shall be construction grade (WCLB).

## 2.1.1.2 Plywood

Plywood shall conform to DOC PS 1, Grade A-C, Group 1, exterior type.

## 2.1.1.3 Bolts, Nuts and Nails

Bolts shall conform to ASME B18.2.1, nuts shall conform to ASME B18.2.2, and nails shall conform to ASTM F547.

## 2.1.1.4 Paints and Oils

Paints shall conform to CED A-A-2336 for primer and CID A-A-2962 for finish paint and lettering.

## PART 3 EXECUTION

## 3.1 PROJECT SCHEDULE

## 3.1.1 General Requirements

Pursuant to the Contract Clause, SCHEDULE FOR CONSTRUCTION CONTRACTS, a Project Schedule as described below shall be prepared. The scheduling of construction shall be the responsibility of the Contractor. Contractor management personnel shall actively participate in its development. Subcontractors and suppliers working on the project shall also contribute in developing and maintaining an accurate Project Schedule. The approved Project Schedule shall be used to measure the progress of the work, to aid in evaluating time extensions, and to provide the basis of all progress payments.

The Contractor shall be required to input its schedule into the Government Resident Management System (RMS) as described in Section 01312, QUALITY CONTROL SYSTEM (QCS). The use of the Standard Date Exchange Format (SDEF) is mandatory for this project. The Contractor must select a scheduling software which supports the SDEF.

### 3.1.2 Basis for Payment

The schedule shall be the basis for measuring Contractor progress. Lack of an approved schedule or scheduling personnel will result in an inability of the CONTRACTING OFFICER'S REPRESENTATIVE to evaluate Contractor's progress for the purposes of payment. Failure of the Contractor to provide all information, as specified below, shall result in the disapproval of the entire Project Schedule submission and the inability of the CONTRACTING OFFICER'S REPRESENTATIVE to evaluate Contractor progress for payment purposes. In the case where Project Schedule revisions have been directed by the CONTRACTING OFFICER'S REPRESENTATIVE and those revisions have not been included in the Project Schedule, the CONTRACTING OFFICER'S REPRESENTATIVE may hold retainage up to the maximum allowed by contract, each payment period, until revisions to the Project Schedule have been made.

#### 3.1.2.1 Project Schedule

The computer software system utilized by the Contractor to produce the Project Schedule shall be capable of providing all requirements of this specification. Failure of the Contractor to meet the requirements of this specification shall result in the disapproval of the schedule. Manual methods used to produce any required information shall require approval by the CONTRACTING OFFICER'S REPRESENTATIVE.

#### 3.1.2.2 Use of the Critical Path Method

The Critical Path Method (CPM) of network calculation shall be used to generate the Project Schedule. The Contractor shall provide the Project Schedule in the Precedence Diagram Method (PDM).

#### 3.1.2.3 Level of Detail Required

The Project Schedule shall include an appropriate level of detail. Failure to develop or update the Project Schedule or provide data to the CONTRACTING OFFICER'S REPRESENTATIVE at the appropriate level of detail, as specified by the CONTRACTING OFFICER'S REPRESENTATIVE, shall result in the disapproval of the schedule. The CONTRACTING OFFICER'S REPRESENTATIVE will use, but is not limited to, the following conditions to determine the appropriate level of detail to be used in the Project Schedule:

Activity Durations: Contractor submissions shall follow the direction of the CONTRACTING OFFICER'S REPRESENTATIVE regarding reasonable activity durations. Reasonable durations are those that

allow the progress of activities to be accurately determined between payment periods (usually less than 2 percent of all non-procurement activities' Original Durations are greater than 20 days).

**Procurement Activities:** Tasks related to the procurement of long lead materials or equipment shall be included as separate activities in the project schedule. Long lead materials and equipment are those materials that have a procurement cycle of over 90 days. Examples of procurement process activities include, but are not limited to: submittals, approvals, procurement, fabrication, and delivery.

**Government Activities:** Government and other agency activities that could impact progress shall be shown. These activities include, but are not limited to: approvals, inspections, utility tie-in, Government Furnished Equipment (GFE) and Notice to Proceed (NTP) for phasing requirements.

**Responsibility:** All activities shall be identified in the project schedule by the party responsible to perform the work. Responsibility includes, but is not limited to, the subcontracting firm, contractor work force, or government agency performing a given task. Activities shall not belong to more than one responsible party. The responsible party for each activity shall be identified by the Responsibility Code.

**Work Areas:** All activities shall be identified in the project schedule by the work area in which the activity occurs. Activities shall not be allowed to cover more than one work area. The work area of each activity shall be identified by the Work Area Code.

**Modification or Claim Number:** Any activity that is added or changed by contract modification or used to justify claimed time shall be identified by a mod or claim code that changed the activity. Activities shall not belong to more than one modification or claim item. The modification or claim number of each activity shall be identified by the Mod or Claim Number. Whenever possible, changes shall be added to the schedule by adding new activities. Existing activities shall not normally be changed to reflect modifications.

**Bid Item:** All activities shall be identified in the project schedule by the Bid Item to which the activity belongs. An activity shall not contain work in more than one bid item. The bid item for each appropriate activity shall be identified by the Bid Item Code.

**Phase of Work:** All activities shall be identified in the project schedule by the phases of work in which the activity occurs. Activities shall not contain work in more than one phase of work. The project phase of each activity shall be by the unique Phase of Work Code.

**Category of Work:** All activities shall be identified in the project schedule according to the category of work which best describes the activity. Category of work refers, but is not limited, to the procurement chain of activities including such items as submittals, approvals, procurement, fabrication, delivery,

installation, start-up, and testing. The category of work for each activity shall be identified by the Category of Work Code.

Feature of Work: All activities shall be identified in the project schedule according to the feature of work to which the activity belongs. Feature of work refers, but is not limited to, a work breakdown structure for the project. The feature of work for each activity shall be identified by the Feature of Work Code.

### 3.1.3 Scheduled Project Completion

The schedule interval shall extend from NTP to the contract completion date.

#### 3.1.3.1 Project Start Date

The schedule shall start no earlier than the date on which the NTP was acknowledged. The Contractor shall include as the first activity in the project schedule an activity called "Start Project". The "Start Project" activity shall have an "ES" constraint date equal to the date that the NTP was acknowledged, and a zero day duration.

#### 3.1.3.2 Constraint of Last Activity

Completion of the last activity in the schedule shall be constrained by the contract completion date. Calculation on project updates shall be such that if the early finish of the last activity falls after the contract completion date, then the float calculation shall reflect a negative float on the critical path. The Contractor shall include as the last activity in the project schedule an activity called "End Project". The "End Project" activity shall have an "LF" constraint date equal to the completion date for the project, and a zero day duration.

#### 3.1.3.3 Early Project Completion

In the event the project schedule shows completion of the project prior to the contract completion date, the Contractor shall identify those activities that have been accelerated and/or those activities that are scheduled in parallel to support the Contractor's "early" completion. Contractor shall specifically address each of the activities noted in the narrative report at every project schedule update period to assist the CONTRACTING OFFICER'S REPRESENTATIVE in evaluating the Contractor's ability to actually complete prior to the contract period.

### 3.1.4 Interim Completion Dates

Contractually specified interim completion dates shall also be constrained to show negative float if the early finish date of the last activity in that phase falls after the interim completion date.

#### 3.1.4.1 Start Phase

The Contractor shall include as the first activity for a project phase an activity called "Start Phase X" where "X" refers to the phase of work. The "Start Phase X" activity shall have an "ES" constraint date equal to the date on which the NTP was acknowledged, and a zero day duration.

#### 3.1.4.2 End Phase

The Contractor shall include as the last activity in a project phase an

activity called "End Phase X" where "X" refers to the phase of work. The "End Phase X" activity shall have an "LF" constraint date equal to the completion date for the project, and a zero day duration.

#### 3.1.4.3 Phase X

The Contractor shall include a hammock type activity for each project phase called "Phase X" where "X" refers to the phase of work. The "Phase X" activity shall be logically tied to the earliest and latest activities in the phase.

#### 3.1.5 Default Progress Data Disallowed

Actual Start and Finish dates shall not be automatically updated by default mechanisms that may be included in CPM scheduling software systems. Actual Start and Finish dates on the CPM schedule shall match those dates provided from Contractor Quality Control Reports. Failure of the Contractor to document the Actual Start and Finish dates on the Daily Quality Control report for every in-progress or completed activity, and failure to ensure that the data contained on the Daily Quality Control reports is the sole basis for schedule updating shall result in the disapproval of the Contractor's schedule and the inability of the CONTRACTING OFFICER'S REPRESENTATIVE to evaluate Contractor progress for payment purposes. Updating of the percent complete and the remaining duration of any activity shall be independent functions. Program features which calculate one of these parameters from the other shall be disabled.

#### 3.1.6 Out-of-Sequence Progress

Activities that have posted progress without all preceding logic being satisfied (Out-of-Sequence Progress) will be allowed only on a case-by-case approval of the CONTRACTING OFFICER'S REPRESENTATIVE. The Contractor shall propose logic corrections to eliminate all out of sequence progress or justify not changing the sequencing for approval prior to submitting an updated project schedule.

#### 3.1.7 Negative Lags

Lag durations contained in the project schedule shall not have a negative value.

### 3.2 PROJECT SCHEDULE SUBMISSIONS

The Contractor shall provide the submissions as described below. The data disk, reports, and network diagrams required for each submission are contained in paragraph SUBMISSION REQUIREMENTS.

#### 3.2.1 Preliminary Project Schedule Submission

The Preliminary Project Schedule, defining the Contractor's planned operations for the first 60 calendar days shall be submitted for approval within 20 calendar days after the NTP is acknowledged. The approved preliminary schedule shall be used for payment purposes not to exceed 60 calendar days after NTP.

#### 3.2.2 Initial Project Schedule Submission

The Initial Project Schedule shall be submitted for approval within 40 calendar days after NTP. The schedule shall provide a reasonable sequence

of activities which represent work through the entire project and shall be at a reasonable level of detail.

### 3.2.3 Periodic Schedule Updates

Based on the result of progress meetings, specified in "Periodic Progress Meetings," the Contractor shall submit periodic schedule updates. These submissions shall enable the CONTRACTING OFFICER'S REPRESENTATIVE to assess Contractor's progress. If the Contractor fails or refuses to furnish the information and project schedule data, which in the judgement of the CONTRACTING OFFICER'S REPRESENTATIVE or authorized representative is necessary for verifying the Contractor's progress, the Contractor shall be deemed not to have provided an estimate upon which progress payment may be made.

### 3.2.4 Standard Activity Coding Dictionary

The Contractor shall use the activity coding structure defined in the Standard Data Exchange Format (SDEF) in ER 1-1-11, Appendix A. This exact structure is mandatory, even if some fields are not used.

## 3.3 SUBMISSION REQUIREMENTS

The following items shall be submitted by the Contractor for the preliminary submission, initial submission, and every periodic project schedule update throughout the life of the project:

### 3.3.1 Data Disks

Two data disks containing the project schedule shall be provided. Data on the disks shall adhere to the SDEF format specified in ER 1-1-11, Appendix A.

#### 3.3.1.1 File Medium

Required data shall be submitted on 3.5 disks, formatted to hold 1.44 MB of data, under the MS-DOS Version 5. or 6.x, unless otherwise approved by the CONTRACTING OFFICER'S REPRESENTATIVE.

#### 3.3.1.2 Disk Label

A permanent exterior label shall be affixed to each disk submitted. The label shall indicate the type of schedule (Preliminary, Initial, Update, or Change), full contract number, project name, project location, data date, name and telephone number or person responsible for the schedule, and the MS-DOS version used to format the disk.

#### 3.3.1.3 File Name

Each file submitted shall have a name related to either the schedule data date, project name, or contract number. The Contractor shall develop a naming convention that will ensure that the names of the files submitted are unique. The Contractor shall submit the file naming convention to the CONTRACTING OFFICER'S REPRESENTATIVE for approval.

### 3.3.2 Narrative Report

A Narrative Report shall be provided with the preliminary, initial, and each update of the project schedule. This report shall be provided as the

basis of the Contractor's progress payment request. The Narrative Report shall include: a description of activities along the 2 most critical paths, a description of current and anticipated problem areas or delaying factors and their impact, and an explanation of corrective actions taken or required to be taken. The narrative report is expected to relay to the Government, the Contractor's thorough analysis of the schedule output and its plans to compensate for any problems, either current or potential, which are revealed through that analysis.

### 3.3.3 Approved Changes Verification

Only project schedule changes that have been previously approved by the CONTRACTING OFFICER'S REPRESENTATIVE shall be included in the schedule submission. The Narrative Report shall specifically reference, on an activity by activity basis, all changes made since the previous period and relate each change to documented, approved schedule changes.

### 3.3.4 Schedule Reports

The format for each activity for the schedule reports listed below shall contain: Activity Numbers, Activity Description, Original Duration, Remaining Duration, Early Start Date, Early Finish Date, Late Start Date, Late Finish Date, Total Float. Actual Start and Actual Finish Dates shall be printed for those activities in progress or completed.

#### 3.3.4.1 Activity Report

A list of all activities sorted according to activity number.

#### 3.3.4.2 Logic Report

A list of Preceding and Succeeding activities for every activity in ascending order by activity number. Preceding and succeeding activities shall include all information listed above in paragraph Schedule Reports. A blank line shall be left between each activity grouping.

#### 3.3.4.3 Total Float Report

A list of all incomplete activities sorted in ascending order of total float. Activities which have the same amount of total float shall be listed in ascending order of Early Start Dates. Completed activities shall not be shown on this report.

#### 3.3.4.4 Earnings Report

A compilation of the Contractor's Total Earnings on the project from the NTP until the most recent Monthly Progress Meeting. This report shall reflect the Earnings of specific activities based on the agreements made in the field and approved between the Contractor and CONTRACTING OFFICER'S REPRESENTATIVE at the most recent Monthly Progress Meeting. Provided that the Contractor has provided a complete schedule update, this report shall serve as the basis of determining Contractor Payment. Activities shall be grouped by bid item and sorted by activity numbers. This report shall: sum all activities in a bid item and provide a bid item percent; and complete and sum all bid items to provide a total project percent complete. The printed report shall contain, for each activity: the Activity Number, Activity Description, Original Budgeted Amount, Total Quantity, Quantity to Date, Percent Complete (based on cost), and Earnings to Date.

### 3.3.5 Network Diagram

The network diagram shall be required on the initial schedule submission and on monthly schedule update submissions. The network diagram shall depict and display the order and interdependence of activities and the sequence in which the work is to be accomplished. The CONTRACTING OFFICER'S REPRESENTATIVE will use, but is not limited to, the following conditions to review compliance with this paragraph:

#### 3.3.5.1 Continuous Flow

Diagrams shall show a continuous flow from left to right with no arrows from right to left. The activity number, description, duration, and estimated earned value shall be shown on the diagram.

#### 3.3.5.2 Project Milestone Dates

Dates shall be shown on the diagram for start of project, any contract required interim completion dates, and contract completion dates.

#### 3.3.5.3 Critical Path

The critical path shall be clearly shown.

#### 3.3.5.4 Banding

Activities shall be grouped to assist in the understanding of the activity sequence. Typically, this flow will group activities by category of work, work area and/or responsibility.

#### 3.3.5.5 S-Curves

Earnings curves showing projected early and late earnings and earnings to date.

### 3.4 PROJECT MEETING

#### 3.4.1 Periodic Schedule Meetings

Progress meetings to discuss payment shall include a monthly onsite meeting or other regular intervals mutually agreed to at the preconstruction conference. During this meeting the Contractor shall describe, on an activity by activity basis, all proposed revisions and adjustments to the project schedule required to reflect the current status of the project. The CONTRACTING OFFICER'S REPRESENTATIVE will approve activity progress, proposed revisions, and adjustments as appropriate.

#### 3.4.2 Meeting Attendance

The Contractor's Project Manager and Scheduler shall attend the regular progress meeting.

#### 3.4.3 Update Submission Following Progress Meeting

A complete update of the project schedule containing all approved progress, revisions, and adjustments, based on the regular progress meeting, shall be submitted not later than 4 working days after the monthly progress meeting.

#### 3.4.4 Progress Meeting Contents

Update information, including Actual Start Dates, Actual Finish Dates, Remaining Durations, and Cost-to-Date shall be subject to the approval of the CONTRACTING OFFICER'S REPRESENTATIVE. As a minimum, the Contractor shall address the following items on an activity by activity basis during each progress meeting.

#### 3.4.4.1 Start and Finish Dates

The Actual Start and Actual Finish dates for each activity currently in-progress or completed .

#### 3.4.4.2 Time Completion

The estimated Remaining Duration for each activity in-progress. Time-based progress calculations shall be based on Remaining Duration for each activity.

#### 3.4.4.3 Cost Completion

The earnings for each activity started. Payment will be based on earnings for each in-progress or completed activity. Payment for individual activities will not be made for work that contains quality defects. A portion of the overall project amount may be retained based on delays of activities.

#### 3.4.4.4 Logic Changes

All logic changes pertaining to NTP on change orders, change orders to be incorporated into the schedule, contractor proposed changes in work sequence, corrections to schedule logic for out-of-sequence progress, lag durations, and other changes that have been made pursuant to contract provisions shall be specifically identified and discussed.

#### 3.4.4.5 Other Changes

Other changes required due to delays in completion of any activity or group of activities include: 1) delays beyond the Contractor's control, such as strikes and unusual weather. 2) delays encountered due to submittals, Government Activities, deliveries or work stoppages which make re-planning the work necessary. 3) Changes required to correct a schedule which does not represent the actual or planned prosecution and progress of the work.

#### 3.4.5 Pre-Construction Meeting

After award of the contract, a pre-construction meeting shall be scheduled at a location and time (prior to mobilization and start of construction) to be agreed upon between the CONTRACTING OFFICER'S REPRESENTATIVE and the Contractor. The Contractor shall make all necessary arrangements to have key personnel of his company and of his principal subcontractors present at the meeting. Each representative shall have authority to make commitments and act for his firm. The purpose of the pre-construction meeting is to discuss any specific concerns or potential problems that the Contractor is aware of, to provide general information appropriate to the contract, to identify responsible individuals for various functions within each organization, and to develop tentative dates for the start of construction.

The Contractor shall submit to the CONTRACTING OFFICER'S REPRESENTATIVE during the pre-construction meeting the following documents:

1. Material data safety sheets
2. Preliminary work schedule
3. Preliminary traffic control plan
4. Emergency telephone numbers
5. Signing authority letter
6. Name and telephone number of the certified safety professional

The pre-construction meeting will cover topics such as critical elements of the work schedule, payment application and processing of invoices. Additionally, a scheduled start date for the work will be determined.

The Contractor shall be responsible to take minutes of the pre-construction meeting and distribute copies to all meeting participants. The meeting minutes shall be distributed within 48 hours of the meeting. At the subsequent construction progress meeting, the minutes will be attested or revised, as appropriate. The cost for attendance at the pre-construction meeting, and preparation and distribution of meeting minutes shall be incidental to the project and no extra payment will be made.

#### 3.4.6 Construction Progress Meetings

Construction progress meetings shall be scheduled weekly, or as considered necessary by the CONTRACTING OFFICER'S REPRESENTATIVE. The Contractor shall make all arrangements to have key personnel of his company and of his principal subcontractors present at all progress meetings; representatives shall have authority to make commitments and act for their firms. The Contractor shall assume full responsibility to act for and commit any subcontractor employed by the Contractor, whether or not such subcontractor is represented at the meeting.

During the construction progress meeting the CONTRACTING OFFICER'S REPRESENTATIVE's will act as chairman and will advise the Contractor of any administrative matters connected with the contract. The Contractor shall submit for review his two-week rolling schedule. The Contractor's representative at these meetings shall be prepared to discuss and resolve construction problems and concerns, material delivery and vendor data submittals status, construction progress as measured against the Contractor's accepted construction schedule and the Contractor's short range construction activities as provided on his two-week rolling schedule.

The Contractor shall not be relieved of his responsibility to fulfill all of the terms of the contract as a result of any inferences drawn or suggestions made available at these meetings.

The Contractor shall be responsible to take minutes of the construction progress meetings and distribute copies to all meeting participants. The meeting minutes shall be distributed within 48 hours of the meeting. At the subsequent construction progress meeting, the minutes will be attested or revised, as appropriate. The cost for attendance at meetings, and preparation and distribution of meeting minutes shall be incidental to the project and no extra payment will be made.

#### 3.5 REQUESTS FOR TIME EXTENSIONS

In the event the Contractor requests an extension of the contract completion date, or any interim milestone date, the Contractor shall furnish the following for a determination as to whether or not the Contractor is entitled to an extension of time under the provisions of the contract: justification, project schedule data, and supporting evidence as the CONTRACTING OFFICER'S REPRESENTATIVE may deem necessary. Submission of

proof of delay, based on revised activity logic, duration, and costs (updated to the specific date that the delay occurred) is obligatory to any approvals.

### 3.5.1 Justification of Delay

The project schedule shall clearly display that the Contractor has used, in full, all the float time available for the work involved with this request.

The CONTRACTING OFFICER'S REPRESENTATIVE's determination as to the number of allowable days of contract extension shall be based upon the project schedule updates in effect for the time period in question, and other factual information. Actual delays that are found to be caused by the Contractor's own actions, which result in the extension of the schedule, will not be a cause for a time extension to the contract completion date.

### 3.5.2 Submission Requirements

The Contractor shall submit a justification for each request for a change in the contract completion date of under 2 weeks based upon the most recent schedule update at the time of the NTP or constructive direction issued for the change. Such a request shall be in accordance with the requirements of other appropriate Contract Clauses and shall include, as a minimum:

- a. A list of affected activities, with their associated project schedule activity number.
- b. A brief explanation of the causes of the change.
- c. An analysis of the overall impact of the changes proposed.
- d. A sub-network of the affected area.

Activities impacted in each justification for change shall be identified by a unique activity code contained in the required data file.

### 3.5.3 Additional Submission Requirements

For any requested time extension of over 2 weeks, the CONTRACTING OFFICER'S REPRESENTATIVE may request an interim update with revised activities for a specific change request. The Contractor shall provide this disk within 4 days of the CONTRACTING OFFICER'S REPRESENTATIVE's request.

## 3.6 DIRECTED CHANGES

If the NTP is issued for changes prior to settlement of price and/or time, the Contractor shall submit proposed schedule revisions to the CONTRACTING OFFICER'S REPRESENTATIVE within 2 weeks of the NTP being issued. The proposed revisions to the schedule will be approved by the CONTRACTING OFFICER'S REPRESENTATIVE prior to inclusion of those changes within the project schedule. If the Contractor fails to submit the proposed revisions, the CONTRACTING OFFICER'S REPRESENTATIVE may furnish the Contractor with suggested revisions to the project schedule. The Contractor shall include these revisions in the project schedule until revisions are submitted, and final changes and impacts have been negotiated. If the Contractor has any objections to the revisions furnished by the CONTRACTING OFFICER'S REPRESENTATIVE, the Contractor shall advise the CONTRACTING OFFICER'S REPRESENTATIVE within 2 weeks of receipt of the revisions. Regardless of the objections, the Contractor shall continue to update the schedule with the CONTRACTING OFFICER'S

REPRESENTATIVE's revisions until a mutual agreement in the revisions is reached. If the Contractor fails to submit alternative revisions within 2 weeks of receipt of the CONTRACTING OFFICER'S REPRESENTATIVE's proposed revisions, the Contractor will be deemed to have concurred with the CONTRACTING OFFICER'S REPRESENTATIVE's proposed revisions. The proposed revisions will then be the basis for an equitable adjustment for performance of the work.

### 3.7 OWNERSHIP OF FLOAT

Float available in the schedule, at any time, shall not be considered for the exclusive use of either the Government or the Contractor.

### 3.8 PERMITS

Permits are required for the completion of this project. The Government will be obtaining several of the permits. The Contractor shall be responsible for obtaining all of the remainder of the permits.

#### 3.8.1 Permits To be Acquired by Contractor

Reference is made to the article of the contract entitled "Permits and Responsibilities" which obligates the Contractor to obtain all required licenses and permits. These permits include those issued by the City of Phoenix, Maricopa County, the State of Arizona, and Federal agencies. Contractor shall pay all charges fees, and taxes and provide all notices necessary and incidental to the due and lawful prosecution of the work. Permits, plans, and notices required of the Contractor may include but not be limited to the following:

##### a. City of Phoenix

1. Electrical Permit/Dry Utility Permit
2. Existing Sewer Permit
3. Manhole Entry Permit (include confined space entry program)
4. Hauling Permit (grading and drainage)
5. Land Use / Stockpile Permit
6. Construction Permit
7. Concrete and Paving Permit
8. Landscaping Permit
9. Building Permit
10. Right of Way Permit

##### b. Maricopa County

1. Waste Tire Disposal Permit
2. Refuse Hauling Permit
3. Earth Moving Permit and overall compliance with requirements of Rule 310 (additional requirements for soil stabilization, etc.)
4. Dust Control Plan

##### c. Arizona Department of Agriculture

1. Arizona Protected Native Plants and Wood Removal Permit for protected plants taken from project site
2. Notice of Intent to Clear Land

##### d. Structural Pest Control Commission

1. Certified Applicator. The following categories may apply: General Pesticide, Stagnant Water, Weed Control, Aquatic, Right-of-Way, Public Health, Turf Ornamental.

- e. Arizona Department of Environmental Quality (USEPA)
  - 1. NPDES Stormwater Construction General Permit Notice of Intent
  - 2. NPDES Stormwater Construction General Permit Notice of Termination.
  - 3. Stormwater Pollution Prevention Plan for Construction Activities
  - 4. NPDES Hydrostatic Test Water Discharge General Permit (Waiver).
  - 5. Compliance with City of Phoenix NPDES Permit provisions and Best Management Practices (BMPs) - BMPs relate to General Housekeeping, Pesticide/Herbicide/Fertilizer Application, Erosion and Sedimentation, and Discharge from Production Wells.
- f. Arizona Department of Water Resources
  - 1. Groundwater Dewatering Permit.

### 3.8.2 Permits To Be Acquired by the Government

The Government will be responsible for obtaining the following permits or compliance with laws and regulations that may regulate activities carried out for this Project, and the Contractor shall comply with any and all provisions of such permits that are applicable to the activities carried out under this Project:

- a. City of Phoenix
  - 1. Development Services Plan Review and Approval.
  - 2. Compliance with Phoenix AMA and AZ Municipal Water Users Association requirements for low water use plants (plants to be specified by the landscape architect, but plant lists must be consulted if any substitutions are made).
- b. Arizona Department of Environmental Quality (USEPA)
  - 1. Individual NPDES Permit and associated Best Management Practices.
- c. Arizona Department of Water Resources
  - 1. Service Area Well Permit and Well Spacing Waiver.
  - 2. Estimated three (3) "Notice of Intent to Drill" permits.
- d. State Historic Preservation Office
  - 1. Archaeological Clearance.
- e. US Army Corps of Engineers
  - 1. Congressionally authorized waiver from 404 permitting via CWA 404(r), and pursuant to an Environmental Impact Statement prepared in compliance with the National Environmental Policy Act of 1969 (42 U.S.C. 4321 et seq.)
- f. US Fish and Wildlife Service
  - 1. Threatened & Endangered Species and Migratory Bird Treaty Act compliance.

### 3.9 AS-BUILT "RECORD" DRAWINGS

#### 3.9.1 General

The Contractor shall prepare as-built drawings for the government. The as-built drawings shall be a record of the construction as installed and completed by the Contractor. They shall include all the information shown on the contract set of drawings and a record of all deviations, modifications, or changes from those drawings, however minor, which were incorporated in the work, all additional work not appearing on the contract

drawings, and all changes which are made after final inspection of the contract work. In the event that the Contractor accomplishes additional work which changes the as-built conditions of the facility after submission of the as-built drawings, the Contractor shall furnish revised and/or additional drawings as required to depict as-built conditions. The requirements for these additional drawings will be the same as for the as-built drawings included in the original submission. The prints shall show the following information, but not be limited thereto:

- a. The location and description of any utility lines or other installations of any kind or description known to exist within the construction area. The location includes dimensions to permanent features.
- b. The location and dimensions of any changes within the structures.
- c. Correct grade or alignment of roads, structures, or utilities if any changes were made from contract plans.
- d. Correct elevations if changes were made in site grading.
- e. Changes in details of design or additional information obtained from working drawings specified to be prepared and/or furnished by the Contractor including but not limited to fabrication, execution, installation plans and placing details, pipe sizes, insulation material, etc.
- f. A survey of topography and grades of all river banks that were graded as a part of the project construction. A 3-D electronic survey of the bank topography shall be prepared using Microstation format.
- g. All changes or modifications that result from the final inspection.
- h. A description of the extent of any wastes removed during the project.

### 3.9.2 Options

Where contract drawings or specifications allow options, only the option selected for construction shall be shown on the as-built drawings.

### 3.9.3 Preliminary As-Built Drawings

The Contractor shall maintain two (2) sets of full size blue-line prints marked-up in red, one for use by the Contractor and one for use by the Government, to show the as-built conditions. The sets of as-built prints shall be kept current and available at the job site at all times. Information to be included on these preliminary drawings shall conform to the requirements as stated above. Prior to submission of each monthly pay estimate, the CONTRACTING OFFICER'S REPRESENTATIVE and the Contractor will jointly inspect the marked-up as-built prints. Failure to keep the as-built field data current shall be sufficient justification to withhold a percentage from the monthly pay estimate.

### 3.9.4 Submittal to CONTRACTING OFFICER'S REPRESENTATIVE for Review and

## Approval

The Contractor shall use blue line drawings to generate as-built drawings for the project. Not later than two weeks after acceptance of the project by the Government, the Contractor shall deliver to the CONTRACTING OFFICER'S REPRESENTATIVE one (1) set of marked-up preliminary as-built drawings and one (1) set of paper or mylar reproducible prints of the as-built drawings. If upon review, the drawings are found to contain errors and/or omissions, the Contractor will be notified and the as-built drawings will be returned to the Contractor for corrections. The Contractor shall complete the corrections and return two (2) sets of corrected as-built drawings to the CONTRACTING OFFICER'S REPRESENTATIVE within ten (10) calendar days.

The final as-built drawings shall be sealed by an Engineer registered in the State of Arizona. And, as-builts will also be provided in electronic format using files on disk or CD as provided by the CONTRACTING OFFICER'S REPRESENTATIVE.

## 3.10 WORKING HOURS

The Contractor shall restrict all construction activities to the following schedule:

Monday thru Friday	6:30 a.m. to 7 p.m.
Saturday	8:00 a.m. to 7 p.m.

No work will be permitted during any other hours or on Sundays or Federal Holidays without prior written approval from the CONTRACTING OFFICER'S REPRESENTATIVE.

Disposal areas and haul routes utilized by the contractor may require restricted hauling hours.

## 3.11 USE OF EXPLOSIVES

Because of the proximity to residential and commercial areas as well as major utilities, the use of explosives will NOT be permitted for any construction activities on the project.

## 3.12 PROTECTION AND RESTORATION OF PROPERTY

The Contractor shall protect-in-place all existing structures and other features as identified on the plans, including but not limited to transmission towers, existing sand and gravel operation haul roads, and existing vegetation outside of the excavation limits.

The Contractor shall limit all construction activities to the right-of-way limits shown on the plans including dedicated street right-of-way, and shall not disturb any areas other than as required for construction as shown on the plans.

The Contractor will grade all Temporary Construction and Permanent Easement areas, and project areas which are disturbed during construction to the lines and grades shown on the plans, or as a minimum, where no lines and grades are shown, to a condition similar to or better than the pre-existing condition.

Existing river bottom Sand & Gravel Operations (SGO) haul roads in the

bottom of the river will be maintained as follows:

1. The north/south haul road crossing the river upstream of 16th Street shall be maintained for the duration of the project for use by the SGO.
2. The east/west haul road that dips south of the ADOT drainage structure located just west of Central Avenue on the north side.
3. The east/west haul road that goes under 24th Street. And,
4. The east/west haul road along the northbank between 16th and 24th Streets.

The Contractor will allow SGO activities along the east/west and north/south haul roads during construction and provide a 14 day prior notice to the SGO if any of these haul roads are to be impacted. Once initial impact has taken place, the Contractor has 60 days to complete the work and return the haul road to its pre-existing condition. The Contractor shall coordinate with the SGO to determine if alternate access and alignments for the roads and ramps must be provided.

The Contractor will minimize damage to and the removal of existing vegetation within the project area that exists beyond required clearing limits. Haul roads and other construction access routes will be created in such a way to minimize such damage and removal whenever possible, and will be approved by the CONTRACTING OFFICER'S REPRESENTATIVE before vegetation is removed.

### 3.13 CONTRACTOR'S RESPONSIBILITY FOR WORK

A. All construction activities will occur within the bottom of the Salt River. As recent as 1993 flows in excess of 100,000 cfs occurred in the river. Flows can occur at any time in the river, and nuisance flows are ever present in the river bottom. The Contractor shall protect his construction work and equipment from flows in the river. The CONTRACTING OFFICER'S REPRESENTATIVE assumes no responsibility for notifying the Contractor of any anticipated flows, nor for any damages incurred by the Contractor to his equipment or to any of the Contractor's work as a result of any flows of water.

B. The Contractor shall provide the CONTRACTING OFFICER'S REPRESENTATIVE at the pre-construction conference with his plan for managing flows.

C. Ground water may be encountered in the area of construction, and it may be pumped from the excavation limits back into the river downstream of the work area under dewatering permits obtained by the City from the Arizona Department of Water Resources, and to be provided to the Contractor.

D. The ground water infiltration rate to be managed by the Contractor when performing excavation activities can be calculated using the following parameter: the soil hydraulic conductivity (K) is estimated at 200 to 600 feet/day.

E. Groundwater pumped from excavations may be piped to the river bottom where it can be allowed to flow downstream. Project access,

concerns about public contact, or proximity to regulated features such as landfills may cause the CONTRACTING OFFICER'S REPRESENTATIVE to require that the ground water be directed away from these areas before allowing discharge as identified in Section 01355 ENVIRONMENTAL PROTECTION.

F. It will be necessary for the Contractor to monitor the total amount of ground water pumped on a daily basis. The Contractor must provide the necessary gages and/or meters to quantify the amount of water pumped in gallons per day at each well, trench pump or other dewatering point. A daily log will be kept by the Contractor, and the data will be provided to the CONTRACTING OFFICER'S REPRESENTATIVE on a monthly basis using the form provided in Appendix "C".

G. The Contractor shall take all necessary action to protect the public from the construction work area including temporary safety fencing. The Contractor will also notify the CONTRACTING OFFICER'S REPRESENTATIVE of any unauthorized personnel in the project area, including the presence of the general public.

H. In accordance with the Environmental Impact Statement the Contractor shall avoid all areas of standing or running water wherever possible, however it may be necessary to operate equipment, including vehicles in areas of water.

### 3.14 TRAFFIC CONTROL

Traffic control shall conform to Section 401 of the MAG Uniform Standard Specifications and COP Supplements except as modified herein.

This work shall consist of traffic control, and use of devices and flagmen or pilot cars in accordance with Section 401 of the COP Supplements and the City of Phoenix Traffic Barricade Manual, dated 1998.

#### a. Traffic Control Devices

All traffic and/or traffic control devices on this project shall be provided, maintained and/or controlled as specified in the City of Phoenix Traffic Barricade Manual, dated 1998.

#### b. Street Closure Permits

Permission to restrict city streets, sidewalks and alleys (street closure permits) shall be requested as specified in Section III of the City of Phoenix Traffic Barricade Manual.

#### c. Traffic Manual

Unless otherwise provided for in the following General Traffic Regulations, all traffic on this project shall be regulated as specified in Section IV of the City of Phoenix Traffic Barricade Manual.

#### d. Prior Approval

No deviation to the General Traffic Regulation will be allowed or implemented unless submitted to the CONTRACTING OFFICER'S REPRESENTATIVE for review and approval two weeks prior to the proposed work.

#### e. City of Phoenix Coordination

The Contractor shall contact Tony Arviso, Construction Traffic

Control, City of Phoenix, at 602-262-6235 to coordinate the traffic control plan.

### 3.14.1 General Traffic Regulations:

A. Local Access Requirements: The Contractor shall maintain local access to all side streets, access roads, driveways, alleys, and parking lots at all times unless specified to be closed herein or as shown on the traffic control plans, and shall notify residents 72 hours in advance of any restrictions which will affect their access. The Contractor shall restore the access as soon as possible. If the primary access cannot be restored in a timely manner, the Contractor shall provide an alternative which shall be predetermined with the residents prior to imposing any restrictions, and approved by the CONTRACTING OFFICER'S REPRESENTATIVE.

b. Special Sign Requirements: The Contractor shall provide, erect and maintain advance notifications, and informational and directional access signs that may be required by the CONTRACTING OFFICER'S REPRESENTATIVE.

c. Flagging of Traffic: No flagging of traffic will be permitted during the peak traffic hours of 6:00 a.m. to 8:30 a.m. and 4:00 p.m. to 7:00 p.m. weekdays. If construction requires, intermittent flagging will be allowed from 8:30 a.m. to 4:00 p.m. on weekdays and weekends to facilitate access for heavy construction equipment.

d. Traffic Control Plan: The Contractor shall submit a traffic control plan which shall implement all traffic control as required for approval, showing placement of all traffic control devices, including all conflicting signs to be covered/removed or relocated, or other features that may conflict with the placement of temporary signage. The plan shall be submitted to the CONTRACTING OFFICER'S REPRESENTATIVE at the pre-construction meeting for review. The Contractor shall obtain approval from the CONTRACTING OFFICER'S REPRESENTATIVE and the City of Phoenix, prior to implementation. Contact Tony Arviso/City of Phoenix at 602-262-6235.

e. At the time of the Pre-Construction conference, the Contractor shall designate an employee, other than the Project Superintendent, who is well qualified and experienced in construction traffic control and safety, to be available on the project site during all periods of construction to set up, maintain and coordinate safe barricading whenever construction restricts traffic. This individual shall be authorized to receive and fulfill instructions from the CONTRACTING OFFICER'S REPRESENTATIVE and shall supervise and direct the work. Instructions and information given by the CONTRACTING OFFICER'S REPRESENTATIVE to this individual shall be considered as having been given to the Contractor.

### 3.14.2 Special Traffic Regulations

Contractor access to the river bottom is available at the following locations using City of Phoenix rights-of-way:

A. Left turns across traffic are acceptable only if there is a left turn center lane. If no center lane, then right turns only. Possible exceptions to this requirement may be provided by the City

through an approved TCP.

B. Off duty uniformed officers shall be utilized for traffic control only as required by the City of Phoenix, and only as approved by the CONTRACTING OFFICER'S REPRESENTATIVE. An off duty officer will be required wherever multiple lanes of traffic must be crossed with construction equipment.

C. A TCP must be provided to the City for review and approval for each access location prior to implementation of the plan. The TCP must include appropriate signage for "truck crossing", etc.

The Contractor shall restore and regrade the areas within the Temporary Construction Easement limits to the same grade as prior to construction. All trash, large rocks, other debris, etc. shall be removed and the easement area left in a neat and clean condition acceptable to the CONTRACTING OFFICER'S REPRESENTATIVE.

### 3.15 CONSTRUCTION OF SIGNS

#### 3.15.1 Project and Hard Hat Signs

Project and hard hat signs shall be constructed as detailed on Figure 1,2, and safety signs. Decals will be furnished by the CONTRACTING OFFICER'S REPRESENTATIVE.

#### 3.15.2 Warning Signs

Warning Signs shall be constructed of plywood not less than 1/2-inch thick and shall be securely bolted to the supports with the bottom of the sign face 3 feet above the ground. The sign face shall be 2 x 4 feet, all letters shall be 4 inches in height, and the wording shall be: "WARNING: OVERHEAD TRANSMISSION LINES."

### 3.16 PAINTING SIGNS

All exposed surfaces and edges of plywood shall be given one coat of linseed oil and be wiped prior to applying primer. All exposed surfaces of signs and supports shall be given one coat of primer and 2 finish coats of white paint. Except as otherwise indicated, lettering on all signs shall be black and sized as indicated.

### 3.17 SCRAP MATERIAL

Materials indicated to be removed and not indicated to be salvaged, stored or reinstalled are designated as scrap and shall become the property of the Contractor and be removed from the site of work. The Contractor by signing this contract hereby acknowledges that he made due allowance for value, if any, of such scrap in the contract price.

### 3.18 PUBLIC SAFETY

Attention is invited to the **CONTRACT CLAUSE: PERMITS AND RESPONSIBILITIES**. The Contractor shall provide temporary fencing, barricades, and/or guards, as required, to provide protection in the interest of public safety. Whenever the Contractor's operations create a condition hazardous to the public, he shall furnish at his own expense and without cost to the Government, such flagmen and guards as are necessary to give adequate warning to the public of any dangerous conditions to be encountered and he

shall furnish, erect, or maintain such fences, barricades, lights, signs and other devices as are necessary to prevent accidents and avoid damage or injury to the public. Flagmen and guards, while on duty and assigned to give warning and safety devices shall conform to applicable city, county, and state requirements. Should the Contractor appear to be neglectful or negligent in furnishing adequate warning and protection measures, the Contracting Officer may direct attention to the existence of a hazard and the necessary warning and protective measures shall be furnished and installed by the Contractor without additional cost to the Government. Should the Contracting Officer point out the inadequacy of warning and protective measures, such action of the Contracting Officer shall not relieve the Contractor from any responsibility for public safety or abrogate his obligation to furnish and pay for those devices. The installation of any general illumination shall not relieve the Contractor of his responsibility for furnishing and maintaining any protective facility.

-- End of Section --

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## SECTION 01270

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## SECTION 01270

## MEASUREMENT AND PAYMENT

## PART 1 GENERAL

## 1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

## AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 615/A 615M	(1996a) Deformed and Plain Billet-Steel Bars for Concrete Reinforcement
ASTM C 127	(1988; R 1993) Specific Gravity and Absorption of Course Aggregate
ASTM C 128	(1997) Specific Gravity and Absorption of Fine Aggregate
ASTM D 1250	(1980; R 1997) Petroleum Measurement Tables

## 1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

## SD-03 Product Data

## Weight Certificates; G, RE

Submit certified weight certificates for Maintenance Roads Asphaltic Concrete.

## 1.3 LUMP SUM PAYMENT ITEMS

Payment items for the work of this contract for which contract lump sum payments will be made are listed in the BIDDING SCHEDULE and described below. All costs for items of work, which are not specifically mentioned to be included in a particular lump sum or unit price payment item, shall be included in the listed lump sum item most closely associated with the work involved. The lump sum price and payment made for each item listed shall constitute full compensation for furnishing all plant, labor, materials, and equipment, and performing any associated Contractor quality control, and performing any associated Contractor quality control reports, mobilization, demobilization, obtaining bonds, insurance, and permits, providing temporary facilities and utilities, payment for usage of utilities, furnishing and installing project and safety signs, furnishing, installing, and maintaining the government field office, scheduling,

providing submittals, attending meetings, preparing as-built drawings, providing traffic control, environmental protection, meeting safety requirements, tests and reports, and for performing all work required for which separate payment is not otherwise provided.

### 1.3.1 Item No. 1, Clearing, Grubbing, and Demolition

#### 1.3.1.1 Payment

Payment includes all labor and equipment required for clearing, grubbing, demolition of any specified structures, and protection of all other structures, and disposal of waste identified within the project limits.

#### 1.3.1.2 Unit of Measure

Unit of measure: Lump sum.

### 1.3.2 Item No. 5, Storm Drain Piping and Structures:

#### 1.3.2.1 Payment

Payment includes all labor and equipment required for trench and structure excavation, processing of on-site material or importing material required for backfill, grading, surface restoration, compacting, extension of existing storm drain pipes, replacement of existing catch basin grates, and the furnishing and placing of concrete, reinforcing steel, headwalls, backfill, culvert piping and appurtenances, concrete collars, pipe zone material, drainage swale, depressed roadway crossings outside of the wetlands area, riprap, riprap bedding, and all other miscellaneous items required to complete the Storm Drain Piping and Structures as shown on the Drawings and as specified.

#### 1.3.2.2 Unit of Measure

Unit of Measure: Lump sum.

### 1.3.3 Item No. 6, Debris Screen Drop Structure

#### 1.3.3.1 Payment

Payment includes all labor and equipment required for excavation, backfill, compacting, and grading, and the furnishing and placement of aggregate base, concrete, reinforcing steel, concrete blocks, dowels, wire mesh, broken concrete ruin blocks, and all miscellaneous items required for a complete debris screen drop structure as shown on the Drawings and as specified.

#### 1.3.3.2 Unit of Measure

Unit of measure: Lump sum.

### 1.3.4 Item No. 21, Water Distribution Pump Station

#### 1.3.4.1 Payment

Payment includes all excavation, grading, compacting, surface restoration, hydrostatic pressure testing, and the furnishing and placing of backfill, structural fill, piping, intake flume, fittings, and appurtenances, prefabricated pump station, screen, concrete, pipe supports, reinforcing

steel, chain link fence roof, screen cloth, hatches, chain link gates, chain link fence roof with shade cover, masonry blocks, radio tower, electrical equipment and service for pump station and high pressure sprinklers, instrumentation and control, and all other miscellaneous items required to complete the Water Distribution Pump Station as shown on the Drawings and as specified.

#### 1.3.4.2 Unit of Measure

Unit of Measure: Lump sum.

#### 1.3.5 Item No. 22, Production Well RSPW No. 1

##### 1.3.5.1 Payment

Payment includes all excavation, grading, compacting, surface restoration, hydrostatic pressure testing, and the furnishing and placing of backfill, structural fill, welded steel piping, fittings, and appurtenances, magnetic flowmeter, butterfly valve, air pressure/vacuum relief valve, check valve, concrete, pipe supports, reinforcing steel, concrete blocks, electrical, instrumentation and control, and all other miscellaneous items required to complete Production Well RSWP No. 1 site as shown on the Drawings and as specified.

##### 1.3.5.2 Unit of Measure

Unit of Measure: Lump sum.

#### 1.3.6 Completion of Existing Production Well RSPW No. 2

##### 1.3.6.1 Payment

Payment includes all excavation, grading, compaction, surface restoration, and the furnishing and placing of backfill, structural fill, concrete, reinforcing steel, concrete blocks, chain link gates, pipe, fittings, and appurtenances for piping to reservoir, adjustable frequency drives, and upgrades to SCADA system, electrical and all other miscellaneous items required for completion of Production Well RSPW No. 2.

##### 1.3.6.2 Unit of Measure

Unit of Measure: Lump sum.

#### 1.3.7 Item No. 24, Reservoir Liner and Edge Treatment

##### 1.3.7.1 Payment

Payment includes all labor and equipment required for excavation, backfilling and the furnishing and placement of the LLDPE liner, retaining wall, mortar, river rock, sand protective fill over liner, structural backfill, shotcrete and all miscellaneous items required for a reservoir, as shown on the Drawings and as specified.

##### 1.3.7.2 Unit of Measure

Unit of Measure: Lump sum.

#### 1.3.8 Item No. 37, Wetlands Piping and Control/Drainage Structures

## 1.3.8.1 Payment

Payment includes all labor and equipment required for excavation, backfill, and grading, and the furnishing and placement of structural fill, concrete, reinforcing steel, structural steel, metals, stop logs, intakes, weirs, weir boxes, flow regulator weir, overflow weir, weir overflow channel, headwalls, canal gate, intake and equalizer piping, unlined canals, riprap, and all miscellaneous items required to complete the wetlands piping and control/drainage structures, as shown on the Drawings and as specified. The limits of this work are generally defined by the wetland liner limits, but also includes the area encompassing the overflow channels, depressed roadway crossings, and riprap aprons that are outside the liner limits.

## 1.3.8.2 Unit of Measure

Unit of Measure: Lump sum.

## 1.3.9 Item No. 46, Overbank and Gateway Permanent Drip Irrigation System

## 1.3.9.1 Payment

Payment includes all labor and equipment required for excavation, backfill, and the furnishing and placement of the pipe and tubing, fittings, valve assemblies, spray sprinklers, drip emitters, controller assemblies, wire, testing, electrical, and maintenance, and all miscellaneous items required for the Overbank and gateways permanent drip irrigation system, as shown on the Drawings. In addition, the lump sum bid price shall include all of the Contractor's costs for furnishing, transporting and installing the mainline pipe and fittings, and control system wire for the Temporary Drip Irrigation System that is installed in the Overbank and City of Gateway areas according to the Drawings and Specifications. In addition, the lump sum bid price shall include all of the Contractor's costs for furnishing and transporting the central control computer work station for the Permanent and Temporary Drip Irrigation Systems to the location designated by the Contracting Officer's Representative.

## 1.3.9.2 Unit of Measure

Unit of Measure: Lump sum.

## 1.3.10 Item No. 47, Terrace and Slope Temporary Drip Irrigation System

## 1.3.10.1 Payment

Payment includes all labor and equipment required for excavation and backfill, and the furnishing and placement of all pipe and tubing, fittings, valve assemblies, drip emitters, testing, electrical, and maintenance; and all miscellaneous items required for the terrace and slopes temporary drip irrigation system, as shown on the Drawings.

## 1.3.10.2 Unit of Measure

Unit of Measure: Lump sum.

## 1.3.11 Item No. 48, Plant Establishment

## 1.3.11.1 Payment

Payment includes all labor and equipment required to operate and maintain the landscaping and irrigation system for a 12 month period starting at substantial completion of the project. As the plants establish themselves, the Contractor will keep the newly planted areas free from undesirable weed growth as specified in the Contract documents. If plantings do not meet the specified coverage and survival criteria during the plant maintenance period, the Contractor will replace the vegetation and replant as necessary until satisfactory stands of vegetation are realized by the Contracting Officer.

1.3.11.2 Unit of Measure

Unit of Measure: Lump sum.

1.3.12 Item No. 49, Staging Area Sitework

1.3.12.1 Payment

Payment includes all labor and equipment required for excavation, backfill, grading, and the furnishing and placement of all aggregate base course, asphalt concrete pavement, concrete, reinforcing, dry wells, striping, and signage required to complete the parking lot, right turn lane, curb, curb and gutter, valley gutter, **cast concrete seat walls, handrails,** sidewalk curbramp, gate at maintenance road, accessible parking lots, tire treadle, catch basins, dry wells, headwall, lighting of pedestrian tunnel, electrical for future entry monument and kiosks, lighting up staging area, and all miscellaneous items required for the staging area sitework, as shown on the Drawings.

1.3.12.2 Unit of Measure

Unit of Measure: Lump sum.

**1.3.13 Item No. 56, Pedestrian Bridge**

**1.3.13.1 Payment**

**Payment includes all labor and equipment required for the excavation, backfilling, compacting, and grading, and the furnishing and placement of the concrete, reinforcing steel, bridge deck, steel, boulders, and all miscellaneous items required for a complete pedestrian bridge, as shown on the Drawings.**

**1.3.13.2 Unit of Measure**

**Unit of measure: Lump sum.**

1.3.14 Item No. 57, Seating Node Area with Furnishings

1.3.14.1 Payment

Payment includes all labor and equipment required for the excavation, backfilling, compacting, and grading, and the furnishing and placement of the salvaged concrete header, cast concrete seatwall, decomposed aggregate, stabilizer, and all miscellaneous items required for a complete seating node area as shown on the Drawings.

1.3.14.2 Unit of Measure

Unit of Measure: Lump sum.

1.3.15 Item No. 58, Interpretive Staging Area

1.3.15.1 Payment

Payment includes all labor and equipment required for the excavating, backfilling, compacting, and grading, and the furnishing and placement of the, concrete walk, cast concrete seatwall, concrete paving, salvaged concrete header, decomposed granite, stabilizer, electrical and all miscellaneous items required for a complete interpretive staging area as shown on the Drawings.

1.3.15.2 Unit of Measure

Unit of Measure: Lump sum.

1.3.16 Item No. 59, Sewer System

1.3.16.1 Payment

Payment includes all labor and equipment required for trench and structure excavation, processing of on-site material or importing material required for backfill, grading, surface restoration, compacting, and connecting to the existing City of Phoenix Sewer, and the furnishing and placing of concrete, reinforcing steel, manholes, clean outs, backfill, vitrified clay pipe and appurtenances, pipe zone material, and all other miscellaneous items required to complete the Sewer System as shown on the Drawings and as specified.

1.3.16.2 Unit of Measure

Unit of Measure: Lump sum.

1.3.17 Item No. 60, Potable Water System

1.3.17.1 Payment

Payment includes all labor and equipment required for trench and structure excavation, processing of on-site material or importing material required for backfill, grading, surface restoration, compacting, and connecting to the existing pipe, and the furnishing and placing of concrete, reinforcing steel, backfill, ductile iron pipe and appurtenances, valves, valve boxes, fire hydrant assembly, water service connection, water meter box, backflow preventer assembly, pipe zone material, thrust blocks, and all other miscellaneous items required to complete the Potable Water System as shown on the Drawings and as specified.

1.3.17.2 Unit of Measure

Unit of Measure: Lump sum.

1.3.18 Item No. 61, Restroom

1.3.18.1 Payment

Payment includes all excavation, grading, compacting, surface restoration, hydrostatic pressure testing, and the furnishing and placing of backfill, structural fill, granite aggregate, plumbing, fittings, and appurtenances,

concrete, reinforcing steel, masonry, roofing, floor drains, hose bibs, room identification signs, steel gates, doors, toilet room accessories, partitions, drinking fountain, electrical and all other miscellaneous items required to complete the restroom as shown on the Drawings and as specified.

1.3.18.2 Unit of Measure

Unit of Measure: Lump sum.

1.3.19 Item No. 62, Overlook A on the North Bank

1.3.19.1 Payment

Payment includes all labor and equipment required for the excavation, backfilling, compacting and grading, and the furnishing and placement of the gabion retaining wall, cast concrete seatwall, decomposed granite, stabilizer, trash receptacle, salvaged concrete header, concrete walk, Ramada, and all miscellaneous items required for a complete Overlook A on the north bank as shown on the Drawings and as specified.

1.3.19.2 Unit of Measure

Unit of Measure: Lump sum.

1.3.20 Item No. 63, Overlook B on the South Bank

1.3.20.1 Payment

Payment includes all labor and equipment required for the excavation, backfilling, compacting and grading, and the furnishing and placement of the gabion retaining wall, cast concrete seatwall, decomposed granite, pedestrian bridge, stabilizer, trash receptacle, salvaged concrete header, concrete walk, Ramada, and all miscellaneous items required for a complete Overlook A on the south bank as shown on the Drawings and as specified.

1.3.20.2 Unit of Measure

Unit of Measure: Lump sum.

1.3.21 Item No. 64, Waterfall

1.3.21.1 Payment

Payment includes all labor and equipment required for the excavation, backfilling, grading, and the furnishing and placement of the concrete, reinforcing steel, shotcrete, structural backfill, river rock, broken concrete river ruin blocks and all miscellaneous items required for a complete waterfall as shown on the Drawings.

1.3.21.2 Unit of Measure

Unit of Measure: Lump sum.

1.3.22 Item No. 66, Option 2 Gateway Hardscape (Recreation)

1.3.22.1 Payment

Payment includes all labor and equipment required for the excavation, backfilling, compacting, and grading, and the furnishing and placement of

the concrete, reinforcing steel, riprap, decomposed granite, stabilizer, tree wells, salvaged concrete ruin seating, bike racks, drinking fountain and chiller, concrete headers, gate, cistern, irrigation flumes, trench drain cover, guardrail, concrete retaining wall, and all miscellaneous items required for a complete gateway hardscape as shown on the Drawings and as specified.

#### 1.3.22.2 Unit of Measure

Unit of Measure: Lump sum.

#### 1.3.23 Item No. 67, Option 3 Gateway Canopy Structure (Betterment)

##### 1.3.23.1 Payment

Payment includes all labor and equipment required for the excavation, backfilling, compacting, and grading, and the furnishing and placement of the concrete, reinforcing steel, structural steel, and all miscellaneous items required for a complete gateway canopy structure as shown on the Drawings and as specified.

##### 1.3.23.2 Unit of Measure

Unit of Measure: Lump sum.

#### 1.3.24 Item No. 68, Option 4 Gateway Electrical (Betterment)

##### 1.3.24.1 Payment

Payment includes all labor and equipment required for the excavation, backfilling, compacting, and grading, and the furnishing and placement of the conduits, conductors, lighting fixture, and all miscellaneous items required for a complete gateway canopy structure as shown on the Drawings and as specified.

##### 1.3.24.2 Unit of Measure

Unit of Measure: Lump sum.

#### 1.4 UNIT PRICE PAYMENT ITEMS

Payment items for the work of this contract on which the contract unit price payments will be made are listed in the BIDDING SCHEDULE and described below. The unit price and payment made for each item listed shall constitute full compensation for furnishing all plant, labor, materials, and equipment, and performing any associated Contractor quality control, environmental protection, meeting safety requirements, tests and reports, and for performing all work required for each of the unit price items.

##### 1.4.1 Items No. 2a and 2b, General Site Excavation for Project Facilities

###### 1.4.1.1 Payment

Payment includes all labor and equipment, including excavation and disposition of excess excavated material and unsuitable material, required for excavation for the wetlands, canals, bridge undercrossings, compacted earth roads, paved maintenance roads, reservoirs and other features on the project site. Specifically excluded from this item is any excavation below

finish grade required to install liners, piping, structures, plantings, and conduits.

#### 1.4.1.2 Measurement

The total quantity of excavated material for which payment will be made will be the theoretical quantity between the ground surface as determined by a survey and the grade and slope of the theoretical cross sections indicated. No allowance will be made for overdepth excavation or for the removal of any material outside the required slope lines unless authorized.

#### 1.4.1.3 Unit of Measure

Unit of measure: Cubic yard.

#### 1.4.2 Items No. 3a and 3b, General Site Fills and Embankments for Project Facilities

##### 1.4.2.1 Payment

Payment includes all labor and equipment required for processing of on-site material, placement of fill, compacting, grading, and water required for the furnishing and placement of any fills and embankments for the wetlands, canals, compacted earth roads, paved maintenance roads and other features on the project site.

##### 1.4.2.2 Measurement

The total quantity of fill material for which payment will be made will be the theoretical quantity between the ground surface as determined by a survey and the grade and slope of the theoretical cross sections indicated. No allowance will be made for additional fill provided outside the required slope lines unless authorized.

##### 1.4.2.3 Unit of Measure

Unit of measure: Cubic yard.

#### 1.4.3 Items No. 4a and 4b, Excavation and Disposal of Construction Debris, Household Waste, Inert Material, and Mixed Waste

##### 1.4.3.1 Payment

Payment includes all labor and equipment required for excavation and disposition of all construction debris, household waste, inert material, and mixed waste.

##### 1.4.3.2 Measurement

The total quantity of excavated material for which payment will be made will be based on the measurements of the stockpile of construction debris, household waste, inert material, and mixed waste that has been segregated from the other excavated material.

##### 1.4.3.3 Unit of Measure

Unit of measure: Cubic yard.

#### 1.4.4 Item no. 7, Fence

## 1.4.4.1 Payment

Payment includes all labor and equipment required for the excavation, backfilling, and grading and the furnishing and placement of the concrete fencing and gates.

## 1.4.4.2 Measurement

The fence will be measured based on the amount of fencing installed in the accepted work.

## 1.4.4.3 Unit of Measure

Unit of measure: Linear foot.

## 1.4.5 Item No. 8, Shotcrete Lined Canal

## 1.4.5.1 Payment

Payment includes all labor and equipment required for excavation, processing on-site material or importing material required for the shotcrete liner, backfilling, compacting, grading, and the furnishing and placement of backfill, structural backfill, and rounded river rock.

## 1.4.5.2 Measurement

The Shotcrete Lined Canal will be measured based on the amount of shotcrete lined canal installed in the accepted work.

## 1.4.5.3 Unit of Measure

Unit of measure: Square yard.

## 1.4.6 Item No. 9, LLDPE Lined Canal

## 1.4.6.1 Payment

Payment includes all labor and equipment required for excavation, backfilling, compacting, grading, and the furnishing and placement of the linear low-density polyethylene (LLDPE) liner, protective layer, geotextile fabric, and rounded river rock.

## 1.4.6.2 Measurement

LLDPE Lined Canal will be measured based on the amount of LLDPE lined canal installed in the accepted work.

## 1.4.6.3 Unit of Measure

Unit of Measure: Square yard.

## 1.4.7 Item No. 10, Canal Control Structure

## 1.4.7.1 Payment

Payment includes all labor and equipment required for excavation, backfill, structural fill, compacting, and grading, and the furnishing and placement of aggregate base, concrete, reinforcing steel, metals, stop logs, and all

miscellaneous items required for a complete control structure as shown on the Drawings and as specified.

#### 1.4.7.2 Measurement

Canal Control Structure will be measured based on the number of this type of structure constructed in the accepted work.

#### 1.4.7.3 Unit of Measure

Unit of measure: Each.

#### 1.4.8 Item No. 11, Canal Feed Splitter Box

##### 1.4.8.1 Payment

Payment includes all labor and equipment required for excavation, backfill, structural fill, and grading, and the furnishing and placement of aggregate base, concrete, reinforcing steel, metals, and all miscellaneous items required for a complete canal feed splitter box as shown on the Drawings and as specified.

##### 1.4.8.2 Measurement

Canal Feed Splitter Box will be measured based on the number of this type of structure constructed in the accepted work.

##### 1.4.8.3 Unit of Measure

Unit of measure: Each.

#### 1.4.9 Item No. 12, Canal Gravity Piping

##### 1.4.9.1 Payment

Payment includes all labor and equipment required for trench excavation, processing of on-site material or importing material required for backfill, grading, compacting, leak testing, and the furnishing and placing of concrete, backfill, piping and appurtenances, and pipe zone material.

##### 1.4.9.2 Measurement

Canal Gravity Piping will be measured based on the amount of pipe installed in the accepted work.

##### 1.4.9.3 Unit of Measure

Unit of measure: Linear foot.

#### 1.4.10 Items No. 13 through 14, Canal Pump Station Discharge Piping

##### 1.4.10.1 Payment

Payment includes all labor and equipment required for trench excavation, processing of on-site material or importing material required for backfill, grading, compacting, hydrostatic pressure testing, and the furnishing and placing of concrete for thrust blocks, backfill, piping, and appurtenances, pipe zone material, and detectable tape.

## 1.4.10.2 Measurement

Canal Pump Station Discharge Piping will be measured based on the amount of canal pressure pipe installed in the accepted work.

## 1.4.10.3 Unit of Measure

Unit of measure: Linear foot.

## 1.4.11 Item No. 15, Canal Transfer Pump Station

## 1.4.11.1 Payment

Payment includes all excavation, grading, compacting, surface restoration, hydrostatic pressure testing, and the furnishing and placing of backfill, structural fill, welded steel piping, fittings, and appurtenances, valves, concrete, pipe supports, reinforcing steel, trash rack, pumps, vaults, electrical, instrumentation and control, and all other miscellaneous items required to complete the Canal Transfer Pump Station as shown on the Drawings and as specified.

## 1.4.11.2 Measurement

Canal Transfer Pump Station will be measured based on the number of structures of this type constructed in the accepted work.

## 1.4.11.3 Unit of Measure

Unit of measure: Each.

## 1.4.12 Items No. 16 thru 18, Pressurized Water Distribution Piping

## 1.4.12.1 Payment

Payment includes all labor and equipment required for trench excavation, processing of on-site material or importing material required for backfill, grading, compacting, hydrostatic pressure testing, surface restoration, and the furnishing and placing of concrete for thrust blocks, backfill, piping and appurtenances, restrained joints, air valves, valves, valve boxes, blind flanges, pipe zone material, and detectable tape.

## 1.4.12.2 Measurement

Pressurized Water Distribution Piping will be measured based on the amount of pressurized water distribution pipe installed in the accepted work.

## 1.4.12.3 Unit of Measure

Unit of measure: Linear foot.

## 1.4.13 Item No. 19, Pressurized Water Distribution Piping Connected to Bridge (12")

## 1.4.13.1 Payment

Payment includes all labor and equipment required for connecting to bridge, corrosion protection, hydrostatic pressure testing, and the furnishing and placing of pipe, fittings and appurtenances, pipe supports, and restrained joints.

## 1.4.13.2 Measurement

Pressurized Water Distribution Piping Connected to Bridge (12") will be measured based on the amount of pressurized water distribution piping connected to bridge installed in the accepted work.

## 1.4.13.3 Unit of Measure

Unit of measure: Linear foot.

## 1.4.14 Item No. 20, Connection to Future High Pressure Sprinkler

## 1.4.14.1 Payment

Payment includes all labor and equipment required for trench excavation, processing of on-site material or importing material required for backfill, grading, compacting, corrosion protection, hydrostatic pressure testing, surface restoration, and the furnishing and placing of concrete for thrust blocks????, backfill, pipe, fittings and appurtenances, restrained joints, valves, valve boxes, blind flanges, vaults with hatches, pipe zone material, and detectable tape.

## 1.4.14.2 Measurement

Connection to Future High Pressure Sprinkler is measured based on the number of structures of this type constructed in the accepted work

## 1.4.14.3 Unit of Measure

Unit of measure: Each.

## 1.4.15 Items No. 25 thru 28, Reservoir Plantings for different habitats

## 1.4.15.1 Payment

Payment includes all labor and equipment required for soil testing, and grading, and the furnishing and placement of the fertilizer, soil additives, and planting material. When the soils are ready for planting and the project's irrigation system(s) has been tested and is deemed functional, the plant contractor will be given control of the reservoir water levels for plant installation and during the plant maintenance period (180 days). The contractor will install the plants per the construction drawings and specifications as well as provide a warranty. As the reservoir plants establish themselves, the contractor will also keep the newly planted areas free from undesirable weed growth as specified in the projects construction documents. If plantings do not meet the specified coverage and survival criteria at the end of the plant maintenance period, the plant contractor will replace the vegetation and replant the reservoir as necessary until satisfactory stands of reservoir vegetation are realized.

## 1.4.15.2 Measurement

Reservoir Plantings for different habitats will be measured based on the number of **acres** of each **habitat** type planted in the accepted work.

## 1.4.15.3 Unit of Measure

Unit of measure: **Acres**.

## 1.4.16 Item No. 29, Wetlands Liner

## 1.4.16.1 Payment

Payment includes all labor and equipment required for excavation, furnishing and placement of the granular filter material, natural clay or soil-bentonite lining, structural backfill, backfill, and grading.

## 1.4.16.2 Measurement

Wetlands Liner will be measured based on the amount of wetlands liner installed in the accepted work.

## 1.4.16.3 Unit of Measure

Unit of Measure: Square yard.

## 1.4.17 Items No. 30 thru 36, Wetlands Plantings for different habitat types

## 1.4.17.1 Payment

Payment includes all labor and equipment required for soil testing, excavation, backfilling, staking, grading, and the furnishing and placement of the fertilizer, soil additives, and planting material. The contractor will be required to locate and obtain approved wetland plant species for installation into the four wetland planting zones. Once the soils are ready for planting and the project's irrigation system(s) has been tested and is deemed functional, the plant contractor will be given control of the wetland water levels for plant installation and during the plant maintenance period (180 days). The contractor will install the plants per the construction drawings and specifications as well as provide a warranty.

As the wetland plants establish themselves, the contractor will also keep the newly planted areas free from undesirable weed growth as specified in the projects construction documents. If plantings do not meet the specified coverage and survival criteria at the end of the plant maintenance period, the plant contractor will replace the vegetation and replant the wetlands as necessary until satisfactory stands of wetland vegetation are realized.

## 1.4.17.2 Measurement

Wetlands Plantings for different habitat types will be measured based on the number of **acres** of each **habitat** type planted in the accepted work

## 1.4.17.3 Unit of Measure

Unit of measure: Each.

## 1.4.18 Item No. 38, Decomposed Granite

## 1.4.18.1 Payment

Payment will include all labor and equipment required for excavating, backfilling, compacting, grading, and the furnishing and placement of the decomposed granite and stabilizer in the designated areas.

## 1.4.18.2 Measurement

Decomposed Granite will be measured based on the amount of decomposed granite installed in the accepted work.

1.4.18.3 Unit of Measure

Unit of Measure: Square yard.

1.4.19 Item No. 39, Seeding

1.4.19.1 Payment

Payment will include all labor and equipment required for soil testing, grading, and the furnishing and placement of the fertilizer, soil additives, and seeds in the designated areas.

1.4.19.2 Measurement

Seeding will be measured based on the amount of seeding applied in the accepted work.

1.4.19.3 Unit of Measure

Unit of Measure: Square foot.

1.4.20 Items Nos. 40 and 41, Transplanting of Trees

1.4.20.1 Payment

Payment will include all labor and equipment required for preparation of transplanting plan, excavating, backfilling, soil testing, root pruning, furnishing and placement of top soil, soil amendments, mulch, soil conditioners, staking, and flagging required for the salvaging, maintaining and transplanting.

1.4.20.2 Measurement

Transplanting of trees will be measured based on the number of trees transplanted.

1.4.20.3 Unit of Measure

Unit of Measure: Each.

1.4.21 Item No. 42 through 45, Planting of Government Furnished Plants

1.4.21.1 Payment

The contractor will be required for soil testing, excavation, backfilling, staking, grading, and the placement of the fertilizer, soil additives, and Owner-Furnished planting material. Once the soils are ready for planting and the project's irrigation system(s) has been tested and is deemed functional, the plant contractor will be given control of the wetland water levels for plant installation and during the plant maintenance period (180 days). The contractor will install the plants per the construction drawings and specifications as well as provide a warranty. The accepted quantities of trees, shrubs and plants measured as described above will be paid for at the contract unit price bid for each for the pay items designated in the bidding schedule complete and in place. No measurement or direct payment will be made for plants selected for inspection and not

planted or for the watering, care and protection of trees, shrubs and plants prior to the beginning of the landscape establishment period, tree stakes, rubber hose, wire, protective cages, pre-emergent herbicide and grass and weed removal, the cost being considered as included in the price of the contract bid items.

#### 1.4.21.2 Measurement

Planting of Government Furnished Plants will be measured based on the number of plants of each type planted in the accepted work.

#### 1.4.21.3 Unit of Measure

Unit of measure: Each.

#### 1.4.22 Item No. 50, Maintenance Roads Aggregate Base Course

##### 1.4.22.1 Payment

Payment includes all labor and equipment required for compacting, grading, testing, and furnishing and placing of the aggregate base for the maintenance road.

##### 1.4.22.2 Measurement

Maintenance Roads Aggregate Base Course will be measured based upon the number of cubic yards of aggregate base course material used in the accepted work.

##### 1.4.22.3 Unit of Measure

Unit of Measure: Cubic yard.

#### 1.4.23 Item No. 51, Maintenance Roads Asphaltic Concrete

##### 1.4.23.1 Payment

Payment includes all labor and equipment required preparation of the hot mix, compaction, grading, testing, and furnishing and placing the aggregate, asphalt cement, joints for the access road.

##### 1.4.23.2 Measurement

Maintenance Roads Asphaltic Concrete will be measured based on the number of tons of asphalt concrete mixture used in the accepted work. Asphalt concrete shall be weighed after mixing, and no separate payment will be made for weight of asphalt cement material incorporated herein. The Contracting Officer may elect to accept certified weight certificates furnished by a public weighmaster in lieu of scale weights at the jobsite.

##### 1.4.23.3 Unit of Measure

Unit of measure: Ton (2,000 pounds).

#### 1.4.24 Item No. 52, Undercrossing Gabion Retaining Walls

##### 1.4.24.1 Payment

Payment includes all labor and equipment required for furnishing and

placing the reinforcement mat, geotextile filter fabric, gabions and rock for filling the gabions.

#### 1.4.24.2 Measurement

Undercrossing Gabion Retaining Walls will be measured based on the amount of undercrossing gabion retaining walls installed in the accepted work.

#### 1.4.24.3 Unit of Measure

Unit of Measure: Square foot.

#### 1.4.25 Item No. 53, Concrete Walks and Cast Concrete Seat Walls

##### 1.4.25.1 Payment

Payment includes all labor and equipment required for the excavation, backfilling, compacting, finishing, and the furnishing and placement of the **concrete and reinforcement**.

##### 1.4.25.2 Measurement

Concrete Walks and Cast Concrete Seat Walls will be measured based on the amount of concrete walks and cast concrete seat walls installed in the accepted work.

##### 1.4.25.3 Unit of Measure

Unit of Measure: Square foot (**Exposed Horizontal Surface**).

#### 1.4.26 Item No. 54, Decomposed Granite Pathways

##### 1.4.26.1 Payment

Payment includes all labor and equipment required for the excavation, backfilling, compacting, and grading, and the furnishing and placement of the decomposed granite and stabilizer.

##### 1.4.26.2 Measurement

Decomposed Granite Pathways will be measured based on the amount decomposed granite pathways installed in the accepted work.

##### 1.4.26.3 Unit of Measure

Unit of Measure: Square foot.

#### 1.4.27 Item No. 55, Main Entry Gate

##### 1.4.27.1 Payment

Payment includes all labor and equipment required for the excavation, backfilling, compacting, and grading, and the furnishing and placement of the concrete, steel pipe, gabions, river rock, steel plate, I-Beam, logo, and lettering and all miscellaneous items required for a complete Main Entry Gate, as shown on the Drawings.

##### 1.4.27.2 Measurement

Main Entry Gate will be measured based on the number of entry gates constructed in the accepted work.

1.4.27.3 Unit of Measure

Unit of measure: Each.

1.4.28 Item No. 65, Option 1 Gateway Gabion Retaining Wall (Recreation)

1.4.28.1 Payment

Payment includes all labor and equipment required for the backfilling, compacting, and grading, and the furnishing and placement of geotextile fabric, river rock, gabions, and all miscellaneous items required for a complete Gateway gabion retaining wall, as shown on the Drawings.

1.4.28.2 Measurement

Gateway Gabion Retaining Wall will be measured based on the amount of square feet of vertical surface area constructed in the accepted work.

1.4.28.3 Unit of Measure

Unit of measure: Square foot.

1.4.29 Item No. 69, Option No. 5: Additional 12 months of Plant Establishment Period

1.4.29.1 Payment

Payment includes all labor and equipment required to operate and maintain the landscaping and irrigation system for an additional plant establishment period starting at the end of the required initial 12 month plant establishment period. As the plants establish themselves, the Contractor will keep the planted areas free from undesirable weed grown as specified in the Construction Documents. If plantings do not meet the specified coverage and survival criteria during the plant establishment period, the Contractor will replace the vegetation and replant as necessary until satisfactory stands of vegetation are realized.

1.4.29.2 Measurement

Plant establishment will be measured based on the number of months which services are provided.

Unit of measure: Month.

PART 2 PRODUCTS (Not Applicable)

PART 3 EXECUTION (Not Applicable)

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## SECTION 02846B

## WETLANDS PLANTING

## PART 1 GENERAL

## 1.1 SUMMARY

This section describes the Work necessary to establish a wetland plant community in the constructed wetland (settling cells and polishing basins).

Plant species, source of plants, quality of plants, plant spacing, planting methods, erosion control, plant maintenance, and criteria for success of plant establishment are specified herein.

## 1.2 DEFINITIONS

## 1.2.1 Water Delivery System

Water conveyance facilities which includes piping, open channels, hydraulic control structures, pumps, and appurtenances used to deliver water to the wetlands site for basin flooding or irrigation purposes. Temporary facilities constructed to control erosion while delivering water during the initial establishment of the plantings are related facilities defined under paragraph entitled "Erosion Control:."

## 1.2.2 Maintenance Period

Begin maintenance immediately after each area is planted (plant propagules or seed) and continue for a period of 180 days after all planting under this section is completed.

## 1.2.3 Planting Zones

- a. Wetland Marsh: This zone includes the invert (bottom of the basin or cell exclusive of the deep zones) of the wetland cells from the toe of slope on the inside of the perimeter berm to the top of slope at the deep zones. The wetland marsh is further subdivided into four discrete zones based upon depth: Emergent Marsh I (0.0 to 1.0-feet), Emergent Marsh II (1.0 to 2.0-feet), Emergent Marsh III (2.0 to 2.5-feet), and Emergent Marsh-Typha (1.0 to 2.5-feet).
- b. Spreading/Floating Aquatic: This zone will start at the upper limit of the capillary fringe on the banks and extend out through emergent zones to the open water. Plants will be established in the moist soils of the wetland banks and depending upon the species, will spread over open-water areas.
- c. Submerged Aquatic: This zone includes the inside slopes and bottom of the deep zones within the wetland cells. This zone is bounded by the top of slope where it meets the cell invert elevation. The smaller deep zones constructed at the inlet and outlet of each cell are not included in this designation.
- d. Transitional Marsh: This zone includes the inside slope of the perimeter berm and slope of the islands from the invert elevation

up the slope to the elevation of maximum water level in the cell.

#### 1.2.4 Other Plantings

For plantings other than the wetlands planting zones described herein, refer to Section 02930A EXTERIOR PLANTING, and 02921A SEEDING.

#### 1.2.5 Acceptable Plant Propagules

Propagules are vegetative structures used for plant reproduction, consisting of aboveground and/or underground structures. Acceptable propagules under this section may consist of transplants (entire plants dug from a natural site or nursery grown), seedlings (entire plants, container grown), and tubelings (seedlings grown in narrow tube-shaped containers). The size and configuration of plant propagules deemed acceptable for planting under this section will vary depending on the plant species. A general description is given below, but the determination of acceptability will be made by the Contracting Officer after examining the plant material samples submitted for inspection.

- a. Wetland Marsh: Transplants or tubelings, depending upon species. Transplants and tubelings shall be container grown or field collected and potted and have minimum 12 inches of green shoot and leaves above the root crown.
- b. Spreading/Floating Aquatic: Material to be planted shall be field-harvested or local nursery-grown bare root seedlings or clumps at least 16 inches in length.
- c. Submerged Aquatic: Transplants shall be full clump or clump divided into individual plants with minimum 12 inches of green leaf tissue.
- d. Transitional Marsh: Transplants or tubelings, depending upon species. Transplants and tubelings shall be container grown or field collected and potted and have minimum 6 inches of green shoot and leaves above the root crown.

#### 1.2.6 Erosion Control

- a. Unacceptable Soil Erosion: Any soil erosion that occurs after final grading due to natural or manmade causes which results in a change of grade greater than 0.2 feet.
- b. Initial Flooding: Initial flooding occurs whenever the emergent zone of a wetland basin or cell is dry or does not have water ponded over the entire area and water is released into the inlet deep zone for the purpose of flooding the area.
- c. Deep Zone Erosion: Flow of water from the emergent zone into a deep zone that is empty will cause substantial amounts of erosion on the deep zone slope prior to establishment of the wetland plants. Deep zones must be filled and maintained full prior to initial flooding the emergent zones or slope protection installed to prevent deep zone erosion.
- d. Infiltration Losses: Infiltration or seepage which occurs during flooding of the wetland areas. All wetland basins will be constructed with a low permeability liner system that must remain moist after placement. The estimated infiltration rate is  $1.0 \times 10^{-6}$  cm/s.
- e. Temporary Water Delivery Facilities: Water conveyance facilities needed on a temporary basis until emergent zone plantings are well established to prevent deep zone erosion. These facilities will be used to fill the deep zone prior to flooding the wetland basins.

The configuration, sizing, layout, installation and operation of these facilities will be the responsibility of the Contractor. The goal is to prevent deep zone erosion during initial flooding of the wetland basins until the emergent plants become sufficiently established to control erosion of the deep zone slopes. These temporary facilities could include any of the following:

1. Piping.
  2. Open channels.
  3. Hydraulic control structures.
  4. Pumps and other appurtenances to convey water to fill the deep zones prior to initial flooding.
- f. Facilities installed temporarily on the surface or buried permanently can be used provided that the functions of the water delivery system is not impaired, landscaping requirements are met, and that site access provided for vehicles or pedestrians is not impeded. The Contractor could also propose slope erosion protection measures, such as rip-rap installation as a means of mitigating deep zone erosion.

#### 1.2.7 Satisfactory Stand

- a. Wetland Marsh and Transitional Marsh Zones: The average spacing of live clumps shall be equal to or less than the planting density specified; the overall survival rate of planted clumps shall be at least 90 percent; and areas no greater than 100 contiguous square feet shall have a survival rate of less than 50 percent.
- b. Spreading/Floating and Submerged Aquatic Zones: Living aquatic plants shall occur over at least 90 percent of the areas of any zone designated for this planting group.

#### 1.3 SUBMITTALS

- a. The Wetland plant contractor shall meet the following requirements and shall submit the necessary written documentation to the Contracting Officer at the preconstruction conference as herein specified:
  1. Must be an Arizona licensed landscape Contractor, in good standing.
  2. Submit a list of a minimum of three 10-Acre or greater constructed wetland planting projects completed by the contractor where he/she was responsible for procurement of wetland plant material, labor, and maintenance period and that were successfully completed using wetland plants native to Arizona.
  3. The list shall include the locations and dates of the project work, type of wetland vegetation established, description of the project and work performed, and the name and phone number of a contact person representing the agency, company or owner for which the work was completed.
  4. Crews must have the capability to perform the work. Submit a list of key wetland planting personnel, minimum one, who will supervise the wetland planting activities and the Maintenance Period. The person(s) listed must be a biologist and will be required to be on site and in responsible charge during wetland

plant installation activities.

b. Shop Drawings: Product labels/data sheets.

c. Quality Control Submittals:

1. Availability of Plant Material: Within 1 month following award of contract, the Contractor shall submit to the Contracting Officer a summary of the availability of plant materials needed to complete this project. This summary shall include an affidavit from nursery owners that specified, nursery-grown plant materials will be available by the expected startup of wetland planting. For field-harvested plant materials, the Contractor shall provide a description of any sites where plant material will be harvested, identification to species of any plants that will be harvested, an estimate of the number of plant propagules of each species that will be collected, and an affidavit that any necessary permissions have been granted for plant harvesting and that no laws will be violated by field harvesting.

2. Plant Samples: Within 1 month before wetlands planting begins, the Contractor shall submit to the Contracting Officer for approval samples of all wetland plant species to be planted in the wetland marsh, spreading/floating aquatic, submerged aquatic, and transitional marsh zones. Representative plant samples should be placed in sealable plastic bags, labeled, packed on ice, and delivered. The samples shall be identified by species, location obtained, and number of propagules to be obtained from this source location. If the Contracting Officer finds that any plant materials are not likely to be satisfactory for use, the Contractor will be required to find an alternate source of acceptable plant materials.

3. Erosion Control Plan: Within 1 month prior to the first initial flooding of the wetland areas, Contractor shall submit to the Contracting Officer for approval an erosion control plan. The plan shall include plans for installing and operating temporary water delivery facilities or otherwise conducting erosion control measures or making slope protection improvements to the deep zone slopes to mitigate unacceptable erosion during initial flooding. Details for deploying personnel at the site during operations to monitor site conditions during filling and plans to take corrective actions, if necessary, shall be included in the plan.

d. Contract Closeout Submittals: Description of required maintenance activities and activity frequency.

#### 1.4 DELIVERY, STORAGE, AND PROTECTION

##### 1.4.1 Propagules of Wetland Plant Species

- a. Harvest and deliver only after planting area is prepared and water delivery system is operable.
- b. Deliver to site and plant within 48 hours after harvesting.
- c. Keep moist and covered to protect from drying from time of harvesting until planted.

#### 1.5 WEATHER RESTRICTIONS

- a. Perform Work under favorable weather and soil moisture conditions as determined by local practice.
- b. Planting shall be conducted during a planting window from February 20 through October 1, unless the Contracting Officer provides other authorization.

#### 1.6 SEQUENCING AND SCHEDULING

- a. Complete final grading and have water delivery system ready for operation before starting Work on this section.
- b. Perform soils sample collection and fertility testing to determine fertilizer and soil amendment requirements.
- c. Complete Work under this section within 60 days after beginning planting.
- d. Notify Contracting Officer at least 3 days in advance of:
  1. Each material delivery.
  2. Start of planting activity.

#### 1.7 MAINTENANCE SERVICE

- a. Contractor: Perform maintenance operations during maintenance period to include:
  1. Watering: Use newly constructed wetlands water delivery system to maintain specified water depths over the wetlands cell invert to sustain submergent aquatic and wetland marsh zones. Periodically increase water depths up to maximum levels for a short time to maintain moist conditions for the spreading/floating aquatic and transitional marsh zones.
  2. Replant unsatisfactory areas or portions thereof immediately when observed or at the end of the maintenance period if a satisfactory stand has not been produced.
  3. Replant unsatisfactory areas or portions thereof during next planting season if scheduled end of maintenance period falls after October 1. Next planting season begins on February 20 of the following year.
  4. Replant entire area if satisfactory stand does not develop by June 1 of the following year.

### PART 2 PRODUCTS

#### 2.1 SUMMARY

Four types of planting zones as previously defined shall be established at the constructed wetlands with multiple plant species within each zone. The locations of the planting zones, area of plantings, and planting densities are shown on the Drawings. All plant materials delivered onsite shall be properly identified and shall be in healthy condition at the time of planting. Plant materials may be field harvested from sites approved by the Contracting Officer or plant materials may be nursery grown or established from seed.

#### 2.2 PLANT MATERIALS

##### 2.2.1 Wetland Planting Zones

The plant materials required for the wetland planting zones are provided below. Unless otherwise indicated, when more than one species is provided for a given planting zone, the Contractor shall provide a reasonably equal mixture of such species.

- a. Wetland Marsh Zones: Emergent Marsh I - Material to be planted shall be field-harvested or nursery-grown bare root seedlings or tubelings (seedlings grown in narrow tube-shaped containers) of the species *Scirpus americanus*, *S. acutus*, *Sagittaria greggii*, *Sagittaria latifolia*, *Alisma triviale* or comparable species approved by the Contracting Officer. Emergent Marsh II - Material to be planted shall be field-harvested or nursery-grown bare root seedlings or tubelings of the species *Scirpus californicus*, *S. validus*, or comparable species as approved by the Contracting Officer. Emergent Marsh III - Material to be planted shall be field-harvested or nursery-grown bare-root seedlings or tubelings of the species *Scirpus californicus*, *Scirpus validus* or comparable species approved by the Contracting Officer. Emergent Marsh - Typha - Material to be planted shall be field-harvested or nursery grown bare-root seedlings or tubelings of the species *Typha latifolia*, *T. domingensis*, *Phragmites communis* or comparable species approved by the Contracting Officer.
- b. Spreading/Floating Aquatic: Material to be planted shall be field-harvested or local nursery-grown bare root seedlings or clumps of at least any three of the species: *Hydrocotyle* sp., *Polygonum hydropiperoides*, *Potamogeton* spp., *Rorippa Nasturtium-aquaticum*, *Ludwigia palustris*, and/or *Veronica* spp. or comparable species approved by the Contracting Officer.
- c. Submerged Aquatic: Submerged aquatic plants shall be established using field-harvested or nursery-grown propagules of one or more of the species *Potamogeton nodosus*, *P. foliosus*, *Ceratophyllum demersum* or comparable species approved by the Contracting Officer.
- d. Transitional Marsh: Transitional marsh areas shall be planted with a minimum of three of the following plant species: *Cyperus niger*, *Cyperus laevigatus*, *Cyperus erythrohizos* or similar species, *Juncus balticus*, *Juncus bufonius*, *Juncus tenurs* var. *Dudleyi*, *Juncus interior*, *Juncus torreyi*, or similar species, *Eleocharis parishii*, *Eleocharis macrostachya*, *Equisetum laevigatum*, or similar species, *Heteranthera limosa*, *Rorippa Nasturtium-aquaticum*, *Anemopsis californicus* or comparable species approved by the Contracting Officer.

#### 2.2.2 Acceptability

Plants shall be live, fresh, healthy, and uninjured at the time of planting. Plants shall be acceptable plant propagules as defined in this section. Plants may be harvested from local wetlands or ponds, provided that a written affidavit is provided that documents all necessary authorizations have been received. Plants shall be kept continually moist and shaded until they are planted. Any plants that have been permitted to dry out or are otherwise injured for any reason in the judgment of the Contracting Officer and do not show a viable condition, shall be rejected for use.

#### 2.3 FERTILIZER

- a. Commercial, uniform in composition, free-flowing, suitable for application with equipment designed for that purpose. Minimum percent of plant food by weight shall be clearly labeled.
- b. Type and Application Rates: For bidding purposes, assume ammonium phosphate (16-20-0) applied at the rate of 400 pounds per acre. Actual requirements will be determined by soil analysis results.

### PART 3 EXECUTION

#### 3.1 SUMMARY

The constructed wetlands shall be planted in four planting zones as indicated on the Drawings. Planting shall begin following installation of an adequate supply of water to the wetlands cells and after final grading and seed bed preparation is completed in a given planting area. The Contractor shall implement the approved erosion protection plan, including the construction of temporary water delivery facilities and/or erosion control measures at no additional cost to the Contracting Officer. Both the water delivery system and the temporary water delivery facilities or slope erosion control measures shall be installed and tested prior to beginning planting.

#### 3.2 PLANTING AREAS AND DENSITY

The constructed wetlands shall be planted in the zones and at the required densities as shown on the Drawings.

#### 3.3 PREPARATION FOR PLANTING

- a. Grade areas to be planted to smooth, rolling surface (no more than 1.0-foot elevation change in any given planting zone) with loose, uniformly fine texture. Any undesirable weed growth or competing vegetation shall be removed prior to planting or seeding operations.
- b. Collected representative soils samples and perform laboratory analyses to determine the need for fertilizer or soil amendments. A minimum of six samples within the wetland planting areas shall be collected and analyzed for pH, salinity, free lime, organic matter, nitrogen, phosphorus, potassium, calcium, magnesium, iron, zinc, copper, and manganese. Make recommendations for composition and application rates of fertilizer and soil amendments to correct nutrient deficiencies or improve conditions for plant growth for approval by the Contracting Officer.
- c. Apply fertilizer and amendments evenly over area in accordance with manufacturer's instructions. Mix into the top 6 inches of soil. Application rates as determined by laboratory analyses and approved by Contracting Officer and in accordance with Section 01356a STORM WATER POLLUTION PREVENTION MEASURES.
- d. Wetland and Transitional Marsh and Floating/Spreading Aquatic and Submerged Aquatic Zones: Initially flood wetland cells to maximum water depth and then reduce water depth to less than 2 inches in preparation for planting.

#### 3.4 PLANTING METHODS

##### 3.4.1 Wetland and Transitional Marsh Zones

Emergent wetland plants (bulrush, cattail, and transitional marsh species) shall be planted in moist to shallowly flooded (less than 2 inches of water

depth) soils. Water depths shall be maintained near the ground surface during planting and initial plant establishment to allow optimal rooting conditions. Emergent wetland plants shall be planted by hand using a shovel, spade, dibble, trowel, or other method approved by the Contracting Officer. The planting tool shall be used to create a shallow hole in the moist substrate for planting. The hole shall be of sufficient depth and width to allow the entire plant root mass to be inserted without breakage or other damage. A small quantity of a standard slow-release plant fertilizer shall be placed at the bottom of each hole. Prior to use, fertilizer quantities and brand shall be submitted to the Contracting Officer for review. Planting rows should be staggered so that open pathways along the direction of water flow are not created. The plants shall be planted upright so the junction between the root crown and the stem or leaf base is at the ground surface. After placement of the plant in the hole, the hole shall be carefully closed around the plant roots by gently applying pressure to the edge of the hole with the foot or other method as approved by the Contracting Officer.

#### 3.4.2 Floating/Spreading Aquatic Plant Zones

Hydrocotyle (pennywort) and Ludwigia (False Loosestrife) or other species as noted above will also be planted in the emergent areas by establishing them along the wetted perimeter of the basin. The Contractor will plant the floating aquatic plants in the bank, such that they are established in moist soil conditions and allowed to grow outward, intermingling with the emergent marsh vegetation. Locations of Floating/Spreading aquatic plant zones are noted on the drawings.

#### 3.4.3 Submerged Aquatic Zones

Submerged aquatic plants shall be planted in shallowly flooded deep water zones. Plant propagules shall be weighted with an iron nail or staple, or equivalent method approved by the Contracting Officer, so they will be in contact with the flooded substrate.

#### 3.4.4 Damaged Plants

Plants which have been judged by the Contracting Officer to be damaged by mishandling during the planting process shall be replaced at the Contractor's expense.

### 3.5 PLANTING SCHEDULE

Once started, the planting operation shall continue uninterrupted until all areas have been planted, except for periods when severe weather conditions prevent planting. If downtime occurs because of severe weather, planting shall be resumed as soon as the weather conditions are suitable for planting.

### 3.6 PLANT MAINTENANCE

#### 3.6.1 Flooding and Erosion Control

The Contractor shall make arrangements and bear all costs of providing adequate water for initial planting and plant maintenance during the maintenance period. Contractor shall provide adequate personnel and materials to implement the approved erosion control plan, which may include temporary water delivery facilities and/or erosion control measures, to prevent unacceptable soil erosion during initial flooding and continued

operations during the maintenance period. Fuel or electrical power requirements for any temporary water delivery facilities shall be the responsibility of the Contractor. All planting areas will be either continuously or intermittently flooded to maintain moist soil conditions until plants have passed inspection and been accepted by the Contracting Officer. The application rates and depths of flooding shall be controlled to maintain moist conditions for optimum growth of the wetland plants during the maintenance period.

### 3.6.2 Maintenance

The Contractor shall be responsible for maintenance of plantings associated with the constructed wetlands. This control is granted to the Contractor because of the Contracting Officer need to hold the Contractor fully responsible for plantings until they are accepted. Although the Contractor is wholly responsible for maintenance of the wetlands planting, the Contractor is encouraged to consult with the Contracting Officer concerning methods to optimize plant growth and survival.

### 3.6.3 Weed Control

Use of these materials shall be in accordance with Section 01356a STORM WATER POLLUTION PREVENTION MEASURES. During the maintenance period the Contractor shall remove or control all weeds and noxious plants before they have grown more than four inches in height within the planted areas. Weeds and noxious plants are defined as those plants that have been determined to be aggressive and potentially detrimental to the establishment and long-term growth of the planted species; and shall include, but is not limited to saltcedar, johnsongrass, horsenettle, and bermuda grass. Cattails occurring outside of the designated planting zones also are defined as noxious weeds and shall be removed during the maintenance period. Weeds and noxious plants shall be mechanically removed or controlled with herbicides. Obtain approval from the Contracting Officer for herbicide materials, means of application, and application rates before use. Use of these materials shall be in accordance with Section 01356a STORM WATER POLLUTION PREVENTION MEASURES.

### 3.6.4 Period of Maintenance

The Contractor is responsible for maintenance of all wetland plantings for maintenance period specified following the end of all wetland planting included under this section. At the end of this period, the Contracting Officer will inventory wetland plantings and determine if they meet minimum levels of survival and growth as described below.

### 3.6.5 Inspection and Acceptance

Within 10 days before the end of the maintenance period, the Contracting Officer will make an inspection to determine if satisfactory stands of wetland and upland plants have been established, as previously defined in this section. For the purposes of this inspection, original planted clumps will be counted as one unit regardless of the number of daughter plants that may have emerged since planting. If the requirements for satisfactory stands are met, the wetlands planting will be accepted and the Contracting Officer will assume responsibility for continued plant maintenance. If any stands are not found to be satisfactory, the Contractor shall replant those areas at his own expense until satisfactory stands are judged by the Contracting Officer to be achieved. The Contracting Officer will inspect any replanted areas within 2 weeks following replanting and will determine

if those replanting efforts are satisfactory. The Contractor shall be responsible for replanting and continued plant maintenance until all plantings are accepted by the Contracting Officer.

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## SECTION 02921

## SEEDING

## PART 1 GENERAL

## 1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

## AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM D 4972 (1995a) pH of Soils  
ASTM D 5268 (1992; R 1996) Topsoil Used for  
Landscaping Purposes

## U.S. DEPARTMENT OF AGRICULTURE (USDA)

AMS Seed Act (1995) Federal Seed Act Regulations Part  
201

## THE UNITED STATES PHARMACOPEIA (USP)

Swell Volume Volume 24 Psillium (plantago) powder swell  
volume test

## 1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

## SD-03 Product Data

## Equipment; G, RE

Contractor shall provide all labor, materials, equipment and incidentals to construct a complete, landscape, as shown on the plans and details and specified herein.

Equipment Lists: Following Contractor's review and approval, submit to the Contracting Officer 6 complete lists of major items of landscape equipment and materials, within 30 calendar days after date of Agreement. Submit all items at one time. Partial list will not be acceptable. Submittals shall include the

Manufacturer's Specifications, weights, space requirements, physical dimensions, rating of equipment and supplemental information requested by the Contracting Officer. Submit performance curves for pumps and fans. Where a submittal sheet describes items in addition to that item being submitted, delete such items. Clearly note equipment and materials which deviate from those shown or specified in size, weight, required clearances, and location of access. Modifications to the Work as shown or specified in submittals shall be indicated and shall be provided by the Contractor as a part of the Work.

Surface Erosion Control Material; G, RE

Contractor shall supply temporary erosion control structures that have been approved by the Contracting Officer in advance shall be in place at the start of this contract. Contractor will analyze existing drainage structures and drainage ways, and make renovations as needed as a part of this scope of work to control and minimize erosion to this projects seeding and landscape. The cost for this work shall be considered incidental to the required Storm Water Pollution Prevention Plan provisions of this contract.

Chemical Treatment Material; G, RE

Contractor shall supply Manufacturer's literature including physical characteristics, application and installation instructions for equipment, surface erosion control material and chemical treatment material.

A listing of equipment to be used for the seeding operation.

Delivery; G, RE

Delivery schedule.

Contractor shall supply within 45 calendar days of the Notice of Award, the Contractor shall furnish a complete "reserve list" of all the seeds needed for this project. The list shall include the confirmed seed source for the seed varieties, assuring the availability of each species and quantity specified on the plans and herein. The list shall include the species name, common name, percent of pure live seed (PLS), minimum percent of germination, and maximum percentage of weed seed content. The confirmed source for the seed as evidenced by an invoice or contract with the confirmed source and the approximate date the seed will be delivered to the jobsite. This "reserve list" shall be submitted in triplicate to the Contracting Officer and approved by the Contracting Officer.

Approval of the "reserve list" by the Contracting Officer does not relieve the Contractor of his responsibility for providing seeds and seed mixes that will pass the inspection required elsewhere in the Standard Specifications and specified on the plans.

Finished Grade and Topsoil; G, RE

Finished grade status.

Topsoil; G, RE

Availability of topsoil from the stripping and stock piling operation.

Quantity Check; G, RE

Bag count or bulk weight measurements of material used compared with area covered to determine the application rate and quantity installed.

Seed Establishment Period; G, RE

Calendar time period for the seed establishment period. When there is more than one seed establishment period, the boundaries of the seeded area covered for each period shall be described.

Maintenance Record; G, RE

Maintenance work performed, area repaired or reinstalled, diagnosis for unsatisfactory stand of grass plants.

Maintenance Records: A written record shall be furnished to the Contracting Officer or its designated representative of the maintenance work performed each week including areas to be reseeded, erosion control that is required, mowing, fertilization calendar, erosion repair, irrigation system repair, replacements, and diagnosis of any unhealthy materials and the prescribed treatment.

Application of Pesticide; G, RE

Contractor shall submit Pesticide treatment plan with sequence of treatment work with dates and times. The pesticide trade name, EPA registration number, chemical composition, formulation, concentration of original and diluted material, application rate of active ingredients, method of application, area treated, amount applied; and the name and state license number of the state certified applicator shall be included.

Treatment for disease or pest shall be in accordance with all Federal, State and City of Phoenix rules and regulations. As feasible, Contractor should seek cultural and biological control solutions which do not depend on chemical applications for the eradication of insects, mites, snails, nematodes, and small animals (squirrels and gophers). Trapping should be utilized unless prescribed in writing by a licensed pest control advisor. Performed method shall be approved by the Contracting Officer prior to initiation of any pesticide treatment or pesticide

program.

SD-04 Samples

Delivered Topsoil; G, RE

Samples taken from several locations at the source.

The work under this section shall consist of furnishing, hauling and placing topsoil in accordance with the details shown on the project plans and the requirements of these specifications.

Soil Amendments; G, RE

A 10 pound sample.

Mulch; G

A 10 pound sample.

The type and application rate of organic mulch materials shall be as specified on the plans, supplied soils test or within these specifications.

SD-06 Test Reports

Equipment Calibration; G, RE

Certification of calibration tests conducted on the equipment used in the seeding operation.

Soil Test; G

Certified reports of inspections and laboratory tests, prepared by an independent testing agency, including analysis and interpretation of test results. Each report shall be properly identified. Test methods used and compliance with recognized test standards shall be described.

SD-07 Certificates

Seed; G  
Topsoil; G  
pH Adjuster; G  
Fertilizer; G  
Organic Material; G  
Soil Conditioner; G  
Mulch; G  
Non-Asphaltic Adhesive; G  
Pesticide; G

Prior to the delivery of materials, certificates of compliance attesting that materials meet the specified requirements. Certified copies of the material certificates shall include the

following:

- a. Seed. Classification, botanical name, common name, percent pure live seed, minimum percent germination and hard seed, maximum percent weed seed content, and date tested.
- b. Topsoil. Particle size, pH, organic matter content, textural class, soluble salts, chemical and mechanical analyses.
- c. pH Adjuster. Calcium carbonate equivalent and sieve analysis.
- d. Fertilizer. Chemical analysis and composition percent.
- e. Organic Material: Composition and source.
- f. Soil Conditioner: Composition and source.
- g. Mulch: Composition and source.
- h. Non-Asphaltic Adhesive: Composition.
- i. Pesticide. EPA registration number and registered uses.

### 1.3 SOURCE INSPECTION

The source of delivered topsoil shall be subject to inspection.

### 1.4 DELIVERY, INSPECTION, STORAGE, AND HANDLING

#### 1.4.1 Delivery

A delivery schedule shall be provided at least 10 calendar days prior to the first day of delivery.

##### 1.4.1.1 Delivered Topsoil

Prior to the delivery of any topsoil, its availability shall be verified in paragraph TOPSOIL. A soil test shall be provided for topsoil delivered to the site. All topsoil shall comply with "Arizona Residential Soil Cleanup" levels and standards.

##### 1.4.1.2 Soil Amendments

Soil amendments shall be delivered to the site in the original, unopened containers bearing the manufacturer's chemical analysis. In lieu of containers, soil amendments may be furnished in bulk. A chemical analysis shall be provided for bulk deliveries. All soil amendments shall comply with Section 01355, ENVIRONMENTAL PROTECTION.

##### 1.4.1.3 Pesticides

All pesticide applications shall comply with Sections 01355, ENVIRONMENTAL PROTECTION and 01356, STORM WATER POLLUTION PREVENTION MEASURES.

Pesticide material shall be delivered to the site in the original, unopened containers bearing legible labels indicating the EPA registration number and the manufacturer's registered uses. All pesticides shall be stored, protected and secured according to all Federal, State and local regulations.

#### 1.4.2 Inspection

Seed shall be inspected upon arrival at the job site for conformity to species and quality. Seed that is wet, moldy, or bears a test date five months or older, shall be rejected. Other materials shall be inspected for compliance with specified requirements. The following shall be rejected: open soil amendment containers or wet soil amendments; topsoil that contains slag, cinders, stones, lumps of soil, sticks, roots, trash or other material over a minimum 1-1/2 inch diameter; and topsoil that contains viable plants and plant parts. Unacceptable materials shall be removed from the job site.

#### 1.4.3 Storage

Materials shall be stored in designated areas. Seed, lime, and fertilizer shall be stored in cool, dry locations away from contaminants. Chemical treatment material shall be stored and protected according to all Federal, State and local regulations and manufacturer's instructions and not with seeding operation materials.

#### 1.4.4 Handling

Except for bulk deliveries, materials shall not be dropped or dumped from vehicles.

#### 1.4.5 Time Limitation

Hydroseeding time limitation for holding seed in the slurry shall be a maximum 1 hour.

### PART 2 PRODUCTS

#### 2.1 SEED

##### 2.1.1 Seed Classification

State-approved seed of the latest season's crop shall be provided in original sealed packages bearing the producer's guaranteed analysis for percentages of mixture, purity, germination, hard seed, weed seed content, and inert material. Labels shall be in conformance with AMS Seed Act and applicable state seed laws.

##### 2.1.2 Permanent Seed Species and Mixtures

Permanent seed species and mixtures shall be proportioned by weight as follows:

Botanical Name	Common Name	Rate Lbs, Acre
LAWN SOD		
Cynodon dacylon Var Midiron	Midiron Bermuda	
SEED AREAS		
<b>COTTONWOOD WILLOW</b>		
Ambrosia ambrosiodes	Canyon ragweed	3.0
Aristida purpurea	Purple three awn	2.0
Datura wrightii	Datura	1.0
Distichlis spicata	Salt Grass	1.0
Elymus glaucus	Wild-Rye	3.0
Hymenoclea salsola	Burrobush	2.0
Muhlenbergia rigens	Deer Grass	1.0
Prosopis velutina	Velvet Mesquite	1.0
Sporobolus airoides	Alkali sacaton	1.0
<b>MESQUITE BOSQUE</b>		
Abronia villosa	Sand verbena	2.0
Atriplex canescens		1.0
Atriplex lentiformis		0.25
Baileya multiradiata	Desert marigold	1.0
Bouteloua curtipendula	Sie-oat grama	2.0
Cercidium floridum	Blue palo verde	3.0
Datura wrightii	Datura	1.0
Distichlis spicata	Salt grass	0.5
Eschscholzia mexicana	Mexicana poppy	3.0
Lupinus arizonicus	Lupine	2.0
Oenothera deltoides	Evening primrose	0.5
Olneya tesota	Ironwood	3.0
Opuntia engelmannii	Engelmann's prickley pear	1.0
Panicum obtusifolium	Vine mesquite	2.0
Panicum virgatum	Switchgrass	1.0
Penstemon parryi	Parry's penstemon	0.5
Phacelia crenulata	Wild heliotrope	1.0
Pleuraphis rigida	Big galleta	1.0
Prosopis pubescens	Screwbean mesquite	0.5
Prosopis velutina	Velvet mesquite	1.0
Setaria macrostachya	Plains bristlegrass	2.0
Sporobolus airoides	Alkali sacaton	1.0
Verbesina encelioides	Cowpen daisy	1.0
<b>LOWER SONORAN MESQUITE</b>		
Acacia constricta	Whitethorn acacia	1.5
Atriplex canescens	Four-wing saltbush	1.0
Atriplex lentiformis	Quailbush	0.25
Bouteloua curtipendula	Sie-oat grama	2.0
Cercidium floridum	Blue palo verde	2.0

Botanical Name	Common Name	Rate Lbs, Acre
<i>Celtis pallida</i>	Desert hackberry	1.0
<i>Larrea tridentata</i>	Creosote bush	4.0
<i>Lycium exsertum</i>	Desert thorn	0.5
<i>Olneya tesota</i>	Ironwood	3.0
<i>Phacelia crenulata</i>	Wild heliotrope	1.0
<i>Ziziphus obtusifolia</i>	Lotebush	1.0
<b>LOWER SONORAN PALO VERDE</b>		
<i>Acacia constricta</i>	Whitethorn acacia	1.5
<i>Acacia greggii</i>	Catclaw acacia	3.0
<i>Ambrosia dumosa</i>	Bursage	5.0
<i>Atriplex canescens</i>	Four-wing saltbush	1.5
<i>Calliandra eriophylla</i>	Fairy duster	2.0
<i>Cassia covesii</i>	Senna	2.0
<i>Celtis pallida</i>	Desert hackberry	1.0
<i>Cercidium floridum</i>	Blue palo verde	2.0
<i>Encelia farinosa</i>	Brittlebush	0.5
<i>Larrea tridentata</i>	Creosote bush	4.0
<i>Lycium exsertum</i>	Desert Thorn	0.5
<i>Olneya tesota</i>	Ironwood	3.0
<i>Opuntia acanthocarpa</i>	Buckhorn cholla	1.0
<i>Opuntia basilaris</i>	Beavertail cactus	1.0
<i>Opuntia engelmannii</i>	Engelman's prickly pear	1.0
<i>Prosopis pubescens</i>	Screwbean mesquite	1.0
<i>Prosopis velutina</i>	Velvet mesquite	0.5
<i>Simmondsia chinensis</i>	Jojoba	5.0
<i>Sphaeralcea ambigua</i>	Desert mallow	1.0
<i>Ziziphus obtusifolia</i>	Lotebush	1.0
<b>OPEN SPACE</b>		
<i>Aristida purpurea</i>	Purple Three-Awn	2.0
<i>Astragalus lentiginosus</i>	Milkvetch, Locoweed	1.0
<i>Baileya multiradiata</i>	Desert marigold	1.0
<i>Bouteloua curtipendula</i>	Sie-oat grama	2.0
<i>Eschscholzia mexicana</i>	Mexican poppy	3.0
<i>Lupinus arizonicus</i>	Lupine	2.0
<i>Muhlenbergia porteri</i>	Bush muhly	0.5
<i>Oenothera deltoides</i>	Evening primrose	0.5
<i>Penstemon parryi</i>	Parry's penstemon	0.5
<i>Phacelia crenulata</i>	Wild heliotrope	1.0
<i>Plantago ovata (insularis)</i>	Plantain	3.0
<i>Pleuraphis rigida</i>	Big galleta	1.0

Weed Seed: Weed seed shall not exceed one percent (1%) by weight of the total mixture.

### 2.1.3 Quality

Weed seed shall be a maximum 0.50 percent by weight of the total mixture.

#### 2.1.4 Seed Mixing

The mixing of seed shall be done on-site at the agreed upon location/staging area and only after inspections and approval of individually delivered species accompanied with required paperwork have been received and approved by the Contracting Officer. All seed mixing shall be inspected and approved by the Contracting Officer prior to any applications.

#### 2.1.5 Substitutions

Substitutions will not be allowed without written request and approval from the Contracting Officer.

#### 2.2 TOPSOIL

Topsoil shall be as defined in ASTM D 5268. When available, the topsoil shall be the existing surface soil stripped and stockpiled onsite in accordance with Section 02300 EARTHWORK. When additional topsoil is required beyond the available topsoil from the stripping operation, topsoil shall be delivered and amended as recommended by the soil test for the seed specified. Topsoil shall be free from slag, cinders, stones, lumps of soil, sticks, roots, trash or other material over a minimum 1-1/2 inch diameter. Topsoil shall be free from viable plants and plant parts.

When a source of topsoil is not designated, the Contractor shall furnish a source in accordance with the requirements herein and the requirements of "Arizona Residential Soil Cleanup" levels and standards. Topsoil from sources furnished by the Contractor shall conform to the following requirements:

Prior to hauling any topsoil to the project site, the Contractor shall furnish a written soil analysis, prepared by a laboratory approved by the Contracting Officer, for each source of topsoil proposed for use. The soil analysis shall indicate the pH, soluble salts, percent calcium carbonate, exchangeable sodium in percent and parts per million, plasticity index and size gradation. A minimum of three samples per each 10,000 cubic yards, with at least three samples per source, shall be tested. All tests shall be performed in accordance with the following requirements and test procedures listed in the Table below. At the Contractor's option, the Contracting Officer will test these topsoil samples. The Contractor shall bear the expense of any topsoil testing from proposed sources.

Topsoil shall be fertile, friable soil obtained from well drained arable land which has or is producing healthy crops, grasses or other vegetation. It shall be free draining, non-toxic and capable of sustaining healthy plant growth.

Topsoil shall be reasonably free of subsoil, refuse, roots, heavy clay, clods, noxious weed seeds, phytotoxic materials, coarse sand, large rocks, sticks, brush, litter and other deleterious substances.

For acceptance purposes, each approximate 20,000 cubic yards or topsoil material delivered from a given source to the project site shall be considered a lot. For each lot of topsoil, six representative samples shall be taken at random locations designated by the Contracting Officer. Topsoil shall be sampled after final placement. Each source of topsoil shall be tested separately. The samples from each lot shall be tested by the Contracting Officer for pH, soluble salts, calcium carbonate, exchangeable sodium in percentage and parts per million, P.I., and gradation in accordance with the test procedures listed in the Table below.

The average test result obtained for each characteristic from each lot shall meet the following requirements:

Characteristics	Test Method	Requirement Average of 6 Samples
pH	ARIZ 237	6.0 - 8.3
Soluble Salts: (PPM)	ARIZ 237	2000 Maximum
Calcium Carbonate	ARIZ 732	8% Maximum
Exchangeable Sodium:	ARIZ 729	5% Maximum
Exchangeable Sodium: (PPMP)	ARIZ 729	300 Maximum
P.I.	AASHTO T 90	5 - 20
Gradation:	ARIZ 201	% Passing
2 inch		100
1/2 inch		85 - 100
No. 40		35 - 100

If the average test result for a lot fails to meet all the specifications listed above, the material from that lot shall be rejected. In lieu of removal and replacement, the Contractor may propose for the Contracting Officer's consideration a method of treatment of the in-place material to obtain specification compliance. Provided the Contracting Officer approves, the topsoil shall be treated at no additional cost to the Government.

The lot shall then be resampled and tested for specification compliance by the Contracting Officer.

If the pH of the topsoil for a lot exceeds 8.3, the topsoil shall either be removed and replaced, or be treated as provided for in the preceding paragraph. Any treatment for pH shall be sufficient to obtain an average pH between 6.0 and 8.0, inclusive. The treatment for pH shall follow the recommendations of a recognized soil analyst and shall be subject to the approval of the Contracting Officer. Any treatment for pH shall be at no additional cost to the Government. Additional acceptance testing after treatment for pH will not be required.

2.3 SOIL AMENDMENTS

Soil amendments shall consist of pH adjuster, fertilizer, organic material and soil conditioners meeting the following requirements. Vermiculite

shall not be used. All soil amendment applications shall comply with Sections 01355, ENVIRONMENTAL PROTECTION and 01356, STORM WATER POLLUTION PREVENTION MEASURES, of these specifications.

Amendments shall be applied per the directions and application rates specified from the supplied soil testing completed by the USACE and in compliance with Sections 01355, ENVIRONMENTAL PROTECTION and 01356, STORM WATER POLLUTION PREVENTION MEASURES, of these specifications. Prepared soil shall be prepared using a mixture of 70% excavated site soil and 30% soil conditioner and amendments. Clods or stones exceeding 2" in diameter and foreign matter deemed objectionable by the Contracting Officer will not be allowed. All excess soil excavated from the plant pits that has clods or stones 2" and larger shall be disposed of on the project site as directed by the Contracting Officer. Amendments shall be mixed with the soil conditioner after they are delivered to the project site under the supervision of the Contracting Officer. No pre-mixing will be allowed prior to delivery to the project. No additional payment will be made for this work and is considered as part of the planting operation.

2.3.1 pH Adjuster

The pH adjuster shall be agricultural grade soil sulfur material. These materials shall be 99% pure, granular or pelletized and flowable. The pH adjuster shall be used to create a favorable soil pH for the plant materials specified. All applications in compliance with Sections 01355, ENVIRONMENTAL PROTECTION and 01356, STORM WATER POLLUTION PREVENTION MEASURES, of these specifications.

2.3.2 Fertilizer

It shall be as recommended by the soil test.

2.3.3 Nitrogen Carrier Fertilizer

It shall be as recommended by the soil test.

2.3.4 Organic Material

Organic material shall consist of either decomposed wood derivatives or recycled compost. The products shall conform to the following minimum requirements:

Cellulose fiber mulch shall consist of at least 70% specifically prepared virgin cellulose fiber, which has been thermo-mechanically processed for specific use as hydromulch. It shall contain no growth inhibiting factors and shall have the following properties:

Virgin Wood Cellulose Fiber	70% (minimum)
Recycled Cellulose Fiber	30% (maximum)
Ash Content	0.8% - 0.3% (maximum)
pH	4.5-1.0
Water Holding Capacity	10:1 (Ratio of Water:fiber)

2.3.4.1 Decomposed Wood Derivatives

Decomposed wood derivatives shall be ground bark, sawdust, yard trimmings, or other wood waste material that is free of stones, sticks, soil, and toxic substances harmful to plants, and is fully composted or stabilized with nitrogen.

#### 2.3.4.2 Recycled Compost

Compost shall be a well decomposed, stable, weed free organic matter source. Compost shall be derived from food; agricultural or industrial residuals; biosolids (treated sewage sludge); yard trimmings; or source-separated or mixed solid waste. The compost shall possess no objectionable odors and shall not resemble the raw material from which it was derived. The material shall not contain substances toxic to plants. Gradation: The compost material shall pass through a 3/8 inch screen, possess a pH of 5.5 to 8.0, and have a moisture content between 35-55 percent by weight. The material shall not contain more than 1 percent by weight of man-made foreign matter. Compost shall be cleaned of plastic materials larger than 2 inches in length.

#### 2.3.5 Soil Conditioner

**Soil conditioner shall be sand, calcined clay, or gypsum for use singly or in combination to meet the requirements of the soil test.**

##### 2.3.5.1 Sand

Sand shall be clean and free of toxic materials. Gradation: A minimum 95 percent by weight shall pass a No. 10 sieve and a minimum 10 percent by weight shall pass a No. 16 sieve. Greensand shall be balanced with the inclusion of trace minerals and nutrients.

##### 2.3.5.2 **DELETED**

##### 2.3.5.3 Gypsum

Gypsum shall be commercially packaged, free flowing, and a minimum 95 percent calcium sulfate by volume.

#### 2.4 MULCH

Mulch shall be free from weeds, mold, and other deleterious materials. Mulch materials shall be native to the region.

##### 2.4.1 Straw

Straw shall be stalks from oats, wheat, rye, barley, or rice, furnished in air-dry condition and with a consistency for placing with commercial mulch-blowing equipment. All straw shall be second cut bales and shall be Arizona grown, harvested and packaged. Contractor shall submit to the Contracting Officer name of supplier for approval. All straw shall comply with Section 01356 STORM WATER POLLUTION PREVENTION MEASURES

#### 2.4.2 Wood Cellulose Fiber Mulch

Wood cellulose fiber mulch shall not contain any growth or germination-inhibiting factors and shall be dyed an appropriate color to facilitate placement during application. Composition on air-dry weight basis: 9 to 15 percent moisture, pH range from 4.5 to 6.0.

#### 2.4.3 Paper Fiber

Paper fiber mulch shall be recycled news print that is shredded for the purpose of mulching seed.

#### 2.5 NON-ASPHALTIC ADHESIVE

The tackifier shall be a naturally occurring organic compound and be non-toxic. It shall be a product typically used for binding soil and mulch in erosion control and seeding operations. It shall consist of mucilage by dry weight as active ingredients obtained from Indian Wheat (psyllium) *Plantago* spp. The tackifier shall be labeled including swell volume, which will be used as the indicator for mucilage content.

Swell volume shall be tested by an independent laboratory using the USP Swell Volume method. A swell volume of shall be considered as the standard swell volume. Tackifier rates shall be adjusted for variations in swell volume. Tested material with lesser swell volume will have tackifier rates increased by the same percentage of decrease in swell volume from the standard. Tested materials with greater swell volume can have rates decreased by the same percentages of increase in swell volume from the standard. The tackifier shall not be cut with starch or any other compound that would appreciably alter the swell volume of the plantago mucilage.

#### 2.6 WATER

All water for seeding will be furnished according to Section 01200, GENERAL REQUIREMENTS. Contractor shall supply all labor and equipment required to load, transport and unload water for seeding operations.

#### 2.7 PESTICIDE

Pesticide shall be insecticide, herbicide, fungicide, nematocide, rodenticide or miticide. For the purpose of this specification, a soil fumigant shall have the same requirements as a pesticide. The pesticide material shall be EPA registered and approved. Applications of all pesticides shall comply with Sections 01355 ENVIRONMENTAL PROTECTION and 01356 STORM WATER POLLUTION PREVENTION MEASURES, of these specifications.

## 2.8 SURFACE EROSION CONTROL MATERIAL

Surface erosion control material shall conform to the following:

### 2.8.1 Surface Erosion Control Blanket

Blanket shall be machine produced mat of wood excelsior formed from a web of interlocking wood fibers; covered on one side with either knitted straw blanket-like mat construction; covered with biodegradable plastic mesh; or interwoven biodegradable thread, plastic netting, or twisted kraft paper cord netting.

### 2.8.2 Surface Erosion Control Fabric

Fabric shall be knitted construction of polypropylene yarn with uniform mesh openings 3/4 to 1 inch square with strips of biodegradable paper. Filler paper strips shall have a minimum life of 6 months.

### 2.8.3 Surface Erosion Control Net

Net shall be heavy, twisted jute mesh, weighing approximately 1.22 pounds per linear yard and 4 feet wide with mesh openings of approximately 1 inch square.

### 2.8.4 Surface Erosion Control Chemicals

Chemicals shall be high-polymer synthetic resin or cold-water emulsion of selected petroleum resins. All applications shall comply with Sections 01355, ENVIRONMENTAL PROTECTION and 01356, STORM WATER POLLUTION PREVENTION MEASURES, of these specifications.

### 2.8.5 Erosion Control Material Anchors

Erosion control anchors shall be as recommended by the manufacturer.

## 2.9 Equipment

Equipment of major items of landscape equipment and materials, shall include but not limited to: backhoes, tractors, dumpsters, trenchers, bobcats, pickups, augers, etc. the list that shall be provided by the contractor to the Contracting Officer shall include all the equipment that will be required to complete the work specified. Contractor shall submit the equipment list including the name/type of equipment and the Manufacturer's Specifications, weights, space requirements, physical dimensions, rating of equipment and supplemental information requested by the Contracting Officer.

## PART 3 EXECUTION

### 3.1 INSTALLING SEED TIME AND CONDITIONS

#### 3.1.1 Seeding Time

Seed shall be installed from October to February for spring establishment; from March to September for summer establishment; and from August to November for fall establishment.

### 3.1.2 Seeding Conditions

Seeding operations shall be performed only during periods when beneficial results can be obtained. When excessive moisture, or other unsatisfactory conditions prevail, the work shall be stopped when directed. When special conditions warrant a variance to the seeding operations, proposed alternate times shall be submitted for approval.

### 3.1.3 Equipment Calibration

Immediately prior to the commencement of seeding operations, calibration tests shall be conducted on the equipment to be used. These tests shall confirm that the equipment is operating within the manufacturer's specifications and will meet the specified criteria. The equipment shall be calibrated a minimum of once every day during the operation. The calibration test results shall be provided within 1 week of testing.

### 3.1.4 Soil Test

Delivered topsoil, existing soil in smooth graded areas, and stockpiled topsoil shall be tested in accordance with ASTM D 5268 and ASTM D 4972 for determining the particle size, pH, organic matter content, textural class, chemical analysis, soluble salts analysis, and mechanical analysis. Sample collection on site shall be random over the entire site. Sample collection for stockpiled topsoil shall be at different levels in the stockpile. The soil shall be free from debris, noxious weeds, toxic substances, or other materials harmful to plant growth. The test shall determine the quantities and type of soil amendments required to meet local growing conditions for the seed species specified.

## 3.2 SITE PREPARATION

### 3.2.1 Finished Grade and Topsoil

The Contractor shall verify that finished grades are as indicated on drawings, and the placing of topsoil, smooth grading, and compaction requirements have been completed in accordance with Section 02300 EARTHWORK, prior to the commencement of the seeding operation.

### 3.2.2 Application of Soil Amendments

#### 3.2.2.1 Applying pH Adjuster

The pH adjuster shall be applied as recommended by the soil test.

#### 3.2.2.2 Applying Fertilizer

The fertilizer shall be applied as recommended by the soil test.

#### 3.2.2.3 Applying Soil Conditioner

The soil conditioner shall be as recommended by the soil test.

#### 3.2.2.4 Applying Super Absorbent Polymers

Polymers shall be spread uniformly over the soil as recommended by the manufacturer and thoroughly incorporated by tillage into the soil to a maximum 6 (six) inch depth.

#### 3.2.3 Tillage

Soil on slopes up to a maximum 3-horizontal-to-1-vertical shall be tilled to a minimum 6 inch depth. Ripper shanks or approved equal shall be placed from 10-36 inches apart to give maximum effective contour furrow berms the Contractor shall take all necessary precautions to minimize the turning or plowing of the soil/seed bed. The Contractor shall either Cultipack or lightly harrow seed bed to break up large clods or fill soil voids these efforts will be applied only if necessary or if directed by Contracting Officer. Contractor shall leave the contour furrows. On slopes between 3-horizontal-to-1-vertical and 1-horizontal-to-1 vertical, the soil shall be tilled to a minimum 1 inch depth by scarifying with heavy rakes, or other method. Rototillers shall be used where soil conditions and length of slope permit. On slopes 1-horizontal-to-1 vertical and steeper, no tillage is required. Drainage patterns shall be maintained as indicated on drawings. Areas compacted by construction operations shall be completely pulverized by tillage. Areas that are compacted within predominantly cobble areas shall not require tillage but shall be ripped or use of another approved method to return the soil to its original compaction. Soil used for repair of surface erosion or grade deficiencies shall conform to topsoil requirements. The pH adjuster, fertilizer, and soil conditioner may be applied during this procedure.

#### 3.2.4 Prepared Surface

##### 3.2.4.1 Preparation

The prepared surface shall be a maximum 1 inch below the adjoining grade of any surfaced area. New surfaces shall be blended to existing areas. The prepared surface shall be completed with a light raking to remove debris.

##### 3.2.4.2 Lawn Area Debris

Debris and stones over a minimum 5/8 inch in any dimension shall be removed from the surface. The surfaces that have been designated to receive turf shall be smooth graded to conform to grading specifications of 1/20 ft.

##### 3.2.4.3 Field Area Debris

The nature of this project in the Salt River river bed will result in working in a cobble rocky surface plane. All surfaces designated on the plans to receive seeding shall be left in a natural appearing roughened condition without tracks, windrows, or ruts. Naturally occurring stones shall remain where not obtrusive or an impediment to the restoration projects programmed features. Other unnatural materials over 3 inches shall

be removed from the surface and legally disposed of off site.

#### 3.2.4.4 Protection

Areas with the prepared surface shall be protected from compaction or damage by vehicular or pedestrian traffic and surface erosion.

### 3.3 INSTALLATION

Prior to installing seed, any previously prepared surface compacted or damaged shall be reworked to meet the requirements of paragraph SITE PREPARATION. Seeding operations shall not take place when the wind velocity will prevent uniform seed distribution.

#### 3.3.1 Installing Seed

Seeding method shall be Hydroseeding. Seeding procedure shall ensure even coverage. Gravity feed applicators, which drop seed directly from a hopper onto the prepared soil, shall not be used because of the difficulty in achieving even coverage, unless otherwise approved. Absorbent polymer powder shall be mixed with the dry seed at the rate recommended by the manufacturer.

#### 3.3.2 Hydroseeding

Seed and fertilizer shall be added to water and thoroughly mixed to meet the rates specified. The time period for the seed to be held in the slurry shall be a maximum one hour. Wood cellulose fiber mulch and tackifier shall be added at the rates recommended within these specifications with the seed, fertilizer, water and thoroughly mixed to produce a homogeneous slurry. Slurry shall be uniformly applied under pressure over the entire area. The hydroseeded area shall not be rolled.

##### 3.3.2.1 Cobble Areas

For areas of predominant cobble (rock) seed shall be hydro seeded with an even application of an aqueous slurry of decomposed wood derivatives or recycled compost and other amendments as recommended by the soil test. Decomposed wood or compost shall be applied at 4 tons per acre. This application method applies only to the high cobble areas of the terrace and the associated slopes from the overbank to the terrace area. This method of application shall allow the aqueous slurry to create the seedbed under, around and in between the cobble areas and not be conducive for the mulch and seed mix to adhere to the surface of the cobble areas. The Contracting Officer shall be consulted in reference to the cobble areas.

##### 3.3.2.2 Field Soil Areas

For areas of predominant soil fines (sand, silt, clay) seed shall be hydroseeded using cellulose fiber mulch at 200 pounds per acre for slopes up to 3:1, and at 600 pounds per acre for slopes exceeding 3:1. This application method applies only to the field soil areas confined to the overbank area. This standard method of application shall allow the hydroseed mix to create the seedbed on the prepared surface. The

Contracting Officer shall be consulted in reference to the field soil areas.

### 3.3.3 Mulching

#### 3.3.3.1 Straw Mulch

Straw mulch shall be spread uniformly at the rate of 2 tons per acre. Mulch shall be spread by hand, blower-type mulch spreader, or other approved method. Mulching shall be started on the windward side of relatively flat areas or on the upper part of steep slopes, and continued uniformly until the area is covered. The mulch shall not be bunched or clumped. Sunlight shall not be completely excluded from penetrating to the ground surface. All areas installed with seed shall be mulched on the same day as the seeding. Mulch shall be anchored immediately following spreading. All straw mulch shall be Arizona grown, harvested and packaged for use per Article MULCH of this Specification.

#### 3.3.3.2 Mechanical Anchor

Mechanical anchor shall be a V-type-wheel land packer; a scalloped-disk land packer designed to force mulch into the soil surface; or other suitable equipment. Where practicable all areas of straw mulch shall be affixed by crimping with a mechanical anchor. Straw mulch shall be crimped to an average depth in the soil of 2 inches. Immediately following crimping straw shall be tacked using a non-asphaltic tackifier.

#### 3.3.3.3 Non-Asphaltic Adhesive Tackifier

Plantago tackifier shall be applied at 150 pounds per acre (USP method swell volume of 30 ml per gm) for slopes less than 3:1 and at 200 pounds per acre for slopes exceeding 3:1 in an aqueous slurry combined with cellulose fiber mulch.

#### 3.3.3.4 Wood Cellulose Fiber, Paper Fiber, and Recycled Paper

Wood cellulose fiber, paper fiber, or recycled paper shall be applied as part of the hydroseeding operation. The mulch shall be mixed and applied in accordance with the manufacturer's recommendations. Cellulose fiber mulch meeting the requirements herein shall be applied in an aqueous slurry with non-asphaltic tackifier at 500 pounds per acre for slopes less than 3:1 and at 750 pounds per acre for slopes greater than 3:1.

#### 3.3.3.5 Mulching Areas Designated for Seed

Areas of predominant cobble (rock) shall require no additional mulch beyond that used for the hydroseeding process described above. Areas of predominant soil (sand, silt, clay) shall be mulched with straw and affixed as specified within. Straw shall be affixed by mechanical anchor and applying an even slurry over the straw of cellulose fiber mulch and non-asphaltic tackifier.

### 3.3.4 Watering Seed

Contractor shall be required to develop a temporary irrigation system, see

Section 02811, UNDERGROUND SPRINKLER SYSTEMS, to apply irrigation to all seeded areas for establishment and acceptance by Agency. Submit method to Contracting Officer for approval prior to installing temporary seeding irrigation system.

Watering shall be started immediately after completing the seeding of an area. Water shall be applied to supplement rainfall at a rate sufficient to ensure moist soil conditions to a minimum 6 inch depth. Run-off and puddling shall be prevented. Watering trucks shall not be driven over turf areas, unless otherwise directed. Watering of other adjacent areas or plant material shall be prevented.

### 3.4 SURFACE EROSION CONTROL

#### 3.4.1 Surface Erosion Control Material

Where indicated or as directed, surface erosion control material shall be installed in accordance with manufacturer's instructions. Placement of the material shall be accomplished without damage to installed material or without deviation to finished grade.

### 3.5 QUANTITY CHECK

For materials provided in bags, the empty bags shall be retained for recording the amount used. For materials provided in bulk, the weight certificates shall be retained as a record of the amount used. The amount of material used shall be compared with the total area covered to determine the rate of application used. Differences between the quantity applied and the quantity specified shall be adjusted as directed.

### 3.6 APPLICATION OF PESTICIDE

When application of a pesticide becomes necessary to remove a pest or disease, a pesticide treatment plan shall be submitted to the Contracting Officer and coordinated with the installation pest management program. All applications conform with all the Federal, State and City regulations and Sections 01355, ENVIRONMENTAL PROTECTION and 01356, STORM WATER POLLUTION PREVENTION MEASURES, of these specifications.

#### 3.6.1 Technical Representative

The certified installation pest management coordinator shall be the technical representative, and shall be present at all meetings concerning treatment measures for pest or disease control. They may be present during treatment application.

#### 3.6.2 Application

A state certified applicator shall apply required pesticides in accordance with EPA label restrictions and recommendations and Sections 01355, ENVIRONMENTAL PROTECTION and 01356, STORM WATER POLLUTION PREVENTION MEASURES, of these specifications. Clothing and personal protective equipment shall be used as specified on the pesticide label. A closed system is recommended as it prevents the pesticide from coming into contact

with the applicator or other persons. Water for formulating shall only come from designated locations. Filling hoses shall be fitted with a backflow preventer meeting local plumbing codes or standards. Overflow shall be prevented during the filling operation. Prior to each day of use, the equipment used for applying pesticide shall be inspected for leaks, clogging, wear, or damage. Any repairs are to be performed immediately. A pesticide plan shall be submitted.

### 3.7 RESTORATION AND CLEAN UP

#### 3.7.1 Restoration

Existing turf areas, pavements, and facilities that have been damaged from the seeding operation shall be restored to original condition at Contractor's expense.

#### 3.7.2 Clean Up

Excess and waste material shall be removed from the seeded areas and shall be disposed offsite. Adjacent paved areas shall be cleaned.

### 3.8 PROTECTION OF INSTALLED AREAS

Immediately upon completion of the seeding operation in an area, the area shall be protected against traffic or other use by erecting barricades and providing signage as required, or as directed.

### 3.9 SEED ESTABLISHMENT PERIOD

#### 3.9.1 Commencement Seeding

The seed establishment period to obtain a healthy stand of plants shall begin on the first day of seeding work under this contract and shall continue through the remaining life of the contract and end 12 months after the last day of the seeding operation required by this contract. Written calendar time period shall be furnished by the Contractor to the Contracting Officer for the seed establishment period. When there is more than 1 seed establishment period, the boundaries of the seeded area covered for each period shall be described. The seed establishment period shall be coordinated with Section 02930 EXTERIOR PLANTING. The seed establishment period shall be modified for inclement weather, shut down periods, or for separate completion dates of areas.

#### 3.9.2 Lawn Sodding Commencement

Sod establishment period begins immediately after sod is delivered and installed on the site. The maintenance of lawn areas begins immediately after each area is sodded and continues until acceptable lawn is established, but for not less than the following periods:

1. Sodded Lawns: 90 days after date of Final Acceptance.
2. When full maintenance period has not elapsed before end of planting season, or if lawn is not fully established at that time,

continue maintenance during next planting/growing season for warm weather sod.

Maintain and establish lawns by watering, fertilizing, weeding, mowing, trimming, replanting, and other operations. Roll, regrade, and replant bare or eroded areas and remulch to produce a uniformly smooth lawn. All lawns shall be uniform in color leaf texture shoot density and be reasonably free of visible imperfections at acceptance. A proper stand of turf will be defined as a minimum of 100 grass plants per square foot and where no gaps are larger than 4 inches in diameter.

### 3.9.3 Satisfactory Stand of Plants

Plants shall be evaluated for species and health when the plants are a minimum 1 inch high.

#### 3.9.3.1 Lawn Area

A satisfactory stand of grass plants from the sodding operation for a lawn area shall be a minimum 100 grass plants per square foot. Bare spots shall be a maximum 6 inches square. The total bare spots shall be a maximum 2 percent of the total sodded area.

#### 3.9.3.2 Seeded Area

A satisfactory stand of seeded plant areas shall be composed of a minimum of three perennial plants per square yard and bare areas shall not exceed 12% of the total seed area.

### 3.9.4 Maintenance During Establishment Period

Maintenance of the seeded areas shall include removing competitive weeds, insects and diseases; protecting embankments and ditches from surface erosion; maintaining erosion control materials and mulch; protecting installed areas from traffic; mowing; watering; and post-fertilization.

#### 3.9.4.1 Mowing

Lawn areas shall be mowed to a minimum 3 inch height when the turf is a maximum 4 inches high. Clippings shall be removed when the amount cut prevents sunlight from reaching the ground surface.

#### 3.9.4.2 Post-Fertilization

The fertilizer shall be applied as recommended by the soil test. All fertilizer shall be applied in accordance with Sections 01355, ENVIRONMENTAL PROTECTION and 01356, STORM WATER POLLUTION PREVENTION MEASURES, of these specifications.

#### 3.9.4.3 Pesticide Treatment

Treatment for disease or pest shall be in accordance with paragraph APPLICATION OF PESTICIDE.

3.9.4.4 Repair or Reinstall

Unsatisfactory stand of turf grass, native seeded plants and unequal distribution of mulch shall be repaired, re-seeded or reinstalled, and eroded areas shall be repaired in accordance with paragraph SITE PREPARATION.

3.9.4.5 Maintenance Record

A record of each site visit shall be furnished, describing the maintenance work performed; areas repaired or reinstalled; and diagnosis for unsatisfactory stand of grass plants.

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SECTION 02930

EXTERIOR PLANTING

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI A300 (1995) Tree Care Operations - Trees, Shrubs and Other Woody Plant Maintenance

AMERICAN NURSERY AND LANDSCAPE ASSOCIATION (ANLA)

ANLA Z60.1 (1996) Nursery Stock

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM D 4972 (1995a) pH of Soils

ASTM D 5268 (1992; R 1996) Topsoil Used for Landscaping Purposes

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Shop Drawings; G, RE

Scale drawings defining areas to receive plant materials.

Finished Grade, Topsoil and Underground Utilities; G, RE

Finished grade status; location of underground utilities and facilities; and availability of topsoil from the stripping and stock piling operation.

SD-03 Product Data

## Chemical Treatment Material; G, RE

Contractor shall supply Manufacturer's literature including physical characteristics, application and installation instructions for chemical treatment material. All chemical treatment shall comply with Sections 01355, ENVIRONMENTAL PROTECTION and 01356, STORM WATER POLLUTION PREVENTION MEASURES of these specifications.

## Maintenance Record; G

Maintenance work performed, quantity of plant losses, and replacements; and diagnosis of unhealthy plant material.

A written record shall be furnished to the Contracting Officer of the maintenance work performed each week including quantity of plant losses, replacements, and diagnosis of any unhealthy plant materials and the prescribed treatment.

## Equipment; G, RE

A listing of equipment to be used for the planting operation.

Equipment Lists: Following Contractor's review and approval, submit to the Contracting Officer 6 complete lists of major items of landscape equipment and materials, within 30 calendar days after date of Agreement. Submit all items at one time. Partial list will not be acceptable. Submittals shall include the Manufacturer's Specifications, weights, space requirements, physical dimensions, rating of equipment and supplemental information requested by the Contracting Officer. Where a submittal sheet describes items in addition to that item being submitted, delete such items. Clearly note equipment and materials which deviate from those shown or specified in size, weight, required clearances, and location of access. Modifications to the Work as shown or specified in submittals shall be indicated and shall be provided by the Contractor as a part of the Work.

## Delivery; G, RE

Delivery schedule.

All trees and shrubs identified on the plans for this project will be supplied and delivered to the project by the Government. The Government supplier for the trees and shrubs is Mountain States Wholesale Nursery of Litchfield Park, Arizona. The contact is Jean Cote. All aquatic plant material shall be supplied by the Contractor per Section 02846, WETLANDS PLANTING of these specifications.

## Plant Establishment Period; G, RE

Calendar time period for the plant establishment period. When there is more than one establishment period, the boundaries of the

planted areas covered for each period shall be described by the Contractor and approved by the Contracting Officer.

Application of Pesticide; G

Contractor shall submit pesticide treatment plan with sequence of treatment work with dates and times. The pesticide trade name, EPA registration number, chemical composition, formulation, concentration of original and diluted material, application rate of active ingredients, method of application, area treated, amount applied; and the name and state license number of the state certified applicator shall be included.

SD-04 Samples

Delivered Topsoil; G

Samples taken from several locations at the source.

Soil Amendments; G

A 10 pound sample.

Mulch; G

A 10 pound sample.

SD-06 Test Reports

Soil Test; G

Percolation Test; G

Certified reports of inspections and laboratory tests, prepared by an independent testing agency, including analysis and interpretation of test results. Each report shall be properly identified. Test methods used and compliance with recognized test standards shall be described.

SD-07 Certificates

Plant Material; G

Topsoil; G

pH Adjuster; G

Fertilizer; G

Organic Material; G

Soil Conditioner; G

Organic Mulch; G

Mycorrhizal Fungi Inoculum; G

Pesticide; G

Prior to delivery of materials, certificates of compliance attesting that materials meet the specified requirements. Certified copies of the material certificates shall include the following.

- a. Plant Material: Classification, botanical name, common name, size, quantity by species, and location where grown.
- b. Topsoil: Particle size, pH, organic matter content, textural class, soluble salts, chemical and mechanical analyses.
- c. pH Adjuster: Sieve analysis and calcium carbonate equivalent.
- d. Fertilizer: Chemical analysis and composition percent.
- e. Organic Material: Composition and source.
- f. Soil Conditioner: Composition and source.
- g. Organic Mulch: Composition, source, and treatment against fungi growth.
- h. Mycorrhizal Fungi Inoculum: Plant material treated.
- i. Pesticide. EPA registration number and registered uses.

SD-10 Operation and Maintenance Data

Maintenance Instructions; G

Instruction for year-round care of installed plant material.

1.3 GENERAL REQUIREMENTS

The water used during Plant Establishment to properly maintain the plant material will be furnished in accordance with Section 01200 GENERAL REQUIREMENTS. No additional water service will be provided and the Contractor shall not create a new water service without the Contracting Officers' approval. The Contractor shall be responsible for all equipment and labor necessary to load, transport and unload water for watering plants.

The Contractor shall notify the Contracting Officer and obtain prior approval for the use of any chemicals for weed eradication or control. See Chemical Treatment Material of this specification.

During the second half of the Landscaping Establishment period, the Contractor shall provide plant material replacements from Contracting Officer approved location as follows:

Original Size	Replacement Size
1 gallon	5 gallon
5 gallon	15 gallon
15 gallon	15 gallon
24 inch box	36 inch box

Ocotillos, Prickly pear, and shall be replaced with one size range up from

their original planting size.

Plant material replacement shall be considered incidental to the landscaping establishment and shall be made at no charge to the Government.

The Contractor shall apply four (4) applications of an approved pre-emergent herbicide on only those areas of the terrace designated on the plans to receive decomposed granite or rock mulch. The application shall be as specified here in including but not limited to the following schedule of applications: Initial application immediately following subgrade preparation for Granite areas during the granite preparation phase of the project. The second application shall occur at time of granite placement and prior to water settling operation of the project. The third application shall occur six (6) months into the maintenance period of the contract period of the Project. And the fourth and final application 30 days prior to completion of the projects maintenance period. The watering of the pre-emergent shall be according to the manufacturer's recommendation and shall be included in each application. The pre-emergent herbicide shall be applied in accordance with all manufacturer specifications and application data and in conformance with all Federal, State and local regulations and Sections 01355, ENVIRONMENTAL PROTECTION and 01356, STORM WATER POLLUTION PREVENTION MEASURES of these specifications. Contractor shall submit data to the Contracting Officer for approval prior to placement and use of pre-emergents.

Supply of the trees and shrubs for this project by the Government does not relieve the Contractor of his responsibility for establishment, maintenance, and warranty of all plants that will be specified elsewhere in these Specifications.

Immediately prior to planting, all ocotillo, and other cactus shall require a thorough application of agricultural streptomycin bactericide to the roots of the stock. Agricultural streptomycin shall have a minimum active ingredient of 21.2% (equivalent to 17% streptomycin) and 78.8% inert ingredients.

All pesticide applications shall comply with Sections 01355, ENVIRONMENTAL PROTECTION and 01356, STORM WATER POLLUTION PREVENTION MEASURES of these specifications.

Treatment for disease or pest shall be in accordance with all Federal, State and City of Phoenix rules and regulations and Sections 01355, ENVIRONMENTAL PROTECTION and 01356, STORM WATER POLLUTION PREVENTION MEASURES of these specifications. As feasible, Contractor should seek cultural and biological control solutions which do not depend on chemical applications for the eradication of insects, mites, snails, nematodes, and small animals (squirrels and gophers). Trapping should be utilized unless prescribed in writing by a licensed pest control advisor. Performed method shall be approved by the Contracting Officer prior to initiation of any pesticide treatment or pesticide program.

Soil amendments shall be applied per the directions and application rates specified. Soil shall be prepared using a mixture of 70% excavated site soil and 30% soil conditioner and amendments. Clods or stones exceeding 2

inches in diameter and foreign matter deemed objectionable by the Contracting Officer will not be allowed. All excess soil excavated from the plant pits that has clods or stones 2 inches and larger shall be disposed of on the project site and foreign material shall be removed from site in accordance with Section 01355, ENVIRONMENTAL PROTECTION. Amendment materials shall be mixed with the soil conditioner after they are delivered to the project site. No pre-mixing will be allowed prior to delivery to the project site. No additional payment will be made for this work and is considered as part of the planting operation.

The type and application rate of organic mulch materials shall be as specified on the plans, supplied soils test or within these specifications.

#### 1.4 SOURCE INSPECTIONS

The nursery or source of plant material and the source of delivered topsoil shall be subject to inspection.

#### 1.5 DELIVERY, INSPECTION, STORAGE, AND HANDLING

##### 1.5.1 Delivery

A delivery schedule for plant material delivery from the Government's supplier (Mountain States Wholesale Nursery) shall be coordinated with said nursery and Contracting Officer and shall be prepared when the Contractor is prepared to accept, maintain, protect and take possession and responsibility of plant material. A delivery schedule shall be provided at least 10 calendar days prior to the first day of delivery to the Contracting Officer.

##### 1.5.1.1 Plant Material Identification

Plant material shall be identified with attached, durable, waterproof labels and weather-resistant ink, stating the correct botanical plant name and size.

##### 1.5.1.2 Delivered Topsoil

Prior to the delivery of any topsoil, the availability of topsoil shall be verified in paragraph TOPSOIL. A soil test shall be provided for delivered topsoil.

##### 1.5.1.3 Soil Amendments

Soil amendments shall be delivered to the site in the original, unopened containers bearing the manufacturer's chemical analysis. In lieu of containers, soil amendments may be furnished in bulk. A chemical analysis shall be provided for bulk deliveries. All soil amendments shall comply with Specification Section 01355, ENVIRONMENTAL PROTECTION.

##### 1.5.1.4 Pesticide Material

Pesticide material shall be delivered to the site in the original, unopened containers bearing legible labels indicating the Environmental Protection

Agency (EPA) registration number and the manufacturer's registered uses. All pesticides shall be stored, protected and secured according to all applicable Federal, State and local regulations.

#### 1.5.2 Inspection

Plant material as furnished by the Government shall be well shaped, vigorous and healthy with a healthy, well branched root system, free from disease, harmful insects and insect eggs, sun-scald injury, disfigurement or abrasion. Plant material shall be checked for unauthorized substitution and to establish nursery grown status. Plant material showing desiccation, abrasion, sun-scald injury, disfigurement, or unauthorized substitution shall be rejected. The plant material shall exhibit typical form of branch to height ratio; and meet the caliper and height measurements specified. Plant material that measures less than specified, or has been poled, topped off or headed back, shall be rejected. Container-grown plant material shall show new fibrous roots and the root mass shall contain its shape when removed from the container. Plant material with broken or cracked balls; or broken containers shall be rejected. Bare-root plant material that is not dormant or is showing roots were pulled from the ground shall be rejected. Upon acceptance of plant material to the project site Contractor assumes full responsibility for the plant material. Other materials shall be inspected for compliance with paragraph PRODUCTS. Open soil amendment containers or wet soil amendments shall be rejected. Topsoil that contains slag, cinders, stones, lumps of soil, sticks, roots, waste or other material larger than 1-1/2 inch diameter shall be rejected. Topsoil that contains viable plant material and plant parts shall be rejected. Unacceptable material shall be immediately removed from the job site one (1) day after rejection.

#### 1.5.3 Storage

##### 1.5.3.1 Plant Material Storage

Plant material not installed on the day of arrival at the site shall be stored and protected in designated areas located on the project site as approved by the Contracting Officer. Plant material shall not be stored longer than 30 days. Plant material shall be protected from direct exposure to wind and sun. Bare-root plant material shall be heeled-in. All plant material shall be kept in a moist condition by watering with a fine mist spray until installed.

##### 1.5.3.2 Other Material Storage

Storage of other material shall be in designated secure areas and shall comply with all Federal, State and local regulations and shall comply with Section 01355, ENVIRONMENTAL PROTECTION. Soil amendments shall be stored in dry locations and away from contaminants. Chemical treatment material shall be stored and secured according to all Federal, State and local regulations and manufacturer's instructions and not with planting operation material.

#### 1.5.4 Handling

Plant material shall not be injured in handling. Cracking or breaking the earth ball of balled and burlapped plant material shall be avoided. Plant material shall not be handled by the trunk or stems. Materials shall not be dropped from vehicles.

#### 1.5.5 Time Limitation

Except for container-grown plant material, the time limitation from digging to installing plant material shall be a maximum 30 days. The time limitation between installing the plant material and placing the mulch shall be a maximum 24 hours.

#### 1.6 WARRANTY

Furnished plant material shall have a warranty for plant growth to be in a vigorous growing condition for a minimum 12 month period. A minimum 12 month calendar time period for the warranty of plant growth shall be provided regardless of the contract time period. When plant material is determined to be unhealthy in accordance with paragraph PLANT ESTABLISHMENT PERIOD, it shall be replaced once under this warranty. Replacement plant material shall only be allowed from a source approved by the Contracting Officer.

### PART 2 PRODUCTS

#### 2.1 PLANT MATERIAL

##### 2.1.1 Plant Material Classification

The plant material furnished by the Government shall be nursery grown stock conforming to ANLA Z60.1 and shall be the species specified.

##### 2.1.2 Plant Schedule

The plant schedule shall provide botanical names as included in one or more of the publications listed under "Nomenclature" in ANLA Z60.1.

##### 2.1.3 Substitutions

Substitutions will not be permitted without written request and approval from the Contracting Officer.

##### 2.1.4 Quality

Well shaped, well grown, vigorous plant material having healthy and well branched root systems in accordance with ANLA Z60.1 shall be provided by the City of Phoenix. Plant material shall be provided free from disease, harmful insects and insect eggs, sun-scald injury, disfigurement and abrasion. Plant material shall be free of shock or damage to branches, trunk, or root systems, which may occur from the digging and preparation for shipment, method of shipment, or shipment. Plant quality is determined by the growing conditions; method of shipment to maintain health of the root system; and growth of the trunk and crown as follows. The following information is provided so that the Contractor can inspect and accept full

responsibility for all plant material delivered to the site by the Government. The information that follows are the guidelines that the Contractor should use in evaluating the supplied plant material.

#### 2.1.5 Growing Conditions

Plant material shall be native to or well-suited to the growing conditions of the project site. Plant material shall be grown under climatic conditions similar to those at the project site. All plant material sources must be approved by the Contracting Officer.

#### 2.1.6 Method of Shipment to Maintain Health of Root System

##### 2.1.6.1 Bare-Root (BR) Plant Material

Minimum root spread shall be in accordance with ANLA Z60.1. A well branched root system characteristic of the species specified shall be provided. Roots shall not be pulled from the ground. Bare-root plant material shall be inoculated with mycorrhizal fungi during germination in the nursery. Before shipment the root system shall be dipped in gels containing mycorrhizal fungi inoculum. Bare-root plant material shall be dormant. The root system shall be protected from drying out.

##### 2.1.6.2 Container-Grown (C) Plant Material

Container size shall be in accordance with ANLA Z60.1. Plant material shall be grown in a container over a duration of time for new fibrous roots to have developed and for the root mass to retain its shape and hold together when removed from the container. Container-grown plant material shall be inoculated with mycorrhizal fungi during germination in the nursery. Before shipment the root system shall be dipped in gels containing mycorrhizal fungi inoculum. The container shall be sufficiently rigid to hold ball shape and protect root mass during shipping.

#### 2.1.7 Growth of Trunk and Crown

##### 2.1.7.1 Deciduous Trees

A height to caliper relationship shall be provided in accordance with ANLA Z60.1. Height of branching shall bear a relationship to the size and species of tree specified and with the crown in good balance with the trunk. The trees shall not be "poled" or the leader removed.

- a. Single stem: The trunk shall be reasonably straight and symmetrical with crown and have a persistent main leader.
- b. Multi-stem: All countable stems, in aggregate, shall average the size specified.
- c. Specimen: The tree provided shall be well branched and pruned naturally according to the species. The form of growth desired, which shall be in accordance with its natural growth habit.

##### 2.1.7.2 Deciduous Shrubs

Deciduous shrubs shall have the height and number of primary stems recommended by ANLA Z60.1. Acceptable plant material shall be well shaped, with sufficient well-spaced side branches, and recognized by the trade as typical for the species grown in the region of the project.

#### 2.1.7.3 Ground Cover and Vine Plant Material

Ground cover and vine plant material shall have the minimum number of runners and length of runner recommended by ANLA Z60.1. Plant material shall have heavy, well developed and balanced crown with vigorous, well developed root system and shall be furnished in containers.

#### 2.1.8 Plant Material Size

All plant material shall be furnished by the City of Phoenix in sizes indicated. Plant material larger in size than specified may be provided at no additional cost to the Government.

#### 2.1.9 Plant Material Measurement

Plant material measurements shall be in accordance with ANLA Z60.1.

### 2.2 TOPSOIL

Topsoil for use on all turf and planting areas and as part of the backfill shall be as defined in ASTM D 5268. When available, the topsoil shall be the existing surface soil stripped and stockpiled onsite in accordance with Section 02300 EARTHWORK. When additional topsoil is required beyond the available topsoil from the stripping operation, topsoil shall be delivered and amended as recommended and in compliance with Section 02921 SEEDING, Article 2.2 Topsoil.

#### 2.2.1 Materials

When a source of topsoil is not designated, the contractor shall furnish a source in accordance with the requirements herein and the requirements of Arizona Residential Soil Cleanup levels and standards. Topsoil from sources furnished by the contractor shall conform to the following requirements:

- a. Prior to hauling any topsoil to the project site, the contractor shall furnish a written soil analysis, prepared by a laboratory approved by the Contracting Officer, for each source of topsoil proposed for use. The soil analysis shall indicate the pH, soluble salts, percent calcium carbonate, exchangeable sodium in percent and parts per million, plasticity index and size gradation. A minimum of three samples per each 10,000 cubic yards, with at least three samples per source, shall be tested. All tests shall be performed in accordance with the following requirements and test procedures listed in the Table below. The contractor shall bear the expense of any topsoil testing from proposed sources.
- b. Topsoil shall be fertile, friable soil obtained from well drained

arable land which has or is producing healthy crops, grasses or other vegetation. It shall be free draining, non-toxic and capable of sustaining healthy plant growth.

- c. Topsoil shall be reasonably free of subsoil, refuse, roots, heavy clay, clods, noxious weed seeds, phytotoxic materials, coarse sand, large rocks, sticks, brush, litter and other deleterious substances.
- d. For acceptance purposes, each approximate 20,000 cubic yards or topsoil material delivered from a given source to the project site shall be considered a lot. For each lot of topsoil, six representative samples shall be taken at random locations designated by the Contracting Officer. Topsoil shall be sampled after final placement. Each source of topsoil shall be tested separately. The samples from each lot shall be tested by the Contracting Officer for pH, soluble salts, calcium carbonate, exchangeable sodium in percentage and parts per million, P.I., and gradation in accordance with the test procedures listed in the Table below.
- e. The average test result obtained for each characteristic from each lot shall meet the following requirements:

Characteristics	Test Method	Requirement Average of 6 Samples
pH	ARIZ 237	6.0 - 8.3
Soluble Salts: (PPM)	ARIZ 237	2000 Maximum
Calcium Carbonate	ARIZ 732	8% Maximum
Exchangeable Sodium:	ARIZ 729	5% Maximum
Exchangeable Sodium: (PPMP)	ARIZ 729	300 Maximum
P.I.	AASHTO T 90	5 - 20
Gradation:	ARIZ 201	% Passing
2 inch		100
1/2 inch		85 - 100
No. 40		35 - 100

- f. If the average test result for a lot fails to meet all the specifications listed above, the material from that lot shall be rejected. In lieu of removal and replacement, the contractor may propose for the Contracting Officer's consideration a method of treatment of the in-place material to obtain specification compliance. Provided the Contracting Officer approves, the topsoil shall be treated at no additional cost to the Department.
- g. The lot shall then be resampled and tested for specification compliance by the Contracting Officer.
- h. If the pH of the topsoil for a lot exceeds 8.3, the topsoil shall either be removed and replaced, or be treated as provided for in the preceding paragraph. Any treatment for pH shall be sufficient to obtain an average pH between 6.0 and 8.0, inclusive. The treatment for pH shall follow the recommendations of a recognized soil analyst and shall be subject to the approval of the Contracting Officer. Any treatment for pH shall be at no additional cost to the Department.

Additional acceptance testing after treatment for pH will not be required.

#### 2.2.2 Construction Requirements

Topsoil shall be spread uniformly on the designated turf areas and areas directed by the Contracting Officer to the depths or contours shown on the plans. The contractor shall avoid over-compaction in spreading and shaping operations. Scarification shall be required for over-compacted areas and haul roads. When topsoil is placed over subgrade material as plating, the subgrade shall be scarified or disked to a six-inch depth prior to placement of the topsoil.

#### 2.3 SOIL AMENDMENTS

Soil amendments shall consist of pH adjuster, fertilizer, organic material and soil conditioners meeting the following requirements. Vermiculite is not recommended. All soil amendments and applications shall comply with Sections 01355 ENVIRONMENTAL PROTECTION and 01356 STORM WATER POLLUTION PREVENTION MEASURES of these specifications.

##### 2.3.1 pH Adjuster

The pH adjuster shall be an agricultural sulfur material. The pH adjuster shall be used to create a favorable soil pH for the plant material specified.

##### 2.3.2 Fertilizer

Fertilizer shall be controlled release commercial grade; free flowing, pellet or tablet form; uniform in composition; and consist of a nitrogen-phosphorus-potassium ratio. The fertilizer shall be derived from sulphur coated urea, urea formaldehyde, plastic or polymer coated pills, or isobutylenediurea (IBDU). Fertilizer shall be balanced with the inclusion of trace minerals and micro-nutrients.

##### 2.3.3 Organic Material

Organic material shall consist of either decomposed wood derivatives, or recycled compost.

###### 2.3.3.1 Decomposed Wood Derivatives

Decomposed wood derivatives shall be ground bark, sawdust, or other wood waste material free of stones, sticks, and toxic substances harmful to plants, and stabilized with nitrogen.

###### 2.3.3.2 Recycled Compost

Compost shall be a well decomposed, stable, weed free organic matter source. It shall be derived from food, agricultural, or industrial residuals; biosolids (treated sewage sludge); yard trimmings; or source-separated or mixed solid waste. The compost shall possess no objectionable odors and shall not resemble the raw material from which it

was derived. The material shall not contain substances toxic to plants. Gradation: The compost material shall pass through a 3/8 inch screen, possess a pH of 5.5 to 8.0, and have a moisture content between 35-55 percent by weight. The material shall not contain more than 1 percent or less by weight of man-made foreign matter. Compost shall be cleaned of plastic materials larger than 2 inches in length. The Contractor shall comply with EPA requirements in accordance with Section 01355, ENVIRONMENTAL PROTECTION

#### 2.3.4 Soil Conditioner

**Soil conditioner shall be sand, calcined clay, or gypsum for single use or in combination to meet topsoil requirements for the plant material specified.**

##### 2.3.4.1 Sand

Sand shall be clean and free of toxic materials. Gradation: A minimum 95 percent by weight shall pass a No. 10 sieve and a minimum 10 percent by weight shall pass a No. 16 sieve. Greensand shall be balanced with the inclusion of trace minerals and nutrients.

##### 2.3.4.2 **DELETED**

##### 2.3.4.3 Gypsum

Gypsum shall be commercially packaged, free flowing, and a minimum 95 percent calcium sulfate by volume.

#### 2.4 MULCH

Mulch shall be free from weeds, mold, and other deleterious materials. Mulch materials shall be native to the region. Rotted manure is not recommended to be used as a mulch because it would encourage surface rooting of the plant material and weeds.

##### 2.4.1 Inorganic Mulch

Decomposed Granite color shall be "Apache Brown" as produced by Granite Express or approved equal. Please see plans for location of inert materials. The approved granite colors shall come from a single source. All granite material shall be sampled for color and gradation by the Contracting Officer. All samples must be approved for color and gradation prior to placement.

Granite shall be placed as shown on the plans.

Decomposed granite shall be shall be as follows: 1/4 inch minus for all

stabilized surfaces and 2 inches minus for all other designated granite areas.

The grading requirements for decomposed granite within the project as identified on the plans shall be as follows:

DECOMPOSED GRANITE 1/4" MINUS

<u>Sieve Size</u>	<u>Percent Passing</u>
1/4 inch	100
No. 40	5-20

DECOMPOSED GRANITE 2" MINUS

<u>Sieve Size</u>	<u>Percent Passing</u>
2 inch	100
1/2 inch	60-80
1/4 inch	45-65
No. 40	5-20

Rock mulch around all drain inlets, swales, for erosion control shall be crushed and angular in form. The grading requirements shall be as follows:

ROCK MULCH

<u>Rock Size</u>	<u>Percent Passing</u>
4 inch	100
2 inch	25-75
1 inch	0-10

The color of the rock mulch shall match the color of the adjacent decomposed granite.

Prior to placing decomposed granite, and rock mulch, the areas shall be totally free of grasses and weeds. When using herbicides, the work shall be in accordance with all applicable Federal, State and Local Municipality rules and regulations. All dead grass and weeds shall be removed and disposed of by the contractor as approved by the Contracting Officer. The contractor shall repair eroded areas and compact soil as approved by the Contracting Officer. The finish subgrade for the Decomposed Granite and Rock Mulch areas shall be compacted to 85-90% of the maximum density. The contractor shall employ the use of all necessary grading equipment, earth moving and compacting machinery, water applications, and approved methods to adequately compact the grade on which the decomposed granite and rock mulch are to be placed. Compaction shall be completed to the approval of the Contracting Officer prior to the placement of any inert materials. Contractor shall apply per manufacturer instructions and Engineers approval to the finish grade the first of two (2) applications of an approved pre-emergent herbicide. The first application shall be applied to the subgrade prior to placing the specified granite or rock mulch.

The finish subgrade, before placement of the decomposed granite and or rock mulch, shall be compacted to a density of 85% - 90% of the maximum density as determined in accordance with the requirements of the City of Phoenix

Materials Testing Manual.

All vehicles used for spreading, grading and raking the decomposed granite and or rock mulch shall have one set of wheels with flotation tires having a minimum width of 18 inches to allow equal compaction of the rock mulch.

After rough spreading and rough grading of the decomposed granite and or rock mulch within the designated areas, the decomposed granite and or rock mulch shall be raked to evenly blend the different gradation sizes in the decomposed granite and or rock mulch. Following approval of the Contracting Officer, the decomposed granite and or rock mulch shall be saturated with water to an optimum moisture level. The Contracting Officer will approve the amount of water necessary to aid in the compaction of the decomposed granite and or rock mulch.

The decomposed granite and or rock mulch shall be placed to a minimum depth of two inches, except in planting pits. Where decomposed granite and or rock mulch is within the planting pits, the maximum depth shall be one inch.

During the final spreading and final grading operations, all surfaces within the decomposed granite and or rock mulch areas shall be passed over by the spreading and grading equipment a minimum of two times. All 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 all the surface.

The pre-emergent herbicide shall be applied in compliance with Sections 01355, ENVIRONMENTAL PROTECTION and 01356, STORM WATER POLLUTION PREVENTION MEASURES of these specifications and activated in the manner recommended by the manufacturer to prevent germination of noxious weeds, and shall be 'Gallery' 'Surflan' or approved equal. The pre-emergent herbicide shall be applied to the decomposed granite, and rock mulch areas and shall occur at a minimum of two (2) times during the Phase I portion of the contract. The first application shall be applied to the subgrade prior to placement of the granite and the second application shall occur before the final water settling operation of the granite areas.

After placing, spreading and grading the decomposed granite and or rock mulch, the contractor shall water settle the total thickness of the decomposed granite and or rock mulch, removing the fine material from the surface. The water settling operation shall be completed at the minimum rate of one-half inch of water and shall occur within 21 days after application of the pre-emergent herbicide.

Rock furnished by the contractor shall be obtained from a single source.

The contractor shall prepare a sample area of approximately 100 square feet of both the decomposed granite and rock mulch for the Contracting Officer's approval. The sample area may be part of the area requiring decomposed granite or rock mulch and this sample once approved, will be used by the Contracting Officer to determine the acceptability of the remaining work under this item.

#### 2.4.2 Organic Mulch

Organic mulch materials shall be native to the project site and consist of recycled mulch, shredded bark, wood chips, or ground bark.

#### 2.4.2.1 Recycled Mulch

Recycled mulch may include compost, tree trimmings, or pine needles with a gradation that passes through a 2-1/2 x 2-1/2 inch screen. It shall be cleaned of all sticks a minimum 1 inch in diameter and plastic materials a minimum 3 inch length. The material shall be treated to retard the growth of mold and fungi. Other recycled mulch may include peanut shells, pecan shells or coco bean shells.

#### 2.4.2.2 Shredded Bark

Locally shredded material shall be treated to retard the growth of mold and fungi.

### 2.5 WOOD STAKING MATERIAL

Wood stakes shall be hardwood or fir; rough sawn; free from knots, rot, cross grain, or other defects that would impair their strength.

#### 2.5.1 Bracing Stake

Wood bracing stakes shall be a minimum 2 x 2 inch square and a minimum 8 feet long with a point at one end. Stake shall be set without damaging rootball.

#### 2.5.2 Wood Ground Stakes

Wood ground stakes shall be a minimum of 2 x 2 inch square and a minimum 3 feet long with a point at one end.

#### 2.5.3 Deadmen

Wood deadmen shall be a minimum 4 x 4 x 36 inches long.

### 2.6 METAL STAKING AND GUYING MATERIAL

Metal shall be aluminum or steel consisting of recycled content made for holding plant material in place.

#### 2.6.1 Bracing Stakes

Metal bracing stakes shall be a minimum 1 inch diameter and a minimum 8 feet long. Stake shall be set without damaging rootball.

#### 2.6.2 Metal Ground Stakes

Metal ground stakes shall be a minimum 1/2 inch diameter and a minimum 3 feet long.

#### 2.6.3 Earth Anchor

Metal earth anchors shall be a minimum 1/2 inch diameter and a minimum 2 feet long.

#### 2.6.4 Guying Material

Metal guying material shall be a minimum 12 gauge wire. Multi-strand cable shall be woven wire. Guying material tensile strength shall conform to the size of tree to be held firmly in place.

#### 2.6.5 Turnbuckle

Metal turnbuckles shall be galvanized or cadmium-plated steel, and shall be a minimum 3 inches long with closed screw eyes on each end. Screw thread tensile strength shall conform to the size of tree to be held firmly in place.

### 2.7 PLASTIC STAKING AND GUYING MATERIAL

Plastic shall consist of recycled plastic product made for holding plant material firmly in place. Plastic shall not be used for deadmen.

#### 2.7.1 Plastic Bracing Stake

Plastic bracing stakes shall be a minimum 2 inch diameter and a minimum 8 feet long. Stake shall be set without damaging rootball.

#### 2.7.2 Plastic Ground Stakes

Plastic ground stakes shall be a minimum 1 inch diameter and a minimum 3 feet long.

#### 2.7.3 Plastic Guying Material

Plastic guying material shall be designed specifically for the purpose of firmly holding plant material in high wind velocities.

#### 2.7.4 Chafing Guard

Plastic chafing guards shall be used to protect tree trunks and branches when metal is used as guying material. The material shall be the same color throughout the project site. Length shall be a minimum 1.5 times the circumference of the plant trunk at its base.

### 2.8 RUBBER GUYING MATERIAL

Rubber chafing guards, consisting of recycled material, shall be used to protect tree trunks and branches when metal guying material is applied. The material shall be the same color throughout the project. Length shall be a minimum 1.5 times the circumference of the plant trunk at its base.

### 2.9 FLAG

Plastic flag material shall be used on guying material. It shall be a

minimum 6 inches long. Tape color shall be consistent and visually complimentary to the entire project area. The tape color shall meet pedestrian visual safety requirements for day and night.

#### 2.10 TREE ROOT BARRIERS

Tree root barriers shall be metal or plastic consisting of recycled content. Barriers shall utilize vertical stabilizing members to encourage downward tree root growth. Barriers shall limit, by a minimum 90 percent, the occurrence of surface roots. Tree root barriers which are designed to be used as plant pit liners will be rejected.

#### 2.11 MYCORRHIZAL FUNGI INOCULUM

Mycorrhizal fungi inoculum shall be composed of multiple-fungus inoculum as recommended by the manufacturer for the plant material specified.

#### 2.12 WATER

All water for exterior planting will be furnished according to Section 01200 GENERAL REQUIREMENTS unless the automatic irrigation system is approved for use by the Contracting Officer.

#### 2.13 PESTICIDE

Pesticide shall be insecticide, herbicide, fungicide, nematocide, rodenticide or miticide. For the purpose of this specification a soil fumigant shall have the same requirements as a pesticide. The pesticide material shall be EPA registered and approved. Applications of any pesticide shall comply with Sections 01355 ENVIRONMENTAL PROTECTION and 01356 STORM WATER POLLUTION PREVENTION MEASURES of these specifications.

### PART 3 EXECUTION

#### 3.1 INSTALLING PLANT MATERIAL TIME AND CONDITIONS

##### 3.1.1 Deciduous Plant Material Time

Deciduous plant material shall be installed from March 15 to October 15 unless approved by the Contracting Officer.

##### 3.1.2 Evergreen Plant Material Time

Evergreen plant material shall be installed from March 15 to October 15 unless approved by the Contracting Officer.

##### 3.1.3 Plant Material Conditions

Planting operations shall be performed only during periods when beneficial results and water can be obtained. When excessive moisture, or other unsatisfactory conditions prevail, the work shall be stopped when directed.

When special conditions warrant a variance to the planting operations, proposed planting times shall be submitted for approval.

### 3.1.4 Tests

#### 3.1.4.1 Percolation Test

Test for percolation shall be done to determine positive drainage of plant pits and beds. A positive percolation shall consist of a minimum 1 inch per 3 hours; when a negative percolation test occurs, a shop drawing shall be submitted indicating the corrective measures.

#### 3.1.4.2 Soil Test

Delivered topsoil, excavated plant pit soil, and stockpiled topsoil shall be tested in accordance with "Arizona Residential Cleanup" levels and standards, ASTM D 5268 and ASTM D 4972 for determining the particle size, pH, organic matter content, textural class, chemical analysis, soluble salts analysis, and mechanical analysis. Sample collection onsite shall be random over the entire site. Sample collection for stockpiled topsoil shall be at different levels in the stockpile. The soil shall be free from debris, noxious weeds, toxic substances, or other materials harmful to plant growth. The test shall determine the quantities and type of soil amendments required to meet local growing conditions for the plant material specified. Any corrective measures as outlined by the Contractor and approved by the Contracting Officer shall occur at no additional charge to the Government.

### 3.2 SITE PREPARATION

#### 3.2.1 Finished Grade, Topsoil and Underground Utilities

The Contractor shall verify that finished grades are as indicated on drawings, and that the placing of topsoil, the smooth grading, and the compaction requirements have been completed in accordance with Section 02300 EARTHWORK, prior to the commencement of the planting operation. The location of underground utilities and facilities in the area of the planting operation shall be verified. Damage to underground utilities and facilities shall be repaired at the Contractor's expense.

#### 3.2.2 Layout

Plant material locations shall be staked on the project site before any excavation is made. Plant material locations may be adjusted to meet field conditions.

#### 3.2.3 Protecting Existing Vegetation

Existing trees and shrubs that are to be preserved shall be barricaded along the dripline to protect them during planting operations. Contractor shall protect existing materials or face the fines per Section 01355 ENVIRONMENTAL PROTECTION.

### 3.3 EXCAVATION

#### 3.3.1 Obstructions Below Ground

When obstructions below ground affect the work, shop drawings showing proposed adjustments to plant material location, type of plant and planting method shall be submitted for approval. In the event that waste material is discovered within the plant pit the Contractor shall contact the Contracting Officer immediately and comply with Sections 01355, ENVIRONMENTAL PROTECTION and 01356 STORM WATER POLLUTION PREVENTION MEASURES of these specifications.

### 3.3.2 Plant Pits

Plant pits for ball and burlapped or container plant material shall be dug to a depth equal to the height of the root ball as measured from the base of the ball to the base of the plant trunk. Plant pits for bare-root plant material shall be dug to a depth equal to the height of the root system. Plant pits shall be dug three times wider than the ball or root system to allow for root expansion. The pit shall be constructed with sides sloping towards the base as a cone, to encourage well aerated soil to be available to the root system for favorable root growth. Cylindrical pits with vertical sides shall not be used.

## 3.4 INSTALLATION

### 3.4.1 Setting Plant Material

Plant material shall be set plumb and held in position until sufficient soil has been firmly placed around root system or ball. In relation to the surrounding grade, the plant material shall be set even with the grade at which it was grown.

#### 3.4.1.1 Bare-Root Plant Material

Bare-root plant material shall be placed in water a minimum 30 minutes prior to setting.

#### 3.4.2 Backfill Soil Mixture

The backfill soil mixture may be a mix of topsoil and soil amendments suitable for the plant material specified. When practical, the excavated soil from the plant pit that is not amended provides the best backfill and shall be used.

#### 3.4.3 Adding Mycorrhizal Fungi Inoculum

Mycorrhizal fungi inoculum shall be added as directed by the Contracting Officer for the plant material specified.

#### 3.4.4 Backfill Procedure

Prior to backfilling, all metal, wood, synthetic products, or treated burlap devices shall be removed from the ball or root system avoiding damage to the root system. The backfill procedure shall remove air pockets from around the root system. Additional requirements are as follows.

##### 3.4.4.1 Bare-Root Plant Material

The root system shall be spread out and arranged in its natural position. Damaged roots shall be removed with a clean cut. The backfill soil mixture shall be carefully worked in amongst the roots and watered to form a soupy mixture. Air pockets shall be removed from around the root system, and root to soil contact shall be provided.

#### 3.4.4.2 Container-Grown and Balled and Potted Plant Material

The plant material shall be carefully removed from containers that are not biodegradable. Prior to setting the plant in the pit, a maximum 1/4 depth of the root mass, measured from the bottom, shall be spread apart to promote new root growth. For plant material in biodegradable containers the container shall be split prior to setting the plant with container. Backfill mixture shall be added to the plant pit in 6 inch layers with each layer tamped.

#### 3.4.4.3 Earth Berm

An earth berm that is of the same size and diameter of the plant pit specified in Article 3.3.2, consisting of backfill soil mixture, shall be formed with a minimum 4 inch height around the edge of the plant pit to aid in water retention and to provide soil for settling adjustments.

#### 3.4.5 Plant Bed

Plant material shall be set in plant beds according to the drawings. Backfill soil mixture shall be placed on previously scarified subsoil to completely surround the root balls, and shall be brought to a smooth and even surface, blending to existing areas. Earth berms shall be provided. Polymers shall be spread uniformly over the plant bed and in the planting pit as recommended by the manufacturer and thoroughly incorporated into the soil to a maximum 4 inch depth.

#### 3.4.6 Watering

Plant pits and plant beds shall be watered immediately after backfilling, until completely saturated. A regular watering schedule shall be established. Slow deep watering shall be used. Run-off and puddling shall be prevented.

#### 3.4.7 Staking and Guying

Staking will be required when trees are unstable or will not remain set due to their size, shape, or exposure to high wind velocity.

##### 3.4.7.1 One Bracing Stake

Trees 4 to 6 feet high shall be firmly anchored in place with one bracing stake. The bracing stake shall be placed on the side of the tree facing the prevailing wind. The bracing stake shall be driven vertically into firm ground and shall not injure the ball or root system. The tree shall be held firmly to the stake with a double strand of guying material. The

guying material shall be firmly anchored at a minimum 1/2 tree height and shall prevent girdling. A chafing guard shall be used when metal is the guying material.

#### 3.4.7.2 Two Bracing Stakes

Trees from 6 to 8 feet height shall be firmly anchored in place with 2 bracing stakes placed on opposite sides. Bracing stakes shall be driven vertically into firm ground and shall not injure the ball or root system. The tree shall be held firmly between the stakes with a double strand of guying material. The guying material shall be firmly anchored at a minimum 1/2 tree height and shall prevent girdling. Chafing guards shall be used when metal is the guying material.

#### 3.4.7.3 Three Ground Stakes

Trees over a minimum 8 feet height and less than a maximum 6 inch caliper shall be held firmly in place with 3 bracing or ground stakes spaced equidistantly around the tree. Ground stakes shall be avoided in areas to be mowed. Stakes shall be driven into firm ground outside the earth berm. The guying material shall be firmly anchored at a minimum 1/2 tree height and shall prevent girdling. For trees over maximum 3 inch diameter at breast height, turnbuckles shall be used on the guying material for tree straightening purposes. One turnbuckle shall be centered on each guy line. Chafing guards shall be used when metal is the guying material.

#### 3.4.8 Deadmen or Earth Anchors

Trees over a minimum 6 inch caliper shall be held firmly in place with wood deadmen buried a minimum 3 feet in the ground or metal earth anchors. Multi-strand cable guying material shall be firmly anchored at a minimum 1/2 tree height and shall prevent girdling. Turnbuckles shall be used on the guying material for tree straightening purposes. One turnbuckle shall be centered on each guy line. Chafing guards shall be used.

#### 3.4.9 Flags

A flag shall be securely fastened to each guy line equidistant between the tree and the stake, deadmen, or earth anchor. The flag shall be visible to pedestrians.

### 3.5 FINISHING

#### 3.5.1 Plant Material

Prior to placing mulch, the installed area shall be raked and shaped as indicated while maintaining the earth berms.

#### 3.5.2 Placing Mulch

The placement of mulch shall occur a maximum 48 hours after planting. Mulch, used to reduce soil water loss, regulate soil temperature and prevent weed growth, shall be spread to cover the installed area with a minimum 2 inch uniform thickness. Mulch shall be kept out of the crowns of

shrubs, ground cover, and vines and shall be kept off buildings, sidewalks and other facilities.

### 3.5.3 Pruning

Pruning shall be accomplished by trained and experienced personnel and only as directed by the Contracting Officer. The pruning of trees shall be in accordance with ANSI A300. Only dead or broken material shall be pruned from installed plants. The typical growth habit of individual plant material shall be retained. Clean cuts shall be made flush with the parent trunk. Improper cuts, stubs, dead and broken branches shall be removed. "Headback" cuts at right angles to the line of growth will not be permitted. Trees shall not be poled or the leader removed, nor shall the leader be pruned or "topped off".

### 3.6 MAINTENANCE DURING PLANTING OPERATION

Installed plant material shall be maintained in a healthy growing condition. Maintenance operations shall begin immediately after each plant is installed to prevent desiccation and shall continue until the plant establishment period commences. Installed areas shall be kept free of weeds, grass, and other undesired vegetation. The maintenance includes maintaining the mulch, watering, and adjusting settling.

### 3.7 APPLICATION OF PESTICIDE

When application of a pesticide becomes necessary to remove a pest or disease, a pesticide treatment plan shall be submitted and coordinated with the installation pest management program. All pesticide shall comply with Sections 01355, ENVIRONMENTAL PROTECTION and 01356, STORM WATER POLLUTION PREVENTION MEASURES of these specifications and all Federal, State and City regulations.

#### 3.7.1 Technical Representative

The State certified pest management applicator shall be the technical representative, and shall be present at all meetings concerning treatment measures for pest or disease control. They may be present during treatment application.

#### 3.7.2 Application

A state certified applicator shall apply required pesticides in accordance with EPA label restrictions and recommendations Sections 01355, ENVIRONMENTAL PROTECTION and 01356, STORM WATER POLLUTION PREVENTION MEASURES of these specifications. Clothing and personal protective equipment shall be used as specified on the pesticide label. A closed system is recommended as it prevents the pesticide from coming into contact with the applicator or other persons. Water for formulating shall only come from designated locations. Filling hoses shall be fitted with a backflow preventer meeting local plumbing codes or standards. Overflow shall be prevented during the filling operation. Prior to each day of use, the equipment used for applying pesticide shall be inspected for leaks, clogging, wear, or damage. Any repairs are to be performed immediately.

### 3.8 RESTORATION AND CLEAN UP

#### 3.8.1 Restoration

Pavements and facilities that have been damaged from the planting operation shall be restored to original condition at the Contractor's expense.

#### 3.8.2 Clean Up

Excess and waste material shall be removed from the installed area and shall be disposed offsite. Adjacent paved areas shall be cleared.

### 3.9 PLANT ESTABLISHMENT PERIOD

#### 3.9.1 Commencement

The plant establishment period for maintaining exterior plantings in a healthy growing condition shall commence on the first day of exterior planting work under this contract and shall continue through the remaining life of the contract and end 12 months after substantial completion and acceptance by the Contracting Officer of exterior planting required by this contract. Written calendar time period shall be furnished for the plant establishment period. When there is more than one plant establishment period, the boundaries of the planted area covered for each period shall be described. The plant establishment period shall be coordinated with Section 02921 SEEDING. The plant establishment period shall be modified for inclement weather shut down periods, or for separate completion dates for areas.

#### 3.9.2 Maintenance During Establishment Period

Maintenance of plant material shall include straightening plant material, straightening stakes; tightening guying material; correcting girdling; supplementing mulch; pruning dead or broken branch tips; maintaining plant material labels; watering; eradicating weeds, insects and disease; post-fertilization; and removing and replacing unhealthy plants.

##### 3.9.2.1 Watering Plant Material

The plant material shall be watered as necessary to prevent desiccation and to maintain an adequate supply of moisture within the root zone. Run-off, puddling and wilting shall be prevented. Unless otherwise directed, watering trucks shall not be driven over turf areas. Watering of other adjacent areas or existing plant material shall be prevented.

##### 3.9.2.2 Weeding

Weeds in the installed areas shall not be allowed to reach a maximum 3 inches height before being completely removed, including the root system.

##### 3.9.2.3 Pesticide Treatment

Treatment for disease or pest shall be in accordance with paragraph

## APPLICATION OF PESTICIDE.

## 3.9.2.4 Post-Fertilization

The plant material shall be topdressed at least once during the period of establishment with controlled release fertilizer, reference paragraph SOIL AMENDMENTS. Apply at the rate of 2 pounds per 100 square feet of plant pit or bed area. Dry fertilizer adhering to plants shall be flushed off. The application shall be timed prior to the advent of winter dormancy.

## 3.9.2.5 Plant Pit Settling

When settling occurs to the backfill soil mixture, additional backfill soil shall be added to the plant pit or plant bed until the backfill level is equal to the surrounding grade. Serious settling that affects the setting of the plant in relation to the maximum depth at which it was grown requires replanting in accordance with paragraph INSTALLATION. The earth berm shall be maintained. All fertilizer applications shall comply with Sections 01355, ENVIRONMENTAL PROTECTION and 01356, STORM WATER POLLUTION PREVENTION MEASURES of these specifications.

## 3.9.2.6 Maintenance Record

A record shall be furnished describing the maintenance work performed, the quantity of plant losses, diagnosis of the plant loss, and the quantity of replacements made on each site visit.

## 3.9.3 Unhealthy Plant Material

A tree shall be considered unhealthy or dead when the main leader has died back, or up to a maximum 25 percent of the crown has died. A shrub shall be considered unhealthy or dead when up to a maximum 25 percent of the plant has died. This condition shall be determined by scraping on a branch an area 1/16 inch square, maximum, to determine if there is a green cambium layer below the bark. The Contractor shall determine the cause for unhealthy plant material and shall provide recommendations for replacement.

Unhealthy or dead plant material shall be removed immediately and shall be replaced as soon as seasonal conditions permit.

## 3.9.4 Replacement Plant Material

Unless otherwise directed, plant material shall be provided for replacement in accordance with paragraph PLANT MATERIAL. Replacement plant material shall only be provided from Contracting Officer approved locations and installed in accordance with paragraph INSTALLATION, and recommendations in paragraph PLANT ESTABLISHMENT PERIOD. Plant material shall be replaced in accordance with paragraph WARRANTY. An extended plant establishment period shall not be required for replacement plant material.

## 3.9.5 Maintenance Instructions

Written instructions shall be furnished containing drawings and other necessary information for year-round care of the installed plant material; including, when and where maintenance should occur, and the procedures for

plant material replacement.

-- End of Section --